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FOOD PROTECTION TRENDS

SCIENCE AND NEWS

FROM THE
INTERNATIONAL ASSOCIATION
FOR FOOD PROTECTION

FEBRUARY 2004



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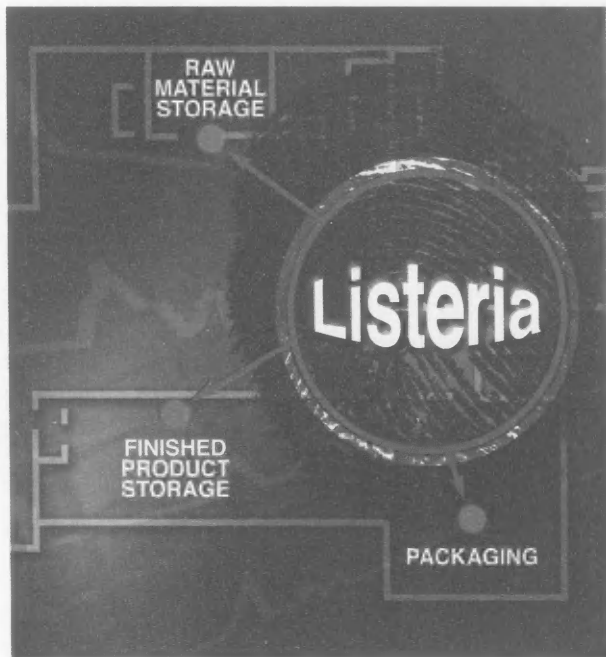
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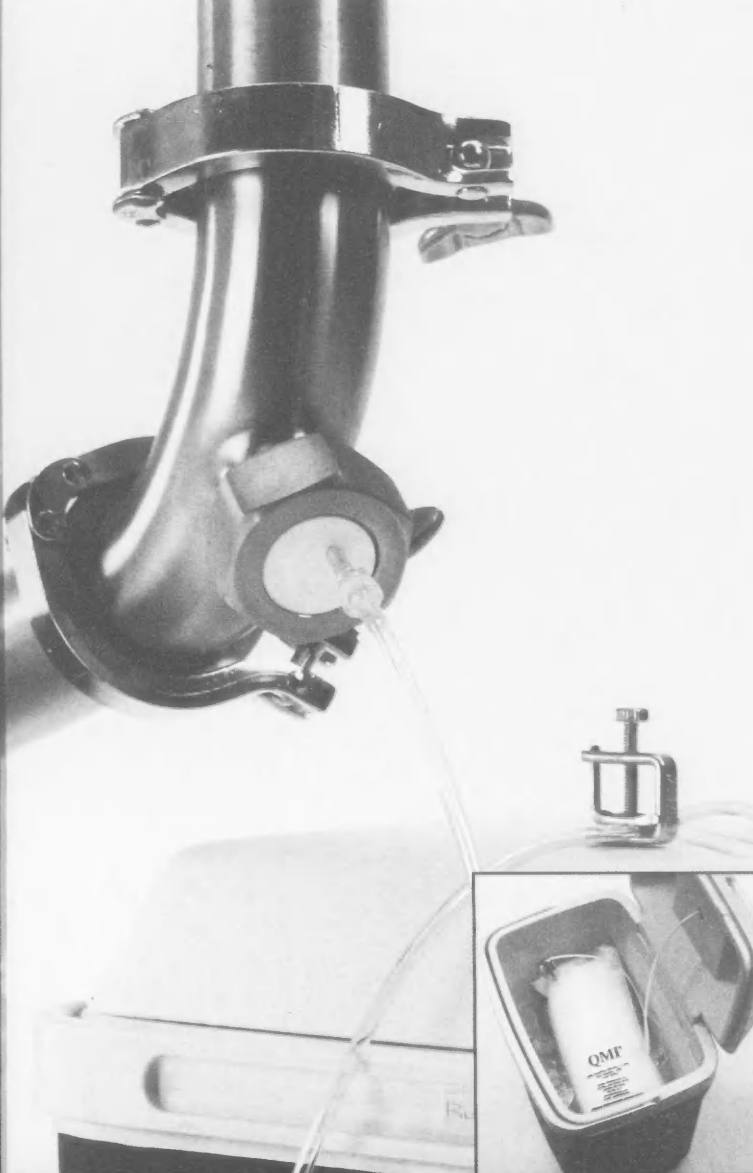
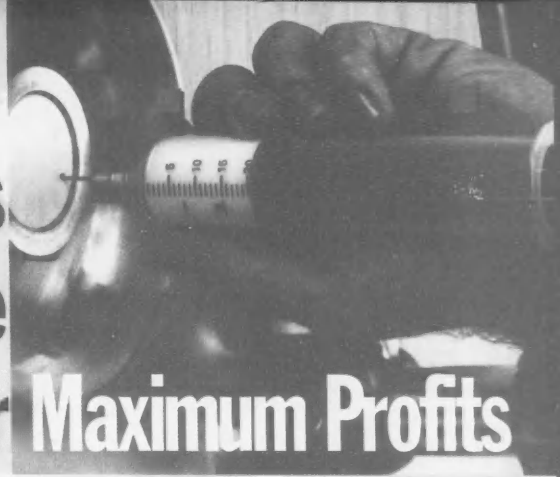
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FOOD PROTECTION TRENDS

VOLUME 24, NO. 2

■ ARTICLES

- 70** **Strategies to Control Vibrios in Molluscan Shellfish**
L. S. Andrews
- 77** **Comparison of Three Media Used to Estimate Psychrotrophic Bacterial Counts in Milk**
A. A. Glueck-Chaloupka and C. H. White
- 82** **Consumers' Attitudes toward Open Dating of USDA-regulated Foods**
Sheryl C. Cates, Katherine M. Kosa, Robert C. Post, and Jeff Canavan

■ ASSOCIATION NEWS

- 64** Sustaining Members
- 66** President's Perspective
- 68** Commentary from the Executive Director
- 110** New Members

■ DEPARTMENTS

- 111** Updates
- 112** News
- 117** Industry Products
- 127** Coming Events
- 129** Career Services Section
- 131** Advertising Index

■ EXTRAS

- 90** Food Safety and Fresh Produce
- 92** Award Nominations
- 94** 2004–2005 Secretary Election
- 97** Audiovisual Library Listing
- 121** IAFP 2004 Proposed Symposia
- 122** IAFP 2004 Networking Opportunities
- 123** IAFP 2004 Event Information
- 126** IAFP 2004 Registration Form
- 130** *Journal of Food Protection* Table of Contents
- 135** Booklet Order Form
- 136** Membership Application

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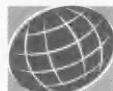
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"PRESIDENT'S" PERSPECTIVE

If you're like me, the two journals that are a must read each month are the *Journal of Food Protection* and *Food Protection Trends*. All of us have busy schedules and it's difficult to carve out enough time to read the plethora of scientific journals and trade publications that cross our desks or E-mails each month. The *Journal of Food Protection*, since its introduction in 1937, has grown to become internationally recognized as the leading publication in the field of food microbiology and safety with a readership of over 11,000 scientists from over 69 countries around the globe. The *Journal of Food Protection* brings you the most up-to-date, original research reports and reviews addressing critical issues in the area of food safety. In 2003, the *Journal of Food Protection* received over 600 submitted papers, a 20% increase over 2002. This phenomenal growth in manuscript submissions is a testament to the strength and importance of the *Journal of Food Protection* to our profession. Our three Scientific Editors, Mike Davidson, Joe Frank, and John Sofos are to be commended for the job they do in managing the content of the *Journal of Food Protection*. I am grateful for their dedication and hard work in making the *Journal of Food Protection* the premier publication in our profession. I am also grateful to the over 125 IAFP members who serve on the *Journal of Food Protection* Editorial Board. Without the volunteer commitment of these busy professionals, our journal would not be what it is today.



By **PAUL HALL**
PRESIDENT

"Science in Our Brave New World"

The other journal that I make it a point to read each month is *Food Protection Trends* (no, not just to see any pretty face or read my own columns!). *Food Protection Trends* is published as the general membership publication of your association and it contains peer-reviewed articles on applied research, applications of current technology and general interest articles for our membership. It is also a major communication tool for your association, listing upcoming meetings and workshops and association news and

official business. *Food Protection Trends* is read by over 9,000 professionals around the world. The Scientific Editor of *Food Protection Trends* is Bill LaGrange, who is also to be commended for the job he does every month in managing the scientific content of the journal. I am also grateful to the over 50 IAFP members who serve on the *Food Protection Trends* Editorial Board. Without their involvement it would not be possible to produce such a quality publication.

I would be remiss if I did not acknowledge the fine work that Bev Brannen, Administrative Editor, and Didi Loynanchan, Administrative Assistant do for the *Journal of Food Protection*. Donna Bahun, Production Editor, and Pam Wanninger, Proofreader for *Food Protection Trends*, do the same making each of these journals the best in our profession.

Your Executive Board is committed to making each of the journals the best they can be. The complex times in which we live present new challenges rarely seen in the past by our Scientific Editors and reviewers. The publication of sensitive scientific information since the horrible events of 9/11 and the subsequent anthrax letter attacks present challenges few of us in our profession have thought about before. The First Amendment to the US Constitution states that, "Congress shall make no law... abridging the freedom of speech". So how do we ensure compliance

with the first amendment but ensure that information published in our journals won't unwittingly be used by organized terrorists or rogue individuals to commit nefarious acts against society? Your Executive Board, working with our Scientific Editors have taken steps to address this issue by adopting a modified review policy for submitted manuscripts dealing with sensitive issues, such as bioterrorism or food security. While this new policy may not be perfect, it does attempt to bring an appropriate level of scrutiny to manuscripts of a sensitive nature while balancing first amendment rights. The National Research Council issued a report in 2003 entitled "Biotechnology Research

in an Age of Terrorism: Confronting the 'Dual Use' Dilemma". This report recommended that scientists should voluntarily restrict dissemination of information that may aid terrorists. The committee also proposed a continuing dialogue between editors and national security experts to decide what results might be too dangerous to publish. I believe each of us has a responsibility to look at our research with a new perspective. Can this information be unwittingly used to inflict damage on society? If so, is there another way to disseminate the information to those who legitimately need it to do research? I admit

these are not easy questions, however, I believe if we don't take a more critical perspective, then we are unwittingly aiding those who want to do harm. The British Viscountess and politician, Lady Nancy Astor said, "The main dangers in this life are people who want to change everything or nothing". I believe not changing our perspective on the publication of sensitive information to be more selective, is as dangerous as not sharing any information at all. Both extremes are a clear danger to our society in my opinion. Science in our brave new world is not as simple as it once was. As always, please share your thoughts with me at phall@kraft.com. Until next month...

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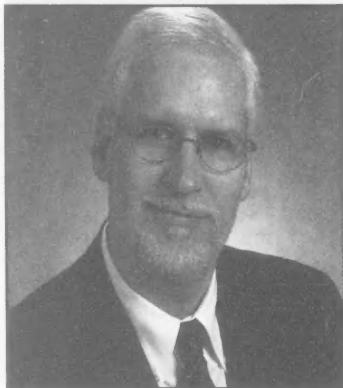
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“COMMENTARY” FROM THE EXECUTIVE DIRECTOR

Handwashing—wash your hands with soap and warm running water. That is the description included with the IAFP International Food Safety Icon for handwashing. Handwashing is so very important to limit the spread of germs and viruses but it is estimated that less than 50% of the population (in the USA) wash their hands often enough and only one in three wash their hands after using the restroom! These results are not acceptable and not what our public health officials want to see, but how can we change people's behavior?

We have all heard pleas from the public health folks telling us the way to reduce spreading the flu or common cold germs is to wash, wash, wash — for at least 20 seconds of vigorous scrubbing. Our mothers most likely told us that years ago as we were growing up (I know that mine did). You would think that with all of this encouragement and the logic that we can reduce illness, everyone would WANT to wash their hands all of the time.

I would think that you, as a food safety professional would be one who “over washes” your hands (washing more often than necessary) and that you “encourage” those around you to do the same. I know in the years I have worked for IAFP, my handwashing has increased exponentially! There are many times that I “remind”



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

“Remember, stress how important handwashing is to public health and to a safe food system.”

my friends and family to wash their hands, whether it is before, during or after food preparation or during a time of high risk for communicable illnesses.

On a recent vacation trip to Los Angeles to view the Tournament of Roses Parade in Pasadena, I was startled by the handwashing experiences I encountered. First, upon arrival at LAX (Los Angeles International Airport), I used the restroom facilities and before exiting, washed my hands. The water

in this particular restroom was ice cold (yes, even in Southern California!). This trend followed in a few of the restaurants that I visited during the week in LA, which was quite surprising to me. The restaurants were very nice, respectable restaurants and some on property of the noted amusement parks in the area.

I made mention of the cold water situation to the manager of one of the restaurants, and my comments were met with a nonchalant, “I’ll look into it.” As I am sure he was busy with “more important” items, I don’t believe that he did look into it, at least not that evening.

Another place where I would think that handwashing would be of utmost importance is at so-called, “temporary events” such as the Tournament of Roses Parade. The Parade organizers had done an excellent job of positioning portable toilet facilities, but I never once saw a portable handwashing station. This again astonished me since there is such an emphasis this year on proper handwashing to prevent the spread of diseases such as the flu. Even in Iowa, my home state, many of the temporary events where portable toilet facilities are made available, organizers provide portable handwashing stations.

Maybe this would be an additional cost for the estimated one million visitors to the Rose

Parade, but it seems that it would be a cost well worth the investment to help our public health! I know that I would be willing to pay an additional dollar or two (less than 3% of the grandstand

seat cost) to have this service available. Maybe then I would not have returned home with a nasty cold, sore throat and chest congestion!

Remember, stress how important handwashing is to

public health and to a safe food system. Thanks for your leadership on this issue! By the way, the Parade was a wonderful experience and we had a great time at this once-in-a-lifetime event.

Announcing

The inaugural "John H. Silliker Lecture"

To be held at IAFP 2004 during a Plenary Session
on Tuesday, August 10, 2004 in Phoenix, Arizona

Featured speaker: R. Bruce Tompkin
Retired Vice President—Product Safety
ConAgra Refrigerated Foods

Presentation Title: "Guess Who's Come to Stay –
The Resident Pathogen Issue"

Tuesday, August 10, 2004
3:45 p.m.

Phoenix, Arizona

***IAFP thanks Silliker, Inc. for their contribution
to the IAFP Foundation in support of this Lecture.***

Strategies to Control *Vibrios* in Molluscan Shellfish

L. S. ANDREWS

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SUMMARY

Pathogenic strains of *Vibrio vulnificus* and *Vibrio parahaemolyticus*, which are natural inhabitants of estuarine environments world wide, are often transmitted to humans through consumption of raw shellfish that flourish in the same estuaries. This review discusses the various control strategies being used to reduce the risk of illness associated with these bacteria. Mitigation strategies have focused on three main areas: education, natural harvesting controls and post harvest treatments or processes.

INTRODUCTION

In the late 1980s *Vibrio vulnificus* emerged as a new foodborne pathogen associated primarily with the consumption of raw oysters. Other *Vibrio* species, e.g., *V. parahaemolyticus* and *V. cholera*, have been associated with severe gastrointestinal illness for many years and have been related primarily to water pollution. These *Vibrio* species cause illness in most individuals exposed to infectious levels. *Vibrio vulnificus* is different in that it is not associated

with water pollution, but rather is naturally present in warm estuarine environments such as the Gulf of Mexico. The severity of illnesses and associated 50% mortality in susceptible individuals has promoted great concern among regulators of shellfish growing waters (14) and health care providers. Although only 20 to 40 illnesses have been reported each year from *V. vulnificus*, those individuals affected and their survivors began a public outcry about how people should be informed of the potential danger of raw oyster con-

sumption and that raw oysters from the Gulf of Mexico should be banned from sale during the warmer summer months. The oyster industry was of course strongly opposed to anything that would affect their livelihood and tried to minimize the problem by noting the low number of illnesses that occur each year. The first illness control strategies to emerge were designed to inform the public without otherwise affecting the marketing and sales of a multimillion dollar fishing industry. Since the first warning signs appeared in 1994, various methods to control *Vibrio* species in shellfish have been researched. This paper is a review of these various strategies.

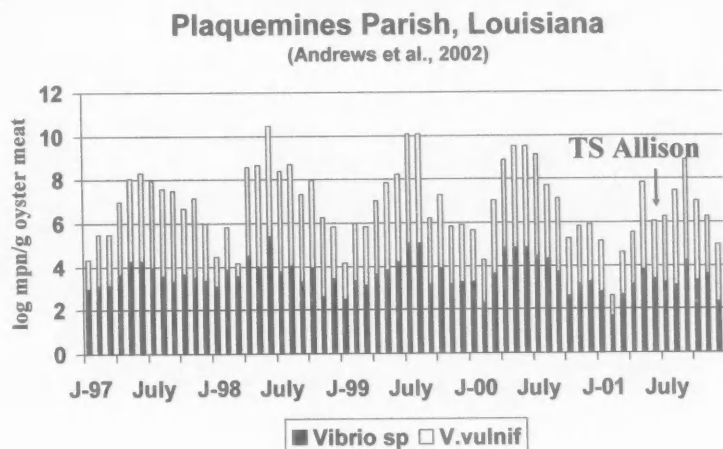
EPIDEMIOLOGY

Vibrio species are classified as Gram-negative halophilic bacteria common to salt waters throughout the world. Most are harmless environmental strains that coexist with other estuarine and marine life. However, a few are pathogenic to humans, capable of causing skin lesions, mild to severe gastrointestinal disorder, or in some cases septicemia resulting in

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FIGURE 1. Survey of *Vibrio* 1997–2001



maining or even death. Most illnesses are caused by ingesting the bacteria, either through contaminated water or by consumption of raw seafood products. Another mode of entry is through cuts or lesions on the skin that have been exposed to raw seafood or to water containing the pathogenic strains, *Vibrio cholera* and *V. parahaemolyticus* are most often associated with water polluted by human waste or by unusual conditions of environmental stress such as that associated with Red Tide. *Vibrio vulnificus*, however, is common to estuarine waters and is not associated with pollution. Consequently, the normal indices used to determine the safety and quality of water and shellfish are not effective in preventing exposure to this pathogen. Most consumers have adequate digestive abilities and immune systems to protect them from illness. Conversely, immunocompromised individuals, such as those suffering from liver disease or diabetes and those undergoing chemotherapy, are highly susceptible to illness. These illnesses are likely to be severe or even fatal because of the rapid progression of the disease. Recent epidemiology reports of all *Vibrio* illnesses have estimated that in the United States alone there

are approximately 8,000 cases with 31 deaths occurring annually (10). In 1999, The Center for Disease Control reported 218 cases of *Vibrio* spp. causing gastroenteritis or septicemia. Ninety-three percent (93%) of these illnesses occurred within 7 days of seafood consumption. Of those, sixty-seven percent (67%) were associated with consumption of raw oysters. Of illnesses associated with raw oysters, 46 cases were from *V. vulnificus* and resulted in 23 deaths; 95 cases were from *V. parahaemolyticus* resulting in one death; *V. cholera* was identified in 33 cases with no deaths; and other *Vibrio* spp. were isolated from 44 cases with no deaths (8). *Vibrio vulnificus* illness data, by the United States Food and Drug Administration, reported 30 illnesses with 18 deaths in 2000; 35 illnesses with 17 deaths in 2001; and 21 cases with 12 deaths in 2002 (11).

INCIDENCE OF *VIBRIO VULNIFICUS*

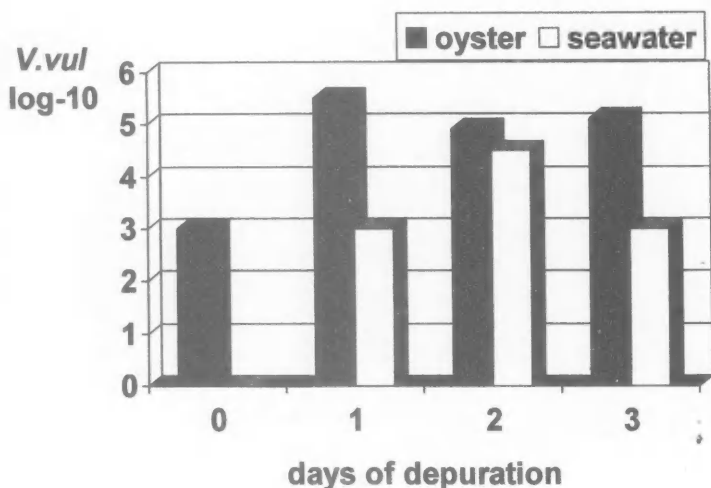
Weekly monitoring of *V. vulnificus* in oysters from reefs in South Louisiana's Plaquemines Parish since 1997 have shown that this organism is present at detectable levels through-

out the year. In the winter months (late December, January and February) levels range from 3 or 4 to 100 mpn/g oyster meat (2). Only rarely are no *V. vulnificus* recovered from these areas. Typically numbers begin to rise in late March and continue to climb to very large numbers (10⁶ mpn/g oyster meat) from June through late September (Fig. 1). Occasionally severe weather conditions bring heavy rain, such as Tropical Storm Allison in June 2001. Following heavy rain, the lower salinity levels in the growing waters causes the *V. vulnificus* numbers to fall to winter levels. Despite the lower winter levels, illnesses and deaths have been reported to occur in nearly every month.

CONTROL STRATEGIES

Prior to the recognition of *V. vulnificus* as a source of severe illness in susceptible individuals, it was believed that normal water quality monitoring by state health regulators was sufficient to prevent illness by a variety of *Vibrio* spp., including *V. cholera* and *V. parahaemolyticus*. Pathogenic strains of *V. cholera* have caused severe gastrointestinal disorder in people who consumed untreated water during periods of heavy rain and flooding that caused large quantities of human waste to pollute the water supply. Today, water quality monitoring is still the first line of defense for preventing illness from bacterial pathogens associated with shellfish. In the late 1980s, *V. vulnificus* was recognized as a pathogenic bacterium associated with shellfish consumption. Prior to that time, many state health officials did not monitor this organism or recognize it as a cause of disease. Starting in the early 1990s, mitigation strategies to control illnesses from *Vibrio* bacteria, particularly *V. vulnificus*, began to emerge and have focused on three main areas: education, natural harvesting

FIGURE 2. Response of *V. vulnificus* to depuration with UV light



controls and post harvest treatments or processes.

Education

The first method used to reduce illness and death associated with *V. vulnificus* was to require consumer warning signs at "point of sale" of shellfish, especially shellfish for raw consumption. Each shellfish "consumption state" has established wording, either using a general warning against consumption of raw or undercooked meats or a specific warning against consumption of raw shellfish. Since that time, the Interstate Shellfish Sanitation Conference (14) has been proactive in developing a variety of educational materials, including consumer bulletins, press releases for newspapers and television, and pamphlets for health care workers. State health authorities have conducted workshops and lectures for consumers and health care providers as well. Unfortunately, over the past decade, these educational strategies have had little impact on the number of illnesses and deaths associated with *V. vulnificus* and *V. parahaemolyticus*. Most shellfish

consumers are not susceptible to *V. vulnificus* illness, because of protection by their own immune systems. The warning signs have caused many healthy people to stop eating raw shellfish. The reduction in shellfish consumption, especially impacting the Gulf of Mexico oyster industry, has resulted in great economic loss by the industry from reduction in sales and market price, but sadly has not resulted in a reduction of illnesses and deaths.

Natural harvesting controls

In an attempt to reduce the numbers of *Vibrios* in oysters prior to marketing, several strategies relating to harvesting practices have been proposed and, in some harvesting states, have been implemented. In Mississippi, oysters for raw half shell consumption are harvested only from mid-September through April. Oyster beds are closed during the warmer summer months and at other times of the year when high river water or heavy rains cause an influx of potentially contaminated water. To date, no illnesses have been reported to occur from consumption of Mississippi

oysters. This may be a result of these harvesting practices or possibly coincidental to the low overall percentage of Gulf oysters from Mississippi that are sold for half shell consumption. The Interstate Shellfish Sanitation Conference (14) and the US Food and Drug Administration (USFDA) have established time-to-temperature regulations (18), that limit the time oysters are held at ambient temperatures prior to refrigeration. Rapid refrigeration has been shown to reduce the rapid increase in *Vibrios* that occurs under ambient summer temperatures (7). However, these regulations have been unsuccessful in reducing illnesses. If illness numbers cannot be reduced by other means, the next proposed time/temperature measure being considered is to require on-board refrigeration for harvesting boats during the warmer months. Two methods for reducing *Vibrio* numbers after initial harvest, taking advantage of natural filtering system of oysters, have been researched with little success. Depuration systems have been used successfully to reduce "indicator" bacteria from filter feeding mollusks. However, depuration for *Vibrio* remediation in oysters has proven largely unsuccessful. In their study, Tamplin and Capers (22) found that depuration with temperatures greater than 23°C caused *V. vulnificus* numbers to increase in the oysters (Fig. 2). Their theory was that "*Vibrio* have evolved commensal or symbiotic association with oysters which make it unamenable to depuration even with UV light water purification". Ozone depuration studies for *V. vulnificus* remediation in southern quahog clams (20) resulted in only 2.7 log mpn/g reduction of the pathogens after 24 hours of ozone depuration treatment. Other natural filtering techniques using offshore relaying systems have produced mixed results. Motes and DePaola (16) reported a reduction of *V. vulnificus* from 3 to 4 log/g oyster meat to < 10/g within

TABLE 1. Effect of various oyster sauces on *V. vulnificus* and aerobic plate counts

Oyster Treatment	<i>V. vulnificus</i>	Total Bacteria
S-Control	1.3×10^4	5.9×10^5
S-Horseradish	1.6×10^4	1.9×10^6
S-Pepper Sauce	** <10	1.6×10^4
W-Control	2.7×10^5	9.2×10^6
W-Horseradish	1.7×10^5	2.9×10^7
W-Pepper Sauce	3.1×10^4	1.9×10^7

S = oyster meat surface

W = within oyster meat

FIGURE 3. Response of *V. vulnificus* to relaying

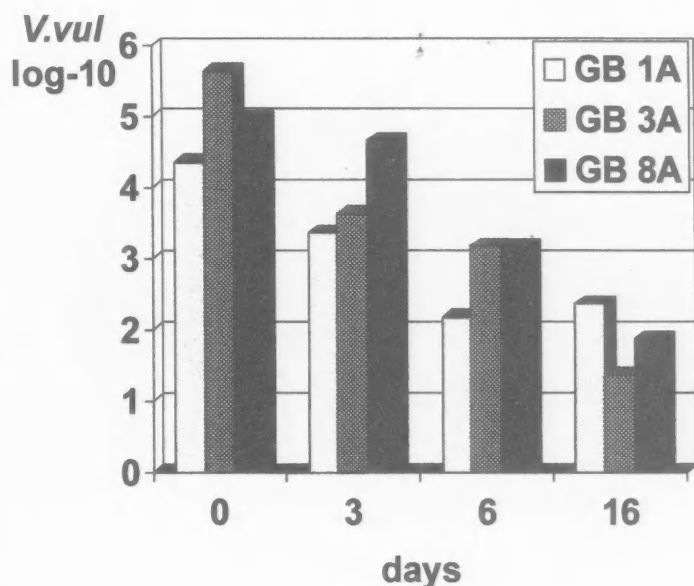
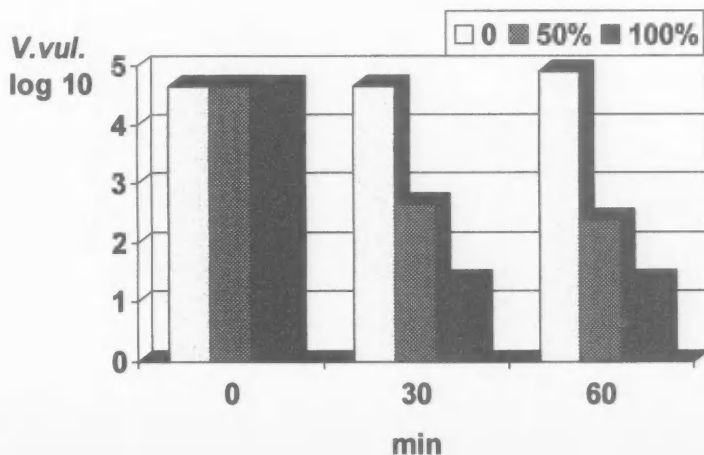


FIGURE 4. Response of *V. vulnificus* to lemon juice



7–17 days at seawater salinities of 30–34 ppt. Longer relaying (17–49 days) resulted in further reduction, to 0.23–2.6 mpn/g. Oysters normally grow in waters with salinities ranging from 10 to 15 ppt and do not tolerate high salinity waters for long periods of relay. In this study, the oysters suffered mortalities of approximately 6%. Another study, by Sea Star System (19), involved relaying oysters into high salinity bayous (19–20 ppt). In Graveline Bayou (GB 1A,3A,8A), *V. vulnificus* levels of 10^5 – 10^7 mpn/g were reduced by 2 to 4 logs over 16 days (Fig. 3). Without being reduced to undetectable levels (< 3 mpn/g), *V. vulnificus* numbers will increase after harvesting, if not placed immediately under refrigeration. In summer months, when natural water temperatures are high and when *Vibrio* numbers reach 10^5 – 10^6 mpn/g, this method would be insufficient to reduce the *Vibrios* to nondetectable levels.

Post harvest (processing) treatments (PHT)

Food processing methods (cooling, brining, and dehydration) for food preservation have been successfully used for over 4,000 years. Until recently, most post harvest processes for preserving and extending shelf life of in-shell and shucked oysters have centered on refrigeration. With the emergence of *V. vulnificus* as a recognized bacterial pathogen naturally present in raw oysters and not related to pollution, research to find other processes to eliminate this pathogen has expanded in new directions. Recent studies include use of chemicals, heat, hydrostatic pressure and irradiation.

Chemical Processes. Chemicals used to reduce *Vibrio* numbers in oysters have included the effects of acetic acid in hot sauces and marinades and natural citric acid in lemon juice. These acid products are commonly consumed with raw half-shell

TABLE 2. D-values for *Vibrio* reduction using hot water pasteurization (52°C)

• D-values

D_{50 + c} values for *Vibrios* in shellstock oysters

• Organism	5 log reduction
• 1.42 min <i>V. vul</i>	7.1 min
• 1.02 min <i>V. para</i>	5.1 min
• 1.56 min <i>V. para</i> 03:K6	7.8 min

*Total cook time = Come up-time and process time

FIGURE 5. Refrigeration response of *V. vulnificus* during storage

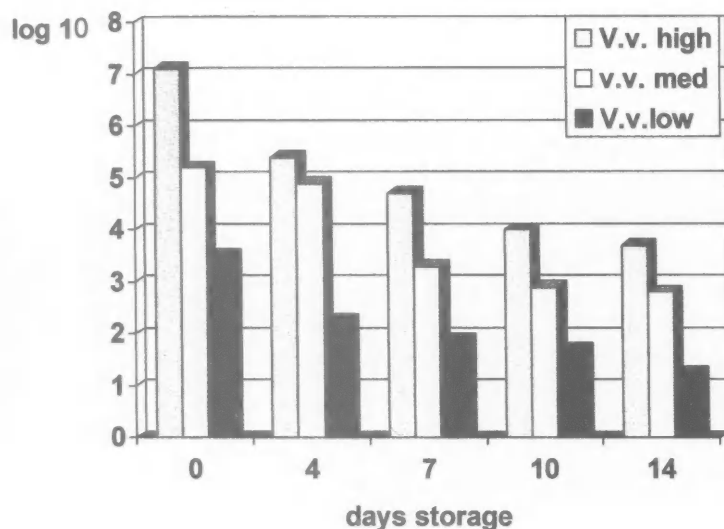
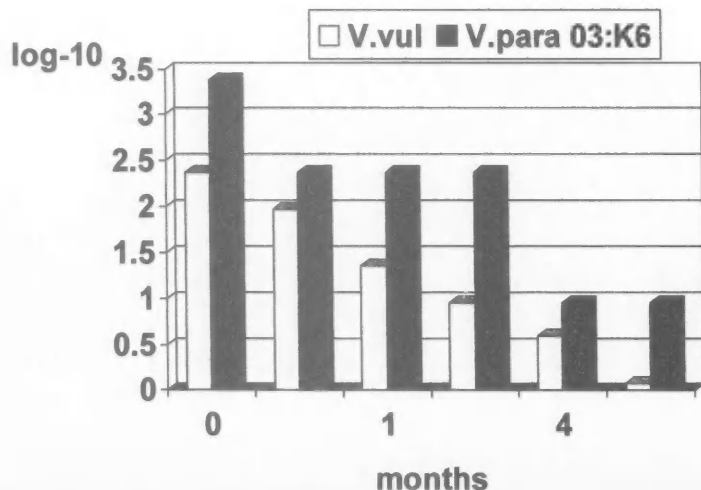


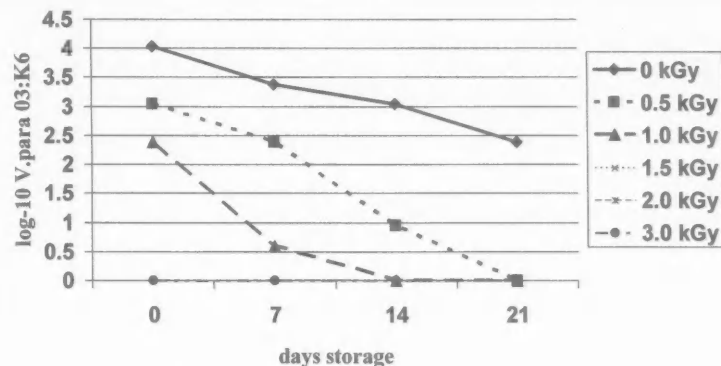
FIGURE 6. Freezing response of *V. vulnificus* during storage



oysters. Sun and Oliver (21) reported some reduction of *V. vulnificus* on the surface of oysters using pepper sauce but not horseradish-style cocktail sauce. *Vibrio* present within the oyster meat were not reduced (Table 1). Borazjani and Andrews (4) were successful in achieving a 1–3 log mpn/g reduction of *V. vulnificus* when oysters were treated with 50 and 100% lemon juice for up to 30 min (Fig. 4).

Thermal Processes. Thermal processes, both cooling and heating, have had varying degrees of success in reducing *V. vulnificus*. Andrews et al. (1), Murphy and Oliver (17), and Cook and Ruple (9) have all reported that storage of shell stock oysters at $\leq 4^\circ\text{C}$ will gradually reduce *V. vulnificus* over time (Fig. 5). Freezing studies by Andrews and DeBlanc (3), and others have shown that long-term storage of half shell oysters at -20°C can successfully reduce low levels of both *V. vulnificus* and *V. parahaemolyticus* to non-detectable levels (Fig. 6). However, when initial concentrations of *Vibrio* are $> 3\text{--}4$ log/g, freezing does not reduce these pathogens to non-detectable levels in a reasonable storage time (< 6 months). Subjecting oysters to hot water temperatures has proven to be very effective in reducing *Vibrios* to nondetectable levels. Heat shocking in-shell oysters to achieve an internal oyster temperature $> 50^\circ\text{C}$ for 1–4 min reduced *V. vulnificus* up to 4 logs (13). An added benefit of heat shock is that the oysters are easier to shuck. Hot water pasteurization at 52°C , of banded in-shell oysters, to achieve an internal temperature of $> 50^\circ\text{C}$ for at least 10 min is able to reduce high levels (10^6 to 10^7 mpn/g oyster meat) of *V. vulnificus* and *V. parahaemolyticus* to nondetectable levels (< 3 mpn/g) (1). Calculated D-values for pasteurization varies with individual strains of *V. vulnificus* and *V. parahaemolyticus*. *Vibrio parahaemolyticus* 03:K6 is the most process-resistant *Vibrio* pathogen stud-

FIGURE 7. Irradiation response of *V. parahaemolyticus* during storage



ited to date (Table 2). As long as processing temperatures do not exceed 52.5°C the oysters maintain a raw-like quality and store well in ice for up to 3 weeks.

Physical Processes. Physical methods of oyster processing represent the most modern of food processing technologies. Both high-pressure processing (HPP) and irradiation processing have been successful in reducing *Vibrios* in shell-stock and shucked oysters. High-pressure processing is a heatless process that can reduce enzymatic activity and the number of microorganisms in foods. The process, in addition, aids in shucking as the shell is "popped open" in the process. To prevent the oyster from falling out of the shell during processing, the shell must be held shut by banding or wrapping. He et al. (12) reported the optimum shucking pressures that caused minimum changes to Pacific oyster appearance were in the range of 240 to 275 MPa. To achieve a 5 log reduction of *V. parahaemolyticus* in Pacific oysters, an HPP treatment of 345 MPa for 120 sec was necessary (5). Irradiation processing of molluscan shellfish has been shown to effectively eliminate even the most resistant *Vibrio* pathogens (2, 15). The advantage of irradiation processing for in-shell oysters is that the oysters are not killed during

the process and, at the low dosages used, the irradiation does not affect the sensory quality (2). *Vibrio parahaemolyticus* 03:K6, the most processing resistant strain of pathogenic *Vibrio*, is effectively eliminated with < 1.5 kGy, even when present in large numbers (Fig. 7). The USDA Office of Market Approval is expected to grant approval for use of irradiation processing on molluscan shellfish in 2003 (6).

CONCLUSION

Vibrio vulnificus was first recognized as an emerging food safety problem in the mid-to-late 1980s. Prior to that, there were occasional outbreaks of illness associated with *V. parahaemolyticus* in raw shellfish. Over the past 20 years, research efforts have focused on a variety of both traditional and innovative processes to reduce the risk of illness associated with these pathogens. These effectively reduce the risk of infection and still provide a quality raw half-shell product. Other current research is focusing on consumer attitudes and acceptability of the various post harvest treated oysters. It is believed that if the industry implements more post harvest processes to reduce the *Vibrio* levels in raw molluscan shellfish, the number of illnesses and deaths will be greatly reduced.

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The International Association for Food Protection welcomes your nominations for the National Food Processors Association (NFPA) Food Safety Award. This award honors an individual (Member or non-member) or a group or organization in recognition of a long history of outstanding contributions to food safety research and education.

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Comparison of Three Media Used to Estimate Psychrotrophic Bacterial Counts in Milk

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SUMMARY

This study was designed to evaluate the suitability of violet red bile agar without an overlay (VRBA/WO) for the accurate and rapid enumeration of psychrotrophs in milk. A survey of 36 commercially produced reduced-fat milk samples was conducted. Samples were plated and evaluated on the day they were collected from the retail outlet and on the day following a preliminary incubation (PI) of 18 h at 21°C. Psychrotrophic bacteria counts were determined after incubation at 32°C and 21°C, on violet red bile agar without an overlay, on standard plate count agar and on crystal violet tetrazolium agar. Bacterial enumerations were compared among the three media and the two temperatures. A correlation ($r^2 = 0.73$) was noted between violet red bile agar counts without an overlay and standard plate counts incubated at 21°C for 18 h. In addition, a strong correlation ($r^2 = 0.87$) was found between the violet red bile agar counts without an overlay and crystal violet tetrazolium counts incubated at 21°C for 18 h. Violet red bile agar without an overlay is a viable alternative method for enumerating psychrotrophic bacteria in fluid milk.

INTRODUCTION

Milk is collected every-other day from most dairy farms in the United States. This practice necessitates proper and adequate refrigerated storage of the milk. In addition, the average age of milk at the time of consumption by the consumer has increased because of the collection practice combined with a decreased number of dairy farms and processing plants. As a result, quality problems related to growth and metabolic activity of microorganisms at low temperatures are on the rise.

The type and number of bacteria in a product directly influences its quality and shelf life. Therefore, it is critical for the dairy industry to detect, isolate and enumerate spoilage organisms. Gram-negative psychrotrophs, especially those belonging to the genus *Pseudomonas*, are the primary spoilage microorganisms responsible for lowered shelf life and quality in milk products. Psychrotrophs are ubiquitous in nature, being found both on the dairy farm

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and in the processing plant and producing visible growth at refrigeration temperatures and below (4, 11, 15). They produce thermostable enzymes as they increase in number during refrigeration. These enzymes cause off-flavors, off-odors and ropiness in milk in a relatively short time.

Even though pasteurization inactivates the cells and inhibits growth of psychrotrophic bacteria present in raw milk, more are able to gain entrance into the milk package post-pasteurization. This adversely affects the quality and consumer acceptability of the product through production of stale, putrid, bitter, fruity, rancid and other offensive off-flavors. Proper hygiene in a processing plant will significantly reduce the presence of these and other microorganisms in products, thus increasing their overall quality. However, it is difficult to completely prevent psychrotrophs from entering milk as the result of human errors in the process (4). Even when present in low numbers, they will eventually induce spoilage by multiplying and degrading milk proteins and fat (2, 5, 9).

As a result, the industry must monitor the psychrotrophic population in both raw and pasteurized milk in order to maintain high quality products. Several methods, which include the use of various incubation times and temperatures, have been identified as suitable for enumeration of psychrotrophic bacteria (4). They include, but are not limited to, the standard method, methods using selective media, dye reduction tests, and metabolite detection. These methods are not without their disadvantages. The standard method takes as long as 10 days before results can be interpreted. Selective media detect gram-negative bacteria but do not always distinguish between mesophiles and psychrotrophs. For example, Smithwell and Kailasapathy state that *methylene blue detects psychrotrophs in the majority of cases but not in all* (13). As a result, new methods are

continuously being sought to rapidly and accurately identify psychrotrophic bacteria.

Violet red bile agar with an overlay is utilized in the dairy industry to detect coliforms in fluid milk. Coliforms isolated from pasteurized milk indicate improper pasteurization and/or post-pasteurization contamination. Since the medium is already successfully used in the industry with fluid milk products, speculation as to its use in detecting other organisms has arisen. Marshall and Schmidt reported that pseudomonads could be successfully enumerated aerobically in milk (8). Therefore, the objective of this research was to investigate the suitability of violet red bile agar without an overlay (VRBA/wo) in accurate enumeration of psychrotrophic bacteria in milk. The violet red bile agar count without an overlay was evaluated against the standard plate count and the crystal violet tetrazolium count to assess its accuracy and speed in predicting the psychrotrophic bacteria count (PBC) in fluid milk.

MATERIALS AND METHODS

Milk samples

Thirty-six reduced-fat milk samples in half-gallon containers were purchased from three different local retail outlets over a three-month period, taken on ice directly to the laboratory and stored at 7°C until testing.

Preliminary incubation

Samples, in their original containers, were subjected to preliminary incubation (PI) at 21°C for 18 h. Bacterial enumerations followed.

Bacterial enumeration

Samples were analyzed for bacteria counts on the day they were col-

lected (fresh counts) and on the day following incubation at 21°C for 18 h (P I + media) on pour plates, following standard methods. Both fresh and P I + media counts were subjected to the standard plate count (Difco Laboratories, Detroit, MI), violet red bile agar count without an overlay (VRBA/WO) (Difco), and crystal violet tetrazolium count (Difco) (10, 16). All samples were plated in duplicate (16). Plates of each medium were incubated at 21°C and at 32°C for 48 h.

Identification and characterization of colonies

A typical colony from each medium and at each incubation temperature was subjected to Gram stain. Hucker's modification of the Gram reaction was used to characterize the type of colonies enumerated on the media (1).

Growth of *Pseudomonas* in milk

"Sterile" reduced-fat milk samples were used to evaluate the appearance of psychrotrophs on the medium in question. *Pseudomonas fluorescens*, and *Pseudomonas putida* are two gram-negative rods within the *Pseudomonas* species that cause the majority of spoilage in pasteurized fluid milk (14). Both the *Pseudomonas fluorescens* strain and the *Pseudomonas putida* strain were collected from the American Type Culture Collection (Manassas, VA, USA) ATCC 948 and ATCC 12633. One 99 ml autoclaved sample of reduced-fat milk was inoculated with approximately 1000 CFU/ml of *Pseudomonas fluorescens* and one 99 ml autoclaved sample of reduced-fat milk was inoculated with approximately 1000 CFU/ml of *Pseudomonas putida*. Samples were incubated at 21°C for 24 h and then plated on the media (VRBA/WO, SPC and CVT).

Statistical analysis

A split-plot statistical design was used to analyze differences obtained

FIGURE 1. The relationship between violet red bile agar counts without an overlay (PI+VRBA/WO) and standard plate counts (PI+SPC) for reduced-fat milk samples preliminary incubated at 21°C for 18 h and plates incubated at 32°C for 48 h

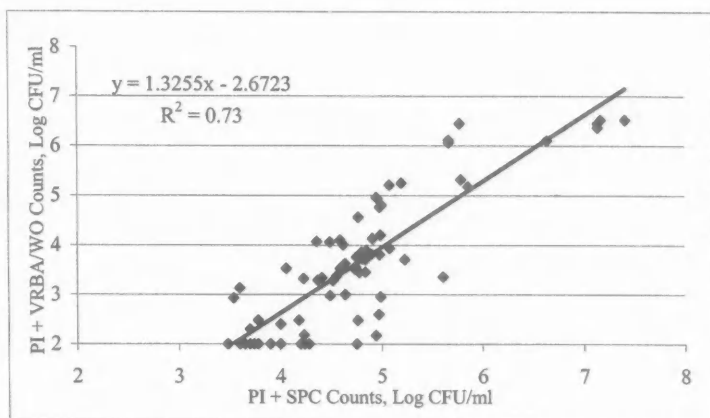
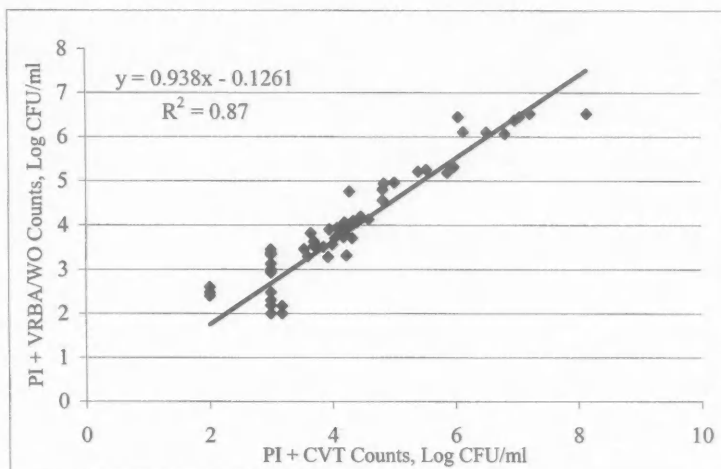


FIGURE 2. The relationship between violet red bile agar counts without an overlay (PI+VRBA/WO) and crystal violet tetrazolium counts (PI+CVT) for reduced-fat milk samples preliminary incubated at 21°C for 18 h and plates incubated at 32°C for 48 h



between the VRBA/WO count and counts with the two other media of interest. Bacterial populations enumerated (CFU/ml) were calculated and transformed to \log_{10} values. Data was then analyzed using Microsoft

Excel 2000 or the Statistical Analysis Software (SAS) package Ver. 8.0 (SAS Institute Inc., Cary, NC). Coefficient of determinants (r^2) and linear regression trend lines were calculated and plotted.

RESULTS AND DISCUSSION

Identification and characterization of colonies

Eighty-five percent of the colonies enumerated and identified from VRBA/WO were gram negative. Psychrotrophic bacteria were white to light yellow in color, while coliforms were red to pink. One-hundred percent of the colonies enumerated from the CVT medium and 83% of colonies enumerated and identified on SPC were gram-negative.

Fresh counts

Differences were observed between results obtained at the two temperatures in question, 21°C and 32°C. More colonies were enumerated on the plates incubated at 32°C than on those at 21°C. No correlations ($P > 0.05$) were noted between SPC values and VRBA/WO values at either temperature. The plates incubated at 32°C had a better agreement between VRBA/WO counts and CVT counts than those incubated at 21°C.

PI + media counts

In samples that had been subjected to a preliminary incubation, no differences were seen between results obtained at the two temperatures, 21°C and 32°C, for the three media investigated. However, a positive association ($P < 0.05$; $r^2 = 0.73$) was observed between PI+SPC and PI+VRBA/WO counts (Fig. 1).

Figure 2 shows a positive association ($P < 0.05$; $r^2 = 0.87$) for PI+VRBA/WO and PI+CVT counts. This was the strongest association observed in the study. The CVT medium, which contains crystal violet to inhibit gram-positive organisms and 2, 3, 5-triphenyl tetrazolium chloride to promote the distinct red color of gram-negative colonies (6, 12), is

TABLE 1. Coefficients of determination (r^2) among plate counts incubated at 21°C

	SPC	PI+SPC	CVT	PI+CVT	VRBA/WO	PI+VRBA/WO
SPC	1.000					
PI+SPC	0.000	1.000				
CVT	0.440	0.000	1.000			
PI+CVT	0.001	0.700*	0.003	1.000		
VRBA/WO	0.001	0.003	0.130	0.003	1.000	
PI+VRBA/WO	0.008	0.740*	0.000	0.870*	0.003	1.000

* Indicates statistically significant ($P < 0.05$)

TABLE 2. Coefficients of determination (r^2) among plate counts incubated at 32°C

	SPC	PI+SPC	CVT	PI+CVT	VRBA/WO	PI+VRBA/WO
SPC	1.000					
PI+SPC	0.025	1.000				
CVT	0.160	0.027	1.000			
PI+CVT	0.027	0.710*	0.001	1.000		
VRBA/WO	0.002	0.054	0.330	0.053	1.000	
PI+VRBA/WO	0.000	0.730*	0.001	0.880*	0.0019	1.000

* Indicates data statistically significant ($P < 0.05$)

used in estimating psychrotrophic bacteria populations in fluid milk. The strong association reported here suggests that a test other than the PI+CVT count could provide similar results for the fluid milk industry.

Samples subjected to PI showed a stronger association than fresh samples (Table 1 and Table 2). A stronger association was found between CVT counts and VRBA/WO counts ($r^2 = 0.88$) than between SPC counts and VRBA/WO counts ($r^2 = 0.73$). By incubating samples at 21°C prior to testing, the number of psychrotrophs present is increased, and this increases the ability of the testing methods to estimate psychrotrophic bacteria. Oliveria and Parmelee reported that incubating

milk samples at 21°C is a very reliable and rapid method to allow psychrotrophic bacteria to produce visible colonies within a short time frame (11). In addition, other researchers have reported significant increases of bacterial counts and higher correlations for samples incubated prior to testing (3, 7, 8). At 21°C, most mesophiles are unable to form visible colonies within the time they are incubated and therefore do not interfere with the enumeration of the psychrotrophic bacteria population.

CONCLUSIONS

It can be concluded that, when combined with a preliminary incubation at 21°C for 18 h, VRBA/WO has

the potential to be a rapid method for accurate detection of psychrotrophic bacteria. The majority of the colonies identified from the VRBA/WO medium were gram-negative. Because these are the primary spoilage microorganisms in pasteurized dairy products, results indicated that the microorganisms of primary concern are detected through the alternative medium suggested here. By pre-incubating samples, the psychrotrophic bacterial population is enhanced, thus increasing the sensitivity of the testing medium used. A stronger association was noted between pasteurized milk samples incubated prior to testing with the VRBA/WO medium than those samples not incubated prior to test-

ing. In addition, the strongest association among pre-incubated samples was between the CVT counts and the VRBA/WO counts. As a result, we concluded that the violet red bile agar without an overlay (VRBA/WO) is a viable alternative method to CVT in enumeration psychrotrophic bacteria in pasteurized fluid milk if the milk is subjected to a preliminary incubation at 21°C for 18 h and if plates are incubated at 32°C for 48 h. This is important to the fluid milk industry because the VRBA medium is already utilized in enumeration of coliforms in finished products. An alternative medium with a strong correlation to CVT can simplify testing procedures for fluid milk while providing accurate and reliable results.

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Consumers' Attitudes toward Open Dating of USDA-regulated Foods

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SUMMARY

Open dates on food products help retailers decide how long to display products for sale ("sell-by" date) or help consumers know by when to purchase or use products for best quality ("use-by" date or "best-if-used by" date). With the exception of infant formula and some baby foods, federal regulations in the United States do not require open dating; thus, for many products consistent information on product shelf life is not available to consumers. This study used focus groups to explore consumers' use and understanding of open dates and consumers' attitudes toward a federally mandated open dating system for US Department of Agriculture (USDA)-regulated foods. Consistent with previous consumer research on open dating, many of our focus group participants rely on open dates to determine storage time. However, some participants are confused by the use of different open date statements. Most focus group participants enthusiastically support Federal regulations that would require manufacturers to provide open dates, preferably use-by dates, on all USDA-regulated products. Although current open dating practices are generally quality based, participants believe mandatory open dating is necessary to ensure the safety of foods. Regulators can use the study findings to assist in developing labeling policy for open dating.

INTRODUCTION

Open dates (i.e., calendar dates) on food products help retailers decide how long to display products for sale ("sell-by" date) or help consumers know by when to purchase or use products for best quality ("use-by" date or "best-if-used by" date). Open dating is most often used on perishable foods such as meat, poultry, eggs, and dairy products. Figure 1 provides USDA's definitions of open date statements commonly used by manufacturers. Closed or coded dates (a series of letters and/or numbers that often refer to the production date) enable tracking of products in interstate commerce and allow manufacturers to rotate their stock. Closed dating is found on shelf-stable products such as cans and boxes of food.

With the exception of infant formula and some baby foods, federal regulations in the United States do not require open dating. However, if an open date statement is used, USDA requires it to include both the month and the day of the month (and the year, for shelf-stable and frozen products). Additionally, the date must be preceded by a phrase explaining the

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FIGURE 1. Definitions of open date statements

A **"Sell-By"** date tells the store how long to display the product for sale. You should buy the product before the date expires.

A **"Best-if-Used-By (or Before)"** date is recommended for best flavor or quality. It is not a purchase or safety date.

A **"Use-By"** date is the last date recommended for the use of the product while at peak quality. The date has been determined by the manufacturer of the product.

Source: (8)

meaning of that date, such as "sell by" or "use by" (8). Twenty-nine states and the District of Columbia mandate some sort of open dating system (3). Many of these regulations apply to milk, milk products, and perishable food products. In the remaining 21 states, open dating is voluntary. Food manufacturers who incorporate open dating procedures generally do so to comply with applicable state laws; to avoid separating products that will be shipped to states that require open dating from those that will be shipped to states that do not; or on a voluntary basis as part of their marketing strategy. Because open dating is frequently done on a voluntary basis and practices differ substantially between states and among food products, current open dating practices are not well known.

Currently, no federal regulations or guidelines govern how open dates are established or validated. Open dates are generally established by manufacturers to indicate a product's shelf life. Winger (10) defines shelf life as "the period of time at the end of which the 'quality' of a given food product is perceived as significantly, unacceptably different from the expected 'fresh' quality." Thus, open dates are not meant to be indicators of microbiological food safety. The Office of Technology Assessment (OTA) (6) and the Institute of Food Technologists (IFT) (2) describe methods used by manufacturers to establish open dates. Some manufacturers rely on trade association guide-

lines to establish open dates for their products.

Interest in establishing safety-based dates has increased recently. In response to the *Listeria monocytogenes* action plan, the federal government is exploring the feasibility of establishing safety-based use-by dates for refrigerated ready-to-eat (RTE) foods (9). Because *Listeria monocytogenes* grows at refrigeration temperatures, preventing storage of RTE foods for excessive periods may reduce the risk of foodborne illness caused by this organism.

In the absence of government requirements, consumers are not provided with consistent information on the expected shelf life of products. Many food products are not currently dated or bear coded dates that only the manufacturer can identify as the production date. In addition, dated products use a variety of date statements (e.g., "use by," "best if used by," and "sell by") that potentially confuse consumers, reducing the usefulness of information gained from open dates.

Labuza and Szybist (4) reviewed consumer research conducted to date on consumers' use and understanding of open dates. Their review suggests that many consumers use open dates to make purchases, but less than half of consumers understand the meaning of open dates. A recent survey by Labuza, Szybist, and Peck (5) revealed that nearly two-thirds of consumers believe open dates are reliable or extremely reliable, despite

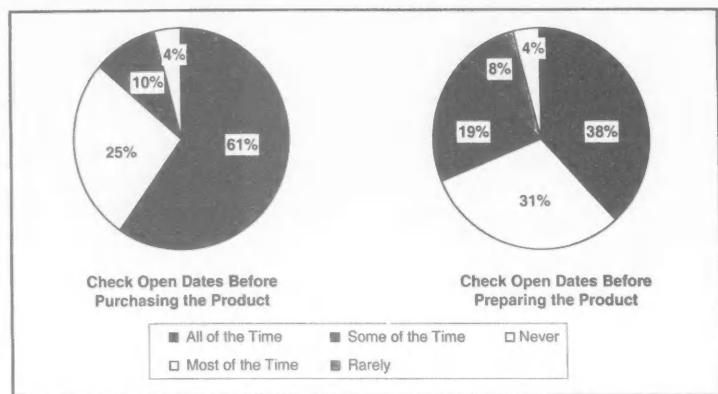
the fact that within the past 12 months, at least one-third of consumers had purchased refrigerated foods that had spoiled prior to the product's open date. Most of the studies reviewed by Labuza and Szybist surveyed a large number of consumers so that researchers could quantify the number of consumers following a particular practice (e.g., check open dates on refrigerated products) or with a particular attitude (e.g., perceived reliability of open dates). However, these studies provide little information on the "whys" behind consumer behavior and attitudes with regard to open product dating.

This study uses consumer focus groups to gain a better understanding of consumers' perceptions of open dating. Focus group discussions provide useful insights into consumer thinking that are difficult to acquire by means of quantitative data collection approaches such as telephone or mail surveys. The study explores consumers' use and understanding of open dates and consumers' attitudes toward a federally mandated open dating system for USDA-regulated foods (i.e., meat, poultry, and egg products). Regulators can use the study findings to assist in developing labeling policy for open dating.

METHODS

To provide geographic diversity, six focus groups with household grocery shoppers and meal preparers were conducted in each of three cities (Raleigh, NC; Philadelphia, PA; and St. Louis, MO). Notably, North Carolina, Pennsylvania, and Missouri do not mandate open dating for USDA-regulated foods. As suggested by Greenbaum (1), the groups were segmented by education and age to increase homogeneity of the groups. In each location, one focus group was conducted with individuals who have a high-school education or less, and one focus group was conducted with individuals who have a college edu-

FIGURE 2. Participants' use of open dates on meat, poultry, and egg product labeling



Source: Prediscussion questionnaire (n = 48). Because a probability-based sample was not used, results from the prediscussion questionnaire should not be generalized to the US population of household grocery shoppers and cooks in any statistical sense.

cation. Two focus groups were conducted with individuals in each of three age groups (18 to 30, 35 to 55, and 60 or older).

In addition to meeting the education and age specifications established for each focus group, participants had to meet certain criteria to be eligible for participation. Local market research firms recruited individuals meeting the following eligibility criteria: have primary or shared responsibility for grocery shopping in the household, have primary or shared responsibility for cooking in the household, are not vegetarian (because of focus on meat and poultry products), prepare food and cook at home at least three times a week, and frequently prepare RTE meat and poultry products. Additionally, each focus group included a mix of males and females and reflected the racial diversity of the area where the group was conducted.

Each focus group consisted of eight participants, for a total of 48 participants. Participants' ages ranged from 18 years to over 70 years, and 50 percent of participants are male. Sixty-five percent of participants are non-

Hispanic Caucasian, 4 percent are Hispanic Caucasian, 25 percent are non-Hispanic African American, and 6 percent represent other races.

The focus group discussions were conducted at local market research facilities in each location in December 2001. Prior to the discussion, participants completed a short questionnaire that collected information on use of open dates, demographics, and other topics. Two trained moderators conducted the focus group discussions. The discussions covered a variety of labeling topics (7), but this paper is limited to participants' discussions on open dating. Participants discussed how they determine product storage time, their use and understanding of open dates, their knowledge of how open dates are established and whether and how they are validated for accuracy, and their attitudes toward a federally mandated open dating system for USDA-regulated meat, poultry, and egg products. Each focus group lasted approximately 90 minutes, and each participant was paid an honorarium of \$50 to \$60 (depending on location).

Each focus group discussion was videotaped and audio recorded, and transcripts were prepared. The transcripts and videotapes were reviewed and a detailed summary of each focus group discussion was prepared. The detailed summaries were then reviewed to identify common themes within and across groups.

RESULTS

Methods for determining storage time for meat, poultry, and egg products

The majority of participants rely on open dates to determine storage time for meat, poultry, and egg products. Although participants rely on other factors such as their previous experience with the product, heuristics or "rules of thumb" for storage time (e.g., always discard meat products 1 week after purchase), the product's visual appearance and to a lesser extent its odor, most rely on open dates to determine how long a product can be stored. As one participant stated, [I consider] "first and foremost the date, and then also how it looks."

Some participants deem open dates to be guidelines for consumers and use these dates along with other indicators, particularly the product's visual appearance and odor to determine whether to use or discard the product. For example, if the product is discolored or if the texture has changed (e.g., shriveled or mushy), participants will discard products even before the expiration date has passed. Conversely, some participants will use products after the expiration date has passed if the product still "looks fresh." Few participants admit to following the potentially unsafe practice of tasting a product to determine whether to use or discard it. Some participants systematically purge their refrigerators each week of items that have been stored too long. Only a few

TABLE 1. Participants' opinions on usefulness of open dates for meat, poultry, and egg products

Product	Most Useful	Somewhat Useful	Least Useful
Frozen entrees or dinners			•
Refrigerated entrees or dinners	•		
Processed products	•		
Canned products			•
Dehydrated products		•	
Raw meat and poultry	•		
Egg products	•		

participants caution that open dates are not reliable if the product has been mishandled, for example, if a perishable product has been inadvertently left at room temperature for a long period of time.

Use of open dates

Sixty-one percent of participants check open dates all of the time before purchasing meat, poultry, and egg products, and 25 percent check open dates most of the time (see Fig. 2). Participants believe that open dates provide an indicator of product freshness and quality. Additionally, some participants have the misperception that open dates, particularly use-by dates, are an indicator of the food's safety. Participants tend to purchase products that have some time between the date of purchase and the sell-by or use-by date on the product. When shopping for groceries, participants often sort through packages so that they choose the package that has the longest amount of time between the date of purchase and the open date. Most participants refer to open dates when making purchase decisions for perishable products. For example, in deciding which brand of product to buy, most participants say that they will not purchase a brand that does not provide an open date.

Before cooking or preparing meat, poultry, and egg products, 38 percent of participants check open dates all of the time and 31 percent check open dates most of the time to see if the date has expired (see Fig. 2). Participants' decisions on whether to use a product for which the open date has expired depend on the type of date statement (e.g., use-by vs. sell-by), the type of food, and the number of days since the date expired. For example, some participants will use meat, poultry, or egg products a few days beyond the use-by date as long as the product smells and looks acceptable. Others will immediately discard a product once it has reached its use-by date.

Participants perceive that the usefulness of open dates varies depending on the type of product (see Table 1). Participants consider open dates most useful for perishable foods such as refrigerated entrees/dinners (e.g., beef with barbeque sauce and meat-filled pasta), processed products (e.g., hot dogs and deli meats), raw meat and poultry (e.g., ground beef and chicken breasts), and egg products (e.g., refrigerated egg whites). Participants find open dates somewhat useful for dehydrated products (e.g., dried chicken noodle soup). Participants do not look for open dates on frozen entrees/dinners (e.g., chicken pot pie or pizza) and canned products (e.g.,

beef stew or chicken soup). Canned products seldom have open dates (closed dates are usually used on canned products); however, some frozen products do have open dates.

Understanding of open dates

Some participants correctly define the different types of open date statements (sell-by, best-if-used-by, and use-by) and base storage decisions on the type of date statement (see Fig. 1 for USDA's definitions of open date statements). Others find the use of different date statements (e.g., sell-by dates on some products and use-by dates on other products) confusing and thus do not distinguish between them.

Many participants correctly define the *sell-by date* as being the date by which the grocery store or supermarket should pull product from its shelves; thus, they understand that this date is provided for retailers' use. Many participants correctly believe that the sell-by date is provided for quality purposes. Some participants have the misperception that the sell-by date is also provided for food safety purposes or find it difficult to distinguish between safety and quality. Most participants believe that a product is still of acceptable quality after the sell-by date but are unsure for how long the quality will remain

acceptable and will not buy a product if the sell-by date has expired or is close to expiring. Some participants are concerned about using a product after the sell-by date has passed because they are unsure of its freshness. Many participants consider the sell-by date not very useful because it does not provide any guidance on how long one can safely store the product at home.

Many participants correctly define the *best-if-used-by date* as when to consume the product for best taste, freshness, and quality. Most participants correctly believe the best-if-used-by date is provided for quality purposes and do not believe it is an indicator of food safety. Most participants find the best-if-used-by date to be of least use to consumers because it does not offer a definitive date by which to use the product.

Participants correctly define the *use-by date* as the date by which consumers should use the product. One participant stated, "...after this date, it's not going to be good any more." Many participants have the misperception that the use-by date is provided primarily for food safety purposes rather than quality. Some participants think the date is provided primarily for quality purposes or find it difficult to distinguish between safety and quality. Most participants agree that, of all the different open date statements, the use-by date is most useful to consumers because it directly informs consumers as to when one should use or discard the product.

Participants think that manufacturers, supermarkets, and the federal government establish and validate open dates for accuracy. The focus group discussions revealed that participants' perceptions do not always reflect actual practices. Some participants believe manufacturers' quality control departments establish open dates and periodically conduct tests to validate the accuracy of these dates. However, actual practices vary by

manufacturer and type of product; some manufacturers conduct tests to determine product shelf life, while others rely on industry guidelines.

Some participants believe that supermarkets establish sell-by dates for raw meat and poultry products. Again, actual practices vary by retailer and type of product. For some products, the packer establishes the sell-by date, whereas for other products the grocery store establishes the sell-by date based on its guidelines.

Some participants have the misperception that the federal government plays a role in open dating by providing guidelines that manufacturers must follow to establish open dates or by periodically conducting tests to verify that open dates are accurate. A few participants mistakenly think that because meat, poultry, and egg products are inspected by USDA, government inspectors periodically conduct tests to determine if open dates are accurate. One participant stated, "If the government's going to put 'USDA' [USDA's inspection legend] on there [the product], of course they should be able to say, 'Yeah, we're checking on them periodically to see if what we're saying is fresh for you is actually fresh for you.'" Several participants are unsure but hope the government plays a role in establishing and validating open dates. One such participant stated, "I feel like the USDA would not let them [manufacturers] use open dates if they [the manufacturer's open dates] were bad."

Attitudes toward mandatory open dating

Most participants support a federally mandated open dating system that would require manufacturers to provide open dates on all USDA-regulated meat, poultry, and egg products. These participants believe that mandatory open dating is needed to help ensure the safety of foods. Most par-

ticipants find the use of different open date statements confusing and want an open dating system implemented in which all products display the same date statement, preferably a use-by date. One participant echoed opinions of others when he stated, "I think a use-by date is a lot better because you know that after that date you don't use it anymore. But a sell-by date means, 'just get it out of the store by this day.' That doesn't mean that two weeks later you can or can't use it." A minority of participants disagree; they deem the sell-by date most useful, particularly for raw meat and poultry products.

Some participants do not support mandatory open dating for all meat, poultry, and egg products. Instead, they think it is the manufacturer's responsibility to provide open dates when deemed necessary, for example, on perishable products. One participant stated, "I put faith in the manufacturers to provide an appropriate date and a safe product." Several participants are concerned that a mandatory open dating system would lead to price increases and are not willing to pay more for products under federally mandated open dating regulations.

DISCUSSION

Consistent with previous consumer research on open dating (4), many of our focus group participants rely on open dates to determine storage time for meat, poultry, and egg products. Even though participants may rely on other factors, such as their previous experience with the product or the product's visual appearance, most consider open dates to be the primary indicator of storage time. Participants consistently check open dates before purchasing meat, poultry, and egg products and often sort through packages to find a package with the longest amount of time between the date of purchase and the open date.

Participants perceive the usefulness of open dates to vary depending on the type of product; they deem open dates most useful for perishable foods such as refrigerated dinners/entrees, processed meats (e.g., hot dogs and deli meats), raw meat and poultry, and egg products. Some participants correctly define the different open date statements, while others find the use of different date statements confusing. Other researchers have assessed consumers' understanding of open dates and reported similar findings (4, 6). Most of our focus group participants consider the "use-by" date more useful than the "sell-by" date or "best-if-used by" date because the use-by date directly indicates the date by which consumers should use or discard the product.

Many participants believe that open dates, particularly use-by dates, are an indicator of food safety. Additionally, some participants think that the federal government provides guidelines that manufacturers must follow to establish open dates and periodically validates that open dates are safe and accurate. Thus, consumers hold many misperceptions about open dating that may lead to a false sense of security, particularly if products have suffered temperature abuse. These findings suggest that consumers could benefit from education about open dating. If open dating information is to be useful to consumers, they must understand what information is to be gleaned from open dates and how to use this information to make informed decisions regarding length of product storage.

Several disincentives may discourage manufacturers from voluntarily providing open dates. First, manufacturers incur costs to establish open dates and add this information to product labels or packaging. If manufacturers do not foresee an increase in revenues that more than offsets the cost incurred by adding open dates to product packaging, they have no incentive to do so vol-

untarily. Second, open dating may lead to increased product waste as consumers sort for the freshest products while grocery shopping. This may lead to lost revenues if products of acceptable quality are not sold and must be removed from supermarket shelves. Supermarkets could potentially alter their stock rotation to mitigate this problem, but additional costs would be coupled with those changes as well. Finally, with regard to safety-based use-by dates, providing these dates will not accurately reflect the true shelf life of a product that has suffered temperature abuse. However, the presence of a use-by date could be used as justification for a lawsuit against the manufacturer if a consumer contracts foodborne illness as a result of consuming the product, which serves as a disincentive to manufacturers to provide this information (3).

The focus group study elicited participants' attitudes toward a mandatory open dating system. Most focus group participants enthusiastically support a federally mandated open dating system that would require manufacturers to provide open dates on all USDA-regulated meat, poultry, and egg products. Most participants want an open dating system adopted in which all products display the same date statement, preferably a use-by date. Participants believe that mandatory open dating is necessary to ensure food safety, although current open dating practices are generally quality based. These findings suggest that consumers would support safety-based use-by dates.

A federally mandated open dating system would increase efficiency and understanding among retailers and their customers. Labuza and Szybist (4) suggest that an open dating system would assist supermarket personnel in stock control and rotation ("first-in first-out" practices) and enhance quality, safety, and nutritional value of foods purchased by consumers.

Although the focus group findings infer that a uniform open dating system would help decrease consumers' confusion and increase usefulness of information that consumers obtain from open dates, these findings alone are not a sufficient basis for regulatory action at this time. USDA's Food Safety and Inspection Service would need to conduct additional analyses to evaluate the costs and benefits of a regulation or policy requiring a uniform open dating system. If a uniform open dating system is mandated, it is important that the change be accompanied by consumer education so that consumers can understand how to use open dates to make appropriate storage decisions. Further scientific research is needed to evaluate the feasibility of establishing safety-based use-by dates for meat, poultry, and egg products, particularly refrigerated RTE products.

ACKNOWLEDGMENTS

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Food Safety and Fresh Produce

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Recent outbreaks of food-related illnesses have increased many people's concerns about the safety of fresh fruits and vegetables—regardless of whether the cause is hepatitis A, *Escherichia coli* (*E. coli*), or some other foodborne microorganism. These concerns already had increased during the past decade when, due primarily to an increased awareness of the health benefits fresh produce provides, people in the United States were eating more of these foods. When Mom told us to eat fresh fruits and vegetables, she knew what she was talking about: these foods contain compounds that help decrease the risk of many illnesses, including cancer and macular degeneration. In addition, consumers in the United States expect to have a multitude of fresh produce available year round. To supply this demand, the produce industry has developed a distribution system to move both domestic and foreign produce to the dinner table.

The recent outbreak of hepatitis A in Pennsylvania, which killed three people and sickened more than 600, has raised new concerns about the safety of this supply and distribution system. The source of the outbreak was identified as green onions (scallions) and, as a result, the US Food and Drug Administration (FDA) has warned consumers not to eat uncooked green onions for the time being. As the story unfolds, can this tragic outbreak teach any valuable lessons about the safety of our food supply chain? Should other fresh produce items be avoided as well?

It is useful to remember that pathogenic (disease-causing) microorganisms are not part of the natural microorganisms found on or in fresh produce. Therefore, any disease-

causing microbes present on fruits or vegetables are there because of inadvertent contamination, which can occur when produce comes in contact with dirty water, equipment, or storage containers; unsanitary human handlers and food preparers; and/or pests. Contamination can occur in the field or at any point in the food supply chain from production to table.

The fresh-produce processing industry uses various tools to decrease microbial contamination on products. Sanitary operating procedures common to the entire food processing industry include pest control, facility sanitation, worker hygiene, and temperature control. Fresh-produce processors often take specific steps to clean fruits and vegetables, including high-pressure washes, scrubbing, trimming, and peeling. Many processors, especially in the fresh-cut produce industry, also use sanitizing washes or dips to clean produce. These dips rely on chlorine or other sanitizers to kill harmful microbes. All the treatments, when properly applied, will substantially decrease—but may not eliminate—microbial contamination.

Consumers can take several actions to decrease their risk from disease-causing microbes on fresh fruits and vegetables. Because most microbial contamination is present on the skin or outer layers of produce, washing and peeling are effective ways to lessen the number of harmful microorganisms present.

- Wash produce with clean water before eating. (Household soaps and other cleansers are not recommended; they may not be effective in killing or removing pathogens and may leave harmful residue on the produce that poses

a greater risk than any microbes potentially present.)

- Scrub firm produce, such as melons and cucumbers, with a produce brush during washing.
- Cut out damaged or bruised areas before eating.
- Control temperature of produce to prevent microbial growth.
- Refrigerate fresh produce that requires cool temperatures (below 45°F, 7°C).
- Avoid leaving cut melons at room temperature for more than two hours.
- Wash hands and food preparation surfaces often.
- Avoid cross-contaminating ready-to-eat foods with raw meat, poultry, or seafood.

These techniques are highly recommended to enhance the safety of fresh produce, but may not be sufficient to remove all pathogens present. This is especially true for leafy greens and other hard-to-wash produce. The only sure way for consumers to eliminate harmful microorganisms in fresh fruits and vegetables is through cooking. Heating fruits or vegetables to a temperature of 160°F (71°C) or greater is enough to kill the pathogenic microorganisms that may be present. Of course, no one wants a cooked green salad. But folks who are particularly susceptible to foodborne illness—children, the elderly, and those with compromised immune systems—may want to avoid higher-risk fresh, uncooked produce.

Researchers at the Centers for Disease Control and Prevention (CDC) and at state land-grant universities are working to decrease the risk of contamination on fresh produce even further. In 1998, the FDA and the US Department of Agriculture (USDA) released a *Guide to Minimize Microbial Food*

Safety Hazards for Fresh Fruits and Vegetables (The Guide). Later, Cornell University released *Food Safety Begins on the Farm — A Grower's Guide*. These publications, which have been well received, spell out what producers, packers, and distributors of fresh produce must do to decrease the risk of produce contamination.

One lesson to learn from the Pennsylvania hepatitis outbreak is this: There is no "magic bullet" to eliminate harmful microorganisms in all fresh foods. No single treatment will do it; that is why a comprehensive food safety system, from farm to table, is essential to minimize the risk of foodborne illness. No link in the food supply chain can be ignored: evidence collected so far from the Pennsylvania outbreak suggests that the green onions already were contaminated with the hepatitis virus when they entered the restaurant, but that poor food-handling practices in the restaurant spread the virus to more people than otherwise would have been infected. Progress has been made in developing and implementing a food safety system for fresh produce, and all of the measures currently in place will decrease risk, especially as more is learned about which practices work best. But even the best system cannot eliminate risk. As *The Guide* states, "Current technologies cannot eliminate all potential food safety hazards associated with fresh produce that will be eaten raw."

Another lesson that may be lost in the clamor surrounding these events is that real health benefits come with a diet rich in fresh fruits and vegetables. But there also are real food safety risks and it is important to manage these risks, especially for particularly susceptible individuals. Consumers should be aware of outbreaks as they occur, heed official warnings, and follow good food-handling practices. With a little caution and common sense, we all can keep following Mom's advice about eating fresh fruits and vegetables.



International Association for
Food Protection®

Award Nominations

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

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Nominations deadline is March 15, 2004. You may make multiple nominations. All nominations must be received at the IAFP office by March 15, 2004.

- ◆ Persons nominated for individual awards must be current IAFP Members. Black Pearl Award nominees must be companies employing current IAFP Members. NFPA Food Safety Award nominees do not have to be IAFP Members.
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- ◆ Executive Board Members and Awards Committee Members are not eligible for nomination.
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Gene Frey, Awards Committee Chairperson

Nominations will be accepted for the following Awards:

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Presented to Member(s) for their devotion to the high ideals and objectives of IAFP and for their service to the Association.

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2004-2005 *Secretary Election*

The following page contains biographical information for the 2004-2005 Secretary candidates. Review the information carefully as you make your voting decision. Ballots were mailed to all International Association for Food Protection Members during the first week of February. Completed ballots are due back to the Association office by March 19, 2004. Sealed ballot envelopes are forwarded to the Tellers Committee for opening and counting. Watch for the election results in the May issue of *Food Protection Trends*.

If you have questions about the election process, contact David W. Tharp, CAE, Executive Director at 800.369.6337, or 515.276.3344, or E-mail dtharp@foodprotection.org.



GARY R. ACUFF



DAVID A. GOLDEN

The Candidates

Biographical Information

Gary R. Acuff

Dr. Gary R. Acuff currently holds the title of Professor of Food Microbiology and serves as the Section Leader for Food Science in the Department of Animal Science at Texas A&M University. He has been a member of the faculty for 18 years, and in 2001 was designated a Faculty Fellow for research leadership in the Texas Agricultural Experiment Station.

Dr. Acuff's research has focused on improving the microbiological quality and safety of beef in all areas of production and utilization, including cattle feeding and holding, slaughter/processing, fabrication, cooking, packaging, retail distribution, and consumer handling. Additional research interests have included characterizing the presence of *Campylobacter jejuni* in turkey processing, improving shelf life of Texas Gulf shrimp, evaluating the heat resistance of *Escherichia coli* O157:H7 in hamburger patties, determining the significance of *Helicobacter pylori* in food and, recently, several research projects have investigated microbiological hazards associated with fresh produce in Texas and Mexico. Dr. Acuff has authored or co-authored over 80 research publications in refereed scientific journals and 10 chapters in various references and textbooks. He recently served on the Editorial Committee of the 4th edition of the *Compendium of Methods for the Microbiological Examination of Foods*.

Since joining the food science teaching faculty at Texas A&M University, Dr. Acuff has taught graduate and undergraduate food microbiology courses and has participated as a team instructor in courses on the Hazard Analysis Critical Control Point (HACCP) system. He served as Chair of the Intercollegiate Faculty of Food Science from 1994 to 1997. In the 13 years that he has been teaching undergraduate food bacteriology, over 3,500 students have taken his class (and most have passed!). Dr. Acuff currently supervises several graduate students, and over his career has served as major professor for 20 students seeking a Master of Science and 8 students pursuing a Doctor of Philosophy.

Dr. Acuff was appointed to the National Advisory Committee on Microbiological Criteria for Food (NACMCF) in 1992 and continued to serve as a member for six years. He is an active member of the American Society for Microbiology and was elected to chair the Food Microbiology Division (Division P) in 1999. Dr. Acuff is also a member of the Institute of Food Technologists and the Society for Applied Microbiology. He has been a member of IAFF since 1982, has served on the Program Committee since 2001, and is currently the Program Committee Chair for the 2004 Annual Meeting in Phoenix, Arizona. He also is a member of the Meat and Poultry Safety and Quality Professional Development Group (PDG). Dr. Acuff has participated as a member of the Editorial Board of the *Journal of Food Protection* since 1994.

Dr. Acuff obtained his B.S. in Biology from Abilene Christian University in 1980 and his M.S. and Ph.D. in Food Science and Technology, specializing in Food Microbiology, from Texas A&M University in 1982 and 1985, respectively.

David A. Golden

Dr. David A. Golden is an Associate Professor of Food Microbiology with the Department of Food Science and Technology at The University of Tennessee (UT). He joined the faculty at UT in 1993. Before that, Dr. Golden spent 2 years as a microbiologist with the Food and Drug Administration in Washington, D.C., where he worked in the areas of food safety research and regulatory compliance as related to food safety. At UT, Dr. Golden's research focuses on ecology, detection, and control of foodborne pathogens in foods and on novel processing technologies for control of foodborne pathogens. Over his career, he has authored or co-authored over 35 peer-reviewed publications and six book chapters on food microbiology and safety and over 65 technical presentations at professional meetings. Additionally, along with Drs. James Jay and Martin Loessner, Dr. Golden is co-author of the seventh edition of *Modern Food Microbiology*, which will be published in 2004. He is a research partner and founding member of the UT Food Safety Center of Excellence.

Dr. Golden teaches courses in Advanced Food Microbiology and Food Laws and Regulations, and serves as the Graduate Coordinator for Food Science and Technology. On a half-time basis, from June 2002 through December 2003, Dr. Golden was Interim Associate Director of the University of Tennessee Honors Program, an undergraduate program for high-ability students. He returned to his full-time position in Food Science and Technology in January of 2004.

Since joining IAFF, Dr. Golden has been an active participant in the organization, presenting technical papers at most Annual Meetings and serving on IAFF committees. He served as a member of the Developing Scientist Awards Committee from 1993 through 1997, chaired the committee in 1996, and has served on the committee on several occasions since 1997. Dr. Golden served as a member of the IAFF Program Committee from 1995 through 2000, chairing the committee in 2000, and is a member of the Fruit and Vegetable Safety and Quality and Meat and Poultry Safety and Quality Professional Development Groups. Additionally, he is presently, and has been for several years, a member of the *Journal of Food Protection* Editorial Board. At the local level, Dr. Golden served as a member of the Local Arrangements Committee for the 1998 Annual Meeting in Nashville, TN.

Other professional affiliations for Dr. Golden include: Professional Member of the Institute of Food Technologists, Co-Editor of the IFT/ASM *Food Microbiology Newsletter*, and Editor of the *International Journal of Food Microbiology*. At the University of Tennessee, Dr. Golden has received awards from Gamma Sigma Delta for excellence in research and teaching, the College of Agricultural Sciences and Natural Resources Outstanding Faculty Advisor and W.F. and Golda Moss Outstanding Teaching Awards, and the Institute of Agriculture's T.J. Whatley Distinguished Young Scientist Award.

Dr. Golden received his M.S. and Ph.D. degrees in Food Science and Technology, with a focus on Food Microbiology, and the B.S. degree in Microbiology, all from the University of Georgia.

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The Audiovisual Library offers International Association for Food Protection Members an educational service through a wide variety of quality training videos dealing with various food safety issues. This benefit allows Members free use of these videos.

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- 1) As the IAFP Membership continues to grow, so does the need for additional committee members and materials for the Library. The Audiovisual Committee meets at the IAFP Annual Meeting to discuss the status of the Audiovisual Library and ways to improve the service. New Members are sought to add fresh insight and ideas.
- 2) Donations of audiovisual materials are always needed and appreciated. Tapes in foreign languages (including, but not limited to Spanish, French, Chinese [Mandarin/Cantonese]), are especially desired for International Members who wish to view tapes in their native language.
- 3) Members may also make a financial contribution to the Foundation Fund. The Foundation Fund sponsors worthy causes that enrich the Association. Revenue from the Foundation Fund supports the IAFP Audiovisual Library. Call Lisa Hovey, Assistant Director or Lucia Collison McPhedran, Association Services at 800.369.6337 or 515.276.3344 if you wish to make a donation.

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- D1180** **10 Points to Dairy Quality**—(10 minute videotape). Provides in-depth explanation of a critical control point in the residue prevention protocol. Illustrated with on-farm, packing plant, and milk-receiving plant scenes as well as interviews of producers, practicing veterinarians, regulatory officials and others. (Dairy Quality Assurance—1992) (Reviewed 1998)
- D1010** **The Bulk Milk Hauler: Protocol & Procedures**—(8 minute videotape). Teaches bulk milk haulers how they contribute to quality milk production. Special emphasis is given to the hauler's role in proper milk sampling, sample care procedures, and understanding test results. (Iowa State University Extension—1990). (Reviewed 1998)
- D1030** **Cold Hard Facts**—This video is recommended for training personnel associated with processing, transporting, warehousing, wholesaling and retailing frozen foods. It contains pertinent information related to good management practices necessary to ensure high quality frozen foods. (National Frozen Food Association—1993) (Reviewed 1998)
- D1031** **Dairy Plant**—(28 minute videotape). Join in on this video as it follows a tour of the University of Wisconsin Dairy Plant. Observe the gleaming machinery and learn the ins and outs of milk processing, packaging, and storage. Watch as workers manufacture butter, cheese, yogurt, sour cream and ice cream, and learn about secondary dairy products. (Chipsbooks Company—2003)
- D1040** **Ether Extraction Method for Determination of Raw Milk**—(26 minute videotape). Describes the ether extraction procedure to measure milkfat in dairy products. Included is an explanation of the chemical reagents used in each step of the process. (CA—1988) (Reviewed 1998)
- D1050** **Food Safety: Dairy Details**—(18 minute videotape). Dairy products are prime targets of contamination because of their high protein and water content, but this presentation shows how to maintain dairy foods. It explores techniques such as selection, handling, preparation and storage for milk, yogurt, cheese and other dairy products. (Chipsbooks Company—2003)
- D1060** **Frozen Dairy Products**—(27 minute videotape). Developed by the California Department of Food and Agriculture. Although it mentions the importance of frozen desserts, safety and checking ingredients; emphasis is on what to look for in a plant inspection. Everything from receiving, through processing and cleaning and sanitizing is outlined, concluded with a quality control program. Directed to plant workers and supervisors, it shows you what should be done. (CA—1987) (Reviewed 1997)
- D1070** **The Gerber Butterfat Test**—(7 minute videotape). Describes the Gerber milkfat test procedure for dairy products and compares it to the Babcock test procedure. (CA—1990) (Reviewed 1998)
- D1080** **High-Temperature, Short-Time Pasteurizer**—(59 minute videotape). Provided by the Dairy Division of Borden, Inc. It was developed to train pasteurizer operators and is well done. There are seven sections with the first covering the twelve components of a pasteurizer and the purpose and operation of each. The tape provides the opportunity for discussion after each section or continuous running of the videotape. Flow diagrams, processing and cleaning are covered. (Borden, Inc.—1986) (Reviewed 1997)
- D1090** **Managing Milking Quality**—(33 minute videotape). This training video is designed to help dairy farmers develop a quality management process and is consistent with ISO 9000 certification and HACCP processes. The first step is to evaluate the strengths and weaknesses of a dairy operation. The video will help you find ways to improve the weaknesses that are identified on your farm.
- D1100** **Mastitis Prevention and Control**—(2-45 minute videotapes). This video is ideal for one-on-one or small group presentations. Section titles include: Mastitis Pathogens, Host Defense, Monitoring Mastitis, Mastitis Therapy, Recommended Milking Procedures, Postmilking Teat Dip Protocols, Milk Quality, Milking Systems. (Nasco—1993)
- D1105** **Milk Hauler Training**—(35 minute videotape). This video covers the procedures and duties of the Milk Hauler from the time of arrival at the dairy farm, to the delivery of the milk at the processing plant. It also provides the viewer with a general understanding of the quality control issues involved in milk production and distribution. Topics include milk composition breakdown, milk fat content measurement, testing for added water, antibiotic and pesticide residues, somatic cell and bacteria counts, sediment, and aflatoxins. (Avalon Mediaworks LLC—2003)
- D1110** **Milk Plant Sanitation: Chemical Solution**—(13 minute videotape). This explains the proper procedure required of laboratory or plant personnel when performing chemical titration in a dairy plant. Five major titrations are reviewed... alkaline wash, presence of chlorine and iodophor, and caustic wash and an acid wash in a HTST system. Emphasis is also placed on record keeping and employee safety. (1989)
- D1120** **Milk Processing Plant Inspection Procedures**—(15 minute videotape). Developed by the California Department of Food and Agriculture. It covers pre- and post-inspection meeting with management, but emphasis is on inspection of all manual and cleaned in place equipment in the receiving, processing and filling rooms. CIP systems are checked along with recording charts and employee locker and restrooms. Recommended for showing to plant workers and supervisors. (CA—1986)

- D1125 Ohio Bulk Milk Hauling**—(15 minute videotape). Milk haulers, weighers, and samplers are the most constant link between the producer, the producer cooperative, and the milk processor. This video shows their complete understanding of all aspects of farm milk collection and handling, milk quality and quality tests, and sanitation and sanitary requirements that contribute to the trust between the producer and the dairy plant. The video educates prospective haulers, weighers, and samplers throughout Ohio. (Ohio State University—2001)
- D1130 Pasteurizer - Design and Regulation**—(16 minute videotape). This tape provides a summary of the public health reasons for pasteurization and a nonlegal definition of pasteurization. The components of an HTST pasteurizer, elements of design, flow-through diagram and legal controls are discussed. (Kraft General Foods—1990) (Reviewed 1998)
- D1140 Pasteurizer - Operation**—(11 minute videotape). This tape provides a summary of the operation of an HTST pasteurizer from start-up with hot water sanitization to product pasteurization and shut-down. There is an emphasis on the legal documentation required. (Kraft General Foods—1990) (Reviewed 1998)
- D1150 Processing Fluid Milk**—(30 minute—140 slides—script—tape). This slide set was developed to train processing plant personnel on preventing food poisoning and spoilage bacteria in fluid dairy products. Emphasis is on processing procedures to meet federal regulations and standards. Processing procedures, pasteurization times and temperatures, purposes of equipment, composition standards, and cleaning and sanitizing are covered. Primary emphasis is on facilities such as drains and floors, and filling equipment to prevent post-pasteurization contamination with spoilage or food poisoning bacteria. It was reviewed by many industry plant operators and regulatory agents and is directed to plant workers and management. (Penn State—1987) (Reviewed 1998)

ENVIRONMENTAL

- E3010 The ABCs of Clean—A Handwashing & Cleanliness Program for Early Childhood Programs**—For early childhood program employees. This tape illustrates how proper handwashing and clean hands can contribute to the infection control program in daycare centers and other early childhood programs. (The Soap & Detergent Association—1991)
- E3020 Acceptable Risks?**—(16 minute videotape). Accidents, deliberate misinformation, and the rapid proliferation of nuclear power plants have created increased fears of improper nuclear waste disposal, accidents during the transportation of waste, and the release of radioactive effluents from plants. The program shows the occurrence of statistically anomalous leukemia clusters; governmental testing of marine organisms and how they absorb radiation; charts the kinds and amounts of natural and man-made radiation to which man is subject; and suggests there is no easy solution to balancing our fears to nuclear power and our need for it. (Films for the Humanities & Sciences, Inc.—1993) (Reviewed 1998)
- E3030 Air Pollution: Indoor**—(26 minute videotape). Indoor air pollution is in many ways a self-induced problem...which makes it no easier to solve. Painting and other home improvements have introduced pollutants, thermal insulation and other energy-saving and water-proofing devices have trapped the pollutants inside. The result is that air pollution inside a modern home can be worse than inside a chemical plant. (Films for the Humanities & Sciences, Inc.) (Reviewed 1998)
- E3031 Allergy Beware**—(15 minute videotape). Designed to educate food and beverage company employees about their role in preventing an accidental allergic reaction caused by a product their company produces. Recommended for product development, production, labeling, scheduling and cleaning. Everyone has an important role to prevent cross-contamination and mislabeling issues. (Food and Consumer Products Manufacturers of Canada—2003)
- E3040 Asbestos Awareness**—(20 minute videotape). This videotape discusses the major types of asbestos and their current and past uses. Emphasis is given to the health risks associated with asbestos exposure and approved asbestos removal abatement techniques. (Industrial Training, Inc.—1988) (Reviewed 1998)
- E3055 Effective Handwashing—Preventing Cross-Contamination in the Food Service Industry**—(3 1/2 minute videotape). It is critical that all food service workers wash their hands often and correctly. This video discusses the double wash method and the single wash method and when to use each method. (Zep Manufacturing Company—1993)
- E3060 EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Ceriodaphnia)**—(22 minute videotape). Demonstrates the Ceriodaphnia 7-Day Survival and Reproduction Toxicity Test and how it is used to monitor and evaluate effluents for their toxicity to biota and their impact on receiving waters and the establishment of NPDES permit limitations for toxicity. The tape covers the general procedures for the test including how it is set up, started, monitored, renewed and terminated. (1989) (Reviewed 1998)
- E3070 EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Fathead Minnow Larva)**—(15 minute videotape). A training tape that teaches environmental professionals about the Fathead Minnow Larval Survival and Growth Toxicity Test. The method described is found in an EPA document entitled, "Short Term Methods for Estimating the Chronic Toxicity of Effluents & Receiving Waters to Freshwater Organisms." The tape demonstrates how fathead minnow toxicity tests can be used to monitor and evaluate effluents for their toxicity to biota and their impact on receiving waters and the establishment of NPDES permit limitations for toxicity. (1989) (Reviewed 1998)
- E3075 EPA: This is Super Fund**—(12 minute videotape). Produced by the United States Environmental Protection Agency (EPA) in Washington, D.C., this videotape focuses on reporting and handling hazardous waste sites in our environment. The agency emphasizes community involvement in identifying chemical waste sites and reporting contaminated areas to the authorities. The primary goal of the "Super Fund Site Process" is to protect human health and to prevent and eliminate haz-

ardous chemicals in communities. The film outlines how to identify and report abandoned waste sites and how communities can participate in the process of cleaning up hazardous sites. The program also explains how federal, state and local governments, industry and residents can work together to develop and implement local emergency preparedness/response plans in case chemical waste is discovered in a community.

- E3100** **Fit to Drink**—(20 minute videotape). This program traces the water cycle, beginning with the collection of rain-water in rivers and lakes, in great detail through a water treatment plant, to some of the places where water is used, and finally back into the atmosphere. Treatment of the water begins with the use of chlorine to destroy organisms; the water is then filtered through various sedimentation tanks to remove solid matter. Other treatments employ ozone, which oxidizes contaminants and makes them easier to remove; hydrated lime, which reduces the acidity of the water; sulfur dioxide, which removes any excess chlorine; and flocculation, a process in which aluminum sulfate causes small particles to clump together and precipitate out. Throughout various stages of purification, the water is continuously tested for smell, taste, titration, and by fish. The treatment plant also monitors less common contaminants with the use of up-to-date techniques like flame spectrometers and gas liquefaction. (Films for the Humanities & Sciences, Inc.—1987)
- E3110** **Garbage: The Movie**—(25 minute videotape). A fascinating look at the solid waste problem and its impact on the environment. Viewers are introduced to landfills, incinerators, recycling plants and composting operations as solid waste management solutions. Problems associated with modern landfills are identified and low-impact alternatives such as recycling, reuse, and source reduction are examined. (Churchill Films) (Reviewed 1998)
- E3120** **Global Warming: Hot Times Ahead**—(23 minute videotape). An informative videotape program that explores the global warming phenomenon and some of the devastating changes it may cause. This program identifies greenhouse gases and how they are produced by human activities. Considered are: energy use in transportation, industry and home; effects of deforestation, planting of trees and recycling as means of slowing the build-up of greenhouse gases. (Churchill Films—1995)
- E3130** **Kentucky Public Swimming Pool & Bathing Facilities**—(38 minute videotape). Developed by the Lincoln Trail District Health Department in Kentucky and includes all of their state regulations which may be different from other states, provinces and countries. This tape can be used to train those responsible for operating pools and waterfront bath facilities. All aspects are included of which we are aware, including checking water conditions and filtration methods. (1987). (Reviewed 1998)
- E3135** **Plastics Recycling Today: A Growing Resource**—(11:35 minute videotape). Recycling is a growing segment of our nation's solid waste management program. This video shows how plastics are handled from curbside pickup through the recycling process to end-use by consumers. This video provides a basic understanding of recycling programs and how communities, companies and others can benefit from recycling. (The Society of the Plastics Industry, Inc.—1988)

- E3140** **Putting Aside Pesticides**—(26 minute videotape). This program probes the long-term effects of pesticides and explores alternative pest-control efforts; biological pesticides, genetically-engineered microbes that kill objectionable insects, the use of natural insect predators, and the cross-breeding and genetic engineering of new plant strains that produce their own anti-pest toxins. (Films for the Humanities & Sciences, Inc.) (Reviewed 1999)
- E3150** **Radon**—(26 minute videotape). This program looks at the possible health implications of radon pollution, methods home-owners can use to detect radon gas in their homes, and what can be done to minimize hazards once they are found.
- E3160** **RCRA—Hazardous Waste**—(19 minute videotape). This videotape explains the dangers associated with hazardous chemical handling and discusses the major hazardous waste handling requirements presented in the Resource Conservation and Recovery Act. (Industrial Training, Inc.)
- E3161** **The Kitchen Uncovered Orkin Sanitized EMP**—(13 minute videotape). This video teaches restaurant workers what they can do to prevent pest infestation, and what health inspectors look for. An excellent training tool for food service workers that can be used in conjunction with HACCP instruction. (Orkin Pest Control—1997)
- The New Superfund. What It is & How It Works**—A six-hour national video conference sponsored by the EPA. Target audiences include the general public, private industry, emergency responders and public interest groups. The series features six videotapes that review and highlight the following issues:
- E3170** **Tape 1—Changes in the Remedial Process: Clean-up Standards and State Involvement Requirements**—(62 minute videotape). A general overview of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and the challenge of its implementation. The remedy process — long-term and permanent clean-up is illustrated step-by-step, with emphasis on the new mandatory clean-up schedules, preliminary site assessment petition procedures and the hazard ranking system/National Priority List revisions. The major role of state and local government involvement and responsibility is stressed.
- E3180** **Tape 2—Changes in the Removal Process: Removal and Additional Program Requirements**—(48 minute videotape). The removal process is a short-term action and usually an immediate response to accidents, fires and illegal dumped hazardous substances. This program explains the changes that expand removal authority and require procedures consistent with the goals of remedial action.
- E3190** **Tape 3—Enforcement & Federal Facilities**—(52 minute videotape). Who is responsible for SARA clean-up costs? Principles of responsible party liability; the difference between strict, joint and several liability; and the issue of the inno-

cent land owner are discussed. Superfund enforcement tools-mixed funding, De Minimis settlements and the new nonbinding preliminary allocations of responsibility (NBARS) are explained.

E3210 **Tape 4-Emergency Preparedness & Community Right-to-Know**-(48 minute videotape). A major part of SARA is a free-standing act known as Title III: The Emergency Planning and Community Right-to-Know Act of 1986, requiring federal, state, and local governments and industry to work together in developing local emergency preparedness/response plans. This program discusses local emergency planning committee requirements, emergency notification procedures, and specifications on community right-to-know reporting requirements such as using OSHA Material Safety Data Sheets, the emergency & hazardous chemical inventory and the toxic chemical release inventory.

E3220 **Tape 5-Underground Storage Tank Trust Fund & Response Program**-(21 minute videotape). Another addition to SARA is the Leaking Underground Storage Tank (LUST) Trust Fund. One half of the US population depends on ground water for drinking—and EPA estimates that as many as 200,000 underground storage tanks are corroding and leaking into our ground water. This program discusses how the LUST Trust Fund will be used by EPA and the states in responding quickly to contain and clean-up LUST releases. Also covered is state enforcement and action requirements, and owner/operator responsibility.

E3230 **Tape 6-Research & Development/Closing Remarks**-(33 minute videotape). An important new mandate of the new Superfund is the technical provisions for research and development to create more permanent methods in handling and disposing of hazardous wastes and managing hazardous substances. This segment discusses the SITE (Superfund Innovative Technology Evaluation) program, the University Hazardous Substance Research Centers, hazardous substance health research and the DOD research, development and demonstration management of DOD wastes.

E3240 **Sink a Germ**-(10 minute videotape). A presentation on the rationale and techniques for effective handwashing in health care institutions. Uses strong imagery to educate hospital personnel that handwashing is the single most important means of preventing the spread of infection. (The Brevis Corp.-1986). (Reviewed 1998)

E3245 **Wash Your Hands**-(5 minute videotape). Handwashing is the single most important means of preventing the spread of infection. This video presents why handwashing is important and the correct way to wash your hands. (LWB Company-1995)

E3250 **Waste Not: Reducing Hazardous Waste**-(35 minute videotape). This tape looks at the progress and promise of efforts to reduce the generation of hazardous waste at the source. In a series of company profiles, it shows activities and programs within industry to minimize hazardous waste in the production process. Waste Not also looks at the obstacles to waste reduction, both within and outside of industry, and considers how society might further encourage the adoption of pollution prevention, rather than pollution control, as the primary approach to the problems posed by hazardous waste. (Umbrella films)

E3251 **Would Your Restaurant Kitchen Pass Inspection?**-(29 minute videotape). Help ensure a perfect score on any health inspection with this video by addressing safe food-handling techniques in the food service industry. Learn how foodborne illness is spread and how it can be prevented. Dramatizations display specific techniques students and employees can use to help any restaurant kitchen meet the highest standards. (Chipsbooks Company-2003)

FOOD

F2260 **100 Degrees of Doom... The Time & Temperature Caper**-(14 minute videotape). Video portraying a private eye tracking down the cause of a *Salmonella* poisoning. Temperature control is emphasized as a key factor in preventing foodborne illness. (Educational Communications, Inc.-1987) (Reviewed 1998)

F2265 **A Day in the Deli**-(22 minute videotape). This training video provides basic orientation for new deli department employees and highlights skills and sales techniques that will build department traffic and increased sales. The focus will be on the priorities of the deli department-freshness, strong customer service, professionalism and food safety. By understanding the most important issues for their position(s), employees can comprehend their contribution to the financial interests of the store. (Food Marketing Institute - 2003)

F2450 **A Guide to Making Safe Smoked Fish**-(21 minute videotape). Smoked fish can be a profitable product for aquaculturalists, but it can be lethal if not done correctly. This video guides you through the steps necessary to make safe smoked fish. It provides directions for brining, smoking, cooling, packaging and labeling, and cold storage to ensure safety. The video features footage of fish smoking being done using both traditional and modern equipment. (University of Wisconsin-Madison-Spring, 1999)

F2005 **A Lot on the Line**-(25 minute videotape). Through a riveting dramatization, "A Lot on the Line" is a powerful training tool for food manufacturing and food service employees. In the video, a food plant supervisor and his pregnant wife are eagerly awaiting the birth of their first child. Across town, a deli manager is taking his wife and young daughter away for a relaxing weekend. Both families, in a devastating twist of fate, will experience the pain, fear, and disruption caused by foodborne illness. This emotionally charged video will enthrall new and old employees alike and strongly reinforce the importance of incorpo-

rating GMPs into everyday work routines. Without question, "A Lot on the Line" will become an indispensable part of your company's training efforts. (Silliker Laboratories-2000)

- F2007 The Amazing World of Microorganisms**—(12 minute videotape). This training video provides your employees with an overview of how microorganisms affect their everyday lives and the foods they produce. The video explores how microscopic creatures are crucial in producing foods, fighting disease, and protecting the environment. In addition, certain microorganisms—when given the proper time and conditions to grow—are responsible for food spoilage, illness, and even death. Equipped with this knowledge, your employees will be better able to protect your brand. (Silliker Laboratories Group, Inc., Homewood, IL- 2001)
- F2008 A Recipe for Food Safety Success**—(30 minute videotape). This video helps food-industry employees understand their obligations in the areas of safety and cleanliness... what the requirements are, why they exist, and the consequences for all involved if they're not adhered to consistently. Critical information covered includes the role of the FDA and USDA; HACCP systems; sanitation and pest control; time and temperature controls that fight bacteria growth, and the causes and effects of pathogens. (J. J. Keller - 2002)
- F2009 Basic Personnel Practices**—(18 minute videotape). This training video covers the practical GMPs from the growing field to the grocery store with a common sense approach. Employees learn the necessary training to help them understand the basic principles of food safety. (AIB International- 2003)
- F2440 Cleaning & Sanitizing in Vegetable Processing Plants: Do It Well, Do It Safely!**—(16 minute videotape) This training video shows how to safely and effectively clean and sanitize in a vegetable processing plant. It teaches how it is the same for processing plant as it is for washing dishes at home. (University of Wisconsin Extension-1996) (Available in Spanish)
- F2010 Close Encounters of the Bird Kind**—(18 minute videotape). A humorous but in-depth look at *Salmonella* bacteria, their sources, and their role in foodborne disease. A modern poultry processing plant is visited, and the primary processing steps and equipment are examined. Potential sources of *Salmonella* contamination are identified at the different stages of production along with the control techniques that are employed to insure safe poultry products. (Topek Products, Inc.) (Reviewed 1998)
- F2013 Control of *Listeria monocytogenes* in Small Meat and Poultry Establishments**—(26 minute videotape). This video addresses a variety of issues facing meat processors who must meet revised regulations concerning *Listeria monocytogenes* in ready-to-eat meats. Topics covered include personal hygiene, sanitation, Biofilms, cross contamination, inplant sampling, and microbiological testing. (Penn State College of Ag Sciences-2003)—(Available in Spanish)
- F2015 Controlling *Listeria*: A Team Approach**—(16 minute videotape). In this video, a small food company voluntarily shuts down following the implication of one of its products in devastating outbreak of *Listeria monocytogenes*. This recall dramatization is followed by actual in-plant footage highlighted key practices in controlling *Listeria*.
- This video provides workers with an overview of the organism, as well as practical steps that can be taken to control its growth in plant environments. Finally, the video leaves plant personnel with a powerful, resounding message: Teamwork and commitment are crucial in the production of safe, quality foods. (Silliker Laboratories-2000)
- F2111 Controlling *Salmonella*: Strategies That Work**—(13 minute videotape). This training video provides practical guidelines to prevent the growth of *Salmonella* in dry environments and avoid costly product recalls. Using this video as a discussion tool, supervisors can help employees learn about water and how it fosters conditions for the growth of *Salmonella* in dry processing plants with potentially devastating consequences. (Silliker Labs- 2002)
- F2037 Cooking and Cooling of Meat and Poultry Products**—(2 videotapes - 176 minutes). (See Part 1 Tape F2035 and Part 2 Tape F2036). This is session 3 of a 3-part Meat and Poultry Teleconference cosponsored by AFDO and the USDA Food Safety Inspection Service. Upon completion of viewing these videotapes, the viewer will be able to (1) recognize inadequate processes associated with the cooking and cooling of meat and poultry at the retail level; (2) Discuss the hazards associated with foods and the cooking and cooling processes with management at the retail level; (3) Determine the adequacy of control methods to prevent microbiological hazards in cooking and cooling at the retail level, and (4) Understand the principle for determining temperature with various temperature measuring devices. (AFDO/USDA-1999)
- F2030 "Egg Games" Foodservice Egg Handling and Safety**—(18 minute videotape). Develop an effective egg handling and safety program that is right for your operation. Ideal for manager training and foodservice educational programs, this video provides step-by-step information in an entertaining, visually-exciting format. (American Egg Board-1999)
- F2020 Egg Handling & Safety**—(11 minute videotape). Provides basic guidelines for handling fresh eggs which could be useful in training regulatory and industry personnel. (American Egg Board-1997)
- F2021 Egg Production**—(46 minute videotape). Live action footage of a completely automated operation follows the egg from the chicken to the carton. Watch the eggs as they roll down onto the main line, are washed, "candled," sorted by weight, placed into their packing containers and prepared for shipment. Sanitation and health concerns are addressed. (Chipsbooks Company-2003)
- F2036 Emerging Pathogens and Grinding and Cooking Comminuted Beef**—(2 videotapes - 165 minutes.) (See Part 1 Tape F2035 and Part 3 Tape F2037.) This is session 2 of a 3-part Meat and Poultry Teleconference co-sponsored by AFDO and the USDA Food Safety Inspection Service. These videotapes present an action plan for federal, state, local authorities, industry, and trade associations in a foodborne outbreak. (AFDO/USDA-1998)
- F2035 Fabrication and Curing of Meat and Poultry Products**—(2 videotapes - 145 minutes). (See Part 2 Tape F2036 and Part 3 Tape F2037). This is session 1 of a 3-part Meat and Poultry Teleconference cosponsored by AFDO and the USDA Food Safety Inspection Service. Upon viewing, the sanitarian will be able to

- (1) Identify typical equipment used for meat and poultry fabrication at retail and understand their uses;
- (2) Define specific terms used in fabrication of meat and poultry products in retail establishments, and
- (3) Identify specific food safety hazards associated with fabrication and their controls. (AFDO/USDA-1997)

FastTrack Restaurant Video Kit—These five short, direct videos can help make your employees more aware of various food hazards and how they can promote food safety. (DiverseyLever/American Hotel & Lodging Educational Institute - 1994)

- F2500 Tape 1—Food Safety Essentials**—(23 minute videotape). This video provides an overview of food safety. All food service employees learn six crucial guidelines for combating foodborne illness. Prepares employees for further position-specific training to apply the six food safety principles to specific jobs.
- F2501 Tape 2—Receiving and Storage**—(22 minute videotape). Make sure only safe food enters your doors! Receiving and storage staff learn what to look for and how to prevent spoilage with proper storage with this video.
- F2502 Tape 3—Service**—(22 minute videotape). Servers are your last safety checkpoint before guests receive food. This video helps you make sure they know the danger signs.
- F2503 Tape 4—Food Production**—(24 minute videotape). Food production tasks cause most food safety problems. Attack dangerous practices at this critical stage with this video training tool.
- F2504 Tape 5—Warewashing**—(21 minute videotape). Proper sanitation starts with clean dishes! With this video, warewashers will learn how to ensure safe tableware for guests and safe kitchenware for co-workers.
- F2039 Food for Thought—The GMP Quiz Show**—(16 minute videotape). In the grand tradition of television quiz shows, three food industry workers test their knowledge of GMP principles. As the contestants jockey to answer questions, the video provides a thorough and timely review of GMP principles. This video is a cost-effective tool to train new hires or sharpen the knowledge of veteran employees. Topics covered include employee practices, including proper attire, contamination, stock rotation, pest control, conditions for microbial growth and employee traffic patterns. Food safety terms such as HACCP, microbial growth niche, temperature danger zone, FIFO and cross-contamination, are also defined. (Silliker Laboratories—2000)
- F2040 Food Irradiation**—(30 minute videotape). Introduces viewers to food irradiation as a new preservation technique. Illustrates how food irradiation can be used to prevent spoilage by microorganisms, destruction by insects, overripening, and to reduce the need for chemical food additives. The food irradiation process is explained and benefits of the process are highlighted. (Turnelle Productions, Inc.) (Reviewed 1998)
- F2045 Food Microbiological Control**—(6 videotapes - approximate time 12 hours). Designed to provide information and demonstrate the application of basic microbiology, the Good Manufacturing Practices (GMPs), retail Food Code, and sanitation practices when conducting food inspections at the processing and retail levels. Viewers will enhance their ability to identify potential food hazards and evaluate the adequacy of proper control methods for these hazards. (FDA-1998)
- F2050 Food Safe—Food Smart—HACCP & Its Application to the Food Industry**—(2-16 minute videotapes). (1)—Introduces the seven principles of HACCP and their application to the food industry. Viewers will learn about the HACCP system and how it is used in the food industry to provide a safe food supply. (2)—Provides guidance on how to design and implement a HACCP system. It is intended for individuals with the responsibility of setting up a HACCP system. (Alberta Agriculture, Food and Rural Development) (Reviewed 1998)
- F2060 Food Safe—Series I**—(4-10 minute videotapes). (1) "Receiving & Storing Food Safely," details for food-service workers the procedures for performing sight inspections for the general conditions of food, including a discussion of food labeling and government approval stamps. (2) "Food-service Facilities and Equipment," outlines the requirements for the proper cleaning and sanitizing of equipment used in food preparation areas. Describes the type of materials, design, and proper maintenance of this equipment. (3) "Microbiology for Foodservice Workers," provides a basic understanding of the microorganisms which cause food spoilage and foodborne illness. This program describes bacteria, viruses, protozoa, and parasites and the conditions which support their growth. (4) "Food-service Housekeeping and Pest Control," emphasizes cleanliness as the basis for all pest control. Viewers learn the habits and life cycles of flies, cockroaches, rats, and mice. (Perennial Education—1991) (Reviewed 1998)
- F2070 Food Safe—Series II**—(4-10 minute videotapes). Presents case histories of foodborne disease involving (1) *Staphylococcus aureus*, (sauces) (2) *Salmonella*, (eggs) (3) *Campylobacter*, and (4) *Clostridium botulinum*. Each tape demonstrates errors in preparation, holding or serving food; describes the consequences of those actions; reviews the procedures to reveal the cause of the illness; and illustrates the correct practices in a step-by-step demonstration. These are excellent tapes to use in conjunction with hazard analysis critical control point training programs. (Perennial Education—1991) (Reviewed 1998)
- F2080 Food Safe—Series III**—(4-10 minute videotapes). More case histories of foodborne disease. This set includes (1) Hepatitis "A", (2) *Staphylococcus aureus* (meats), (3) *Bacillus cereus*, and (4) *Salmonella* (meat). Viewers will learn typical errors in the preparation, holding and serving of food. Also included are examples of correct procedures which will reduce the risk of food contamination. (Perennial Education—1991) (Reviewed 1998)
- F2133 Food Safety First**—(50 minute videotape). This food safety training video presents causes of foodborne illness in foodservice and ways to prevent foodborne illness. Individual segments include personal hygiene and handwashing, cleaning and sanitizing, prevent-

ing cross contamination and avoiding time and temperature abuse. Foodhandling principles are presented through scenarios in a restaurant kitchen. (Glo-Germ 1998). Available in Spanish.

F2090

Food Safety: An Educational Video for Institutional Food Service Workers—(10 minute videotape). Provides a general discussion on food safety principles with special emphasis on pathogen reductions in an institutional setting from child care centers to nursing homes. (US Department of Health & Human Services—1997)

Food Safety for Food Service Series I—An employee video series containing quick, 10-minute videos that teach food service employees how to prevent foodborne illness. This four video series examines sources of foodborne illness, plus explores prevention through awareness and recommendations for best practices for food safety. It also looks at how food safety affects the food service employee's job. (J.J. Keller & Associates—2000)

F2100 Tape 1—Food Safety for Food Service: Cross Contamination—(10 minute videotape). Provides the basic information needed to ensure integrity and safety in foodservice operations. Explains proper practices and procedures to prevent, detect and eliminate cross contamination.

F2101 Tape 2—Food Safety for Food Service: HACCP—(10 minute videotape). This video takes the mystery out of HACCP for your employees, and explains the importance of HACCP procedures in their work. Employees will come away feeling confident, knowing how to make HACCP work. The seven steps of HACCP and how HACCP is used in foodservice are some of the topics discussed.

F2102 Tape 3—Food Safety for Food Service: Personal Hygiene—(10 minute videotape). This video establishes clear, understandable ground rules for good personal hygiene in the foodservice workplace and explains why personal hygiene is so important. Topics include: personal cleanliness; proper protective equipment; correct hand washing procedures; when to wash hands, hygiene with respect to cross contamination and prohibited practices and habits.

F2103 Tape 4—Food Safety for Food Service: Time and Temperature Controls—(10 minute videotape). This video examines storage and handling of raw and cooked ingredients, and explains how to ensure their safety. Employees learn how to spot potential problems and what to do when they find them. Topics include: correct thermometer use, cooling, thawing and heating procedures, food storage procedures, holding temperature requirements, and handling leftovers.

Food Safety for Food Service Series II—An employee video series containing quick, 10-minute videos that boost safety awareness for food service employees and teach them how to avoid foodborne illness. (J. J. Keller & Associates, Neenah, WI—2002)

F2104 Tape 1—Basic Microbiology and Foodborne Illness—(10 minute videotape). Covers four common microorganisms in food, how they get into food, and simple ways to prevent contamination. Stresses the importance of keeping food at the right temperature, having proper personal hygiene, and cleaning and sanitizing work surfaces.

F2105 Tape 2—Handling Knives, Cuts and Burns—(10 minute videotape). Explains why sharp knives are safer than dull ones, provides tips for selecting a good knife, and gives techniques for cutting food safely. Also explains first aid for cuts and burns and the most common causes of burns.

F2106 Tape 3—Working Safely to Prevent Injury—(10 minute videotape). Discusses common lifting hazards and how back injuries can happen. Gives proper lifting and carrying techniques to prevent soreness and injury. Also covers how to prevent slips, trips, and falls.

F2107 Tape 4—Sanitation—(10 minute videotape). Provides tips for good personal hygiene habits, including the proper way to wash your hands, dress, and prepare for work. Also covers cleaning and sanitizing equipment; storing chemicals and cleaning supplies; and controlling pests that can contaminate work areas and food.

F2120 Food Safety: For Goodness Sake, Keep Food Safe—(15 minute videotape). Teaches foodhandlers the fundamentals of safe food handling. The tape features the key elements of cleanliness and sanitation, including: good personal hygiene, maintaining proper food product temperature, preventing time abuse, and potential sources of food contamination. (Iowa State University Extension—1990) (Reviewed 1998)

F2110 Food Safety is No Mystery—(34 minute videotape). This is an excellent training visual for foodservice workers. It shows the proper ways to prepare, handle, serve and store food in actual restaurant, school and hospital situations. A policeman sick from food poisoning, a health department sanitarian, and a food-service worker with all the bad habits are featured. The latest recommendations on personal hygiene, temperatures, cross-contamination, and storage of foods are included. (USDA—1987). Also available in Spanish. — (Reviewed 1998)

F2130 Food Safety: You Make the Difference—(28 minute videotape). Through five food workers from differing backgrounds, this engaging and inspirational documentary style video illustrates the four basic food safety concepts: handwashing, preventing cross-contamination, moving foods quickly through the danger zone, and hot/cold holding (Seattle-King County Health Department—1995)

Food Safety Zone Video Series—A one-of-a-kind series that helps get your employees to take food safety issues seriously! These short, to-the-point videos can help make your employees aware of

various food hazards, and how they can help promote food safety. The 4 topics are: Basic Microbiology, Cross Contamination, Personal Hygiene, and Sanitation. (J.J. Keller & Associates – 1999). (Also available in Spanish.)

- F2125 Tape 1–Food Safety Zone: Basic Microbiology**–(10 minute videotape). In this video, food service personnel will gain a deeper understanding of food safety issues and what they can do to prevent recalls and contamination. It describes the different types of bacteria that can be harmful to food, and tells how to minimize bacterial growth through time and temperature controls, personal hygiene practices, and sanitation.
- F2126 Tape 2–Food Safety Zone: Cross Contamination**–(10 minute videotape). Quickly teach your employees how they can help prevent cross contamination. Employees are educated on why contaminants can be extremely dangerous, cause serious injury, and even death, to consumers of their food products. This fast-paced video will give your employees a deeper understanding of the different types of cross contamination, how to prevent it, and how to detect it through visual inspections and equipment. The emphasis is that prevention is the key to eliminating cross contamination.
- F2127 Tape 3–Food Safety Zone: Personal Hygiene**–(10 minute videotape). After watching this video, your employees will understand why their personal hygiene is critical to the success of your business. This video teaches employees about four basic good personal hygiene practices: keeping themselves clean, wearing clean clothes, following specific hand washing procedures, and complying with all related work practices. Personnel are also taught that personal hygiene practices are designed to prevent them from accidentally introducing bacteria to food products, and are so important that there are federal laws that all food handlers must obey.
- F2128 Tape 4–Food Safety Zone: Sanitation**–(10 minute videotape). Don't just tell your employees why sanitation is important, show them! This training video teaches employees about the sanitation procedures that cover all practices to keep workplaces clean, and food produced free of contaminants and harmful bacteria. Four areas covered include personal hygiene, equipment and work areas, use and storage of cleaning chemicals and equipment, and pest control.
- F2134 Food Safety: Fish and Shellfish Safety Video**–(21 minute videotape). Seafood tops the list for foods that can become contaminated with bacteria-causing foodborne illness. This video shows how to protect yourself from fish and shellfish contamination by learning proper selection, storage, preparation and safe consumption. (Chipsbooks Company – 2003)
- F2129 Food Technology: Irradiation**–(29 minute videotape). Video covers the following issues: history and details of the irradiation process; effects of irradiation on treated products, and consumer concerns and acceptance trends. Other important concerns addressed include how food irradiation affects food cost, the nutritional food industry, food science and research, and irradiation regulatory industries (such as the Nuclear Regulatory Commission) add insight into the process of irradiation. (Chipbooks– 2001)
- F2135 Get with a Safe Food Attitude**–(40 minute videotape). Consisting of nine short segments which can be viewed individually or as a group, this video presents safe food handling for moms-to-be. Any illness a pregnant woman contracts can affect her unborn child whose immune system is too immature to fight back. The video follows four pregnant women as they learn about food safety and preventing foodborne illness. (US Department of Agriculture–1999)
- F2136 GLP Basics: Safety in the Food Micro Lab**–(16 minute videotape). This video is designed to teach laboratory technicians basic safety fundamentals and how to protect themselves from inherent workplace dangers. Special sections on general laboratory rules, personal protective equipment, microbiological, chemical, and physical hazards, autoclave safety, and spill containment are featured. (Silliker Laboratories Group, Inc., Homewood, IL–2001)
- F2137 GMP Basics: Avoiding Microbial Cross-Contamination**–(15 minute videotape). This video takes a closer look at how harmful microorganisms, such as *Listeria*, can be transferred to finished products. Employees see numerous examples of how microbial cross-contamination can occur from improper traffic patterns, poor personal hygiene, soiled clothing, unsanitized tools and equipment. Employees need specific knowledge and practical training to avoid microbial cross-contamination in plants. This video aids in that training. (Silliker Laboratories–2000)
- F2140 GMP Basics – Employee Hygiene Practices**–(20 minute videotape). Through real-life examples and dramatization, this video demonstrates good manufacturing practices that relate to employee hygiene, particularly hand washing. This video includes a unique test section to help assess participants' understanding of common GMP violations. (Silliker Laboratories–1997)
- F2143 GMP Basics: Guidelines for Maintenance Personnel**–(21 minute videotape). Developed specifically for maintenance personnel working in a food processing environment, this video depicts a plant-wide training initiative following a product recall announcement. Maintenance personnel will learn how GMPs relate to their daily activities and how important their roles are in the production of safe food products. (Silliker Laboratories–1999)
- F2148 GMP–GSP Employee**–(38 minute videotape). This video was developed to teach food plant employees the importance of "Good Manufacturing Practices" and "Good Sanitation Practices." Law dictates that food must be clean and safe to eat. This video emphasizes the significance of each employee's role in protecting food against contamination. Tips on personal cleanliness and hygiene are also presented. (L.J. Bianco & Associates)
- F2150 GMP: Personal Hygiene & Practices in Food Manufacturing**–(14 minute videotape). This video focuses on the personal hygiene of food-manufac-

turing workers, and explores how poor hygiene habits can be responsible for the contamination of food in the manufacturing process. This is an instructional tool for new food-manufacturing line employees and supervisors. It was produced with "real" people in actual plant situations, with only one line of text included in the videotape. (Penn State-1993)-(Available in Spanish and Vietnamese)

- F2147 GMP Basics: Process Control Practices**-(16 minute videotape). In actual food processing environments, an on-camera host takes employees through a typical food plant as they learn the importance of monitoring and controlling key points in the manufacturing process. Beginning with receiving and storing, through production, and ending with packaging and distribution, control measures are introduced, demonstrated, and reviewed. Employees will see how their everyday activities in the plant have an impact on product safety. (Silliker Laboratories-1999)
- GMP Food Safety Video Series**-This five-part video series begins with an introduction to GMPs and definitions, then goes on to review specific sections of the GMPs: personnel, plant and grounds, sanitary operations, equipment and utensils, process and controls, warehousing, and distribution. Developed to assist food processors in training employees on personnel policies and Good Manufacturing Practices (GMPs), the series includes different types of facilities, including dairy plants, canning factories, pasta plants, bakeries, and frozen food manufacturing facilities. (J.J. Keller- 2003)
- F2151 Tape 1-Definitions**-(11:40 minute videotape). Provides the definitions necessary to understand the meaning of the GMPs.
- F2152 Tape 2-Personnel and Personnel Facilities**-(11:20 minute videotape). Covers selection of personnel, delegation of responsibilities, development of plant policies for employees, and operational practices.
- F2153 Tape 3-Building and Facilities**-(15:50 minute videotape). Discusses guidelines for the construction and maintenance of the manufacturing plant and grounds around the plant.
- F2154 Tape 4-Equipment and Utensils**-(12:30 minute videotape). Provides guidelines for the construction, installation, and maintenance of processing equipment.
- F2155 Tape 5-Production and Process Controls**-(20 minute videotape). Covers establishing a food safety committee, in-house inspections, analysis of raw materials and ingredients, cleaning schedules and procedures, and more.
- F2160 GMP: Sources & Control of Contamination during Processing**-(20 minute videotape). This program, designed as an instructional tool for new employees and for refresher training for current or reassigned workers, focuses on the sources and control of contamination in the food-manufacturing process. It was produced in actual food plant situations. A concise description of microbial contamination and growth and cross-contamination, a demonstration of food storage, and a review of aerosol contaminants are also included. (Penn State-1995)

GMPs for Food Plant Employees; 5 volume video series based on European standards and regulations-Developed to assist food processors in training employees in the Good Manufacturing Practices. Examples are drawn from a variety of processing facilities including dairy plants, canning facilities, pasta plants, bakeries, frozen food facilities, etc. (AIB International- 2003)

- F2161 Tape 1-Definitions**-(13 minute videotape). Begins with an introduction to the GMPs and traces a basic history of food laws in Europe, ending with the EC Directive 93/43/EEC of June 1993 on the hygiene of foodstuffs.
- F2162 Tape 2-Personnel and Personnel Practices**-(13 minute videotape). Selecting personnel, delegating responsibilities, developing plant policies for employees and visitors, and establishing operational practices.
- F2163 Tape 3-Building and Facilities**-(17 minute videotape). Guidelines for the construction and maintenance of the manufacturing facility and grounds around the factory.
- F2164 Tape 4-Equipment and Utensils**-(13 minute videotape). Guidelines for construction, installation, and maintenance of processing equipment.
- F2165 Tape 5-Production/Process Controls**-(22 minute videotape). Covers production and process controls, establishing a food safety committee, conducting in-house inspections, analyzing raw materials and ingredients, developing operational methods, establishing cleaning schedules and procedures, creating pest control programs and record keeping.
- F2266 HACCP: A Basic Understanding**-(32 minute videotape). Explore applications for Hazard Analysis Critical Control Points (HACCP), a system of process controls required by federal and state governments for most areas of the food service industry. Learn to minimize the risk of chemical, microbiological and physical food contamination while focusing on the seven principles of HACCP and the chain of responsibility. (Chipsbooks Company-2003)
- F2180 HACCP: Safe Food Handling Techniques**-(22 minute videotape). The video highlights the primary causes of food poisoning and emphasizes the importance of self-inspection. An explanation of potentially hazardous foods, cross-contamination, and temperature control is provided. The main focus is a detailed description of how to implement a Hazard Analysis Critical Control Point (HACCP) program in a food-service operation. A leader's guide is provided as an adjunct to the tape. (The Canadian Restaurant & Foodservices Association-1990) (Reviewed 1998)
- F2169 HACCP: Training for Employees - USDA Awareness**-(15 minute videotape). This video is a detailed training outline provided for the employee program. Included in the video is a synopsis of general federal regulations; HACCP plan development; incorporation of HACCP's seven principles; HACCP plan checklist, and an HACCP employee training program. (J.J. Keller & Associates-1999)

- F2172 HACCP: Training for Managers**—(17 minute videotape). Through industry-specific examples and case studies, this video addresses the seven HACCP steps, identifying critical control points, recordkeeping and documentation, auditing, and monitoring. It also explains how HACCP relates to other programs such as Good Manufacturing Practices and plant sanitation. (J.J. Keller & Associates, Inc.—2000)
- F2170 The Heart of HACCP**—(22 minute videotape). A training video designed to give plant personnel a clear understanding of the seven HACCP principles and practical guidance on how to apply these principles to their own work environment. This video emphasizes the principles of primary concern to plant personnel such as critical limits, monitoring systems, and corrective actions that are vital to the success of a HACCP plan. (Silliker Laboratories Group—1994)
- F2171 HACCP: The Way to Food Safety**—(53 minute videotape). The video highlights the primary causes of food poisoning and stresses the importance of self-inspection. Potentially hazardous foods, cross-contamination and temperature control are explained. The video is designed to give a clear understanding of the seven HACCP principles and practical guidance on how to apply these principles to a work environment. Critical limits, monitoring systems and corrective action plans are emphasized. The video also provides an overview of foodborne pathogens, covering terminology, the impact of pathogens, and what employees must do to avoid problems. Also described are the sources, causes and dangers of contamination in the food industry. (Southern Illinois University—1997)
- F2173 Inside HACCP: Principles, Practices & Results**—(15 minute videotape). This video is designed to help you build a more knowledgeable work-force and meet safety standards through a comprehensive overview of HACCP principles. Employees are provided with details of prerequisite programs and a clear overview of the seven HACCP principles. "Inside HACCP" provides short succinct explanations of how HACCP works and places special emphasis on the four principles —monitoring, verification, corrective action, and recordkeeping — in which employees actively participate. (Silliker Laboratories Group, Inc., Homewood, IL—2001)
- F2175 Inspecting For Food Safety—Kentucky's Food Code**—(100 minute videotape). Kentucky's Food Code is patterned after the Federal Food Code. The concepts, definitions, procedures, and regulatory standards included in the code are based on the most current information about how to prevent foodborne diseases. This video is designed to prepare food safety inspectors to effectively use the new food code in the performance of their duties. (Department of Public Health Commonwealth of Kentucky—1997) (Reviewed 1999)
- F2190 Is What You Order What You Get? Seafood Integrity**—(18 minute videotape). Teaches seafood department employees about seafood safety and how they can help insure the integrity of seafood sold by retail food markets. Key points of interest are cross-contamination control, methods and criteria for receiving seafood and determining product quality, and knowing how to identify fish and seafood when unapproved substitutions have been made. (The Food Marketing Institute) (Reviewed 1998)
- F2210 Northern Delight—From Canada to the World**—(13 minute videotape). A promotional video that explores the wide variety of foods and beverages produced by the Canadian food industry. General in nature, this tape presents an overview of Canada's food industry and its contribution to the world's food supply. (Ternelle Production, Ltd.) (Reviewed 1998)
- F2240 On the Front Line**—(18 minute videotape). A training video pertaining to sanitation fundamentals for vending service personnel. Standard cleaning and serving procedures for cold food, hot beverage and cup drink vending machines are presented. The video emphasizes specific cleaning and serving practices which are important to food and beverage vending operations. (National Automatic Merchandising Association—1993) (Reviewed 1998)
- F2250 On the Line**—(30 minute videotape). This was developed by the Food Processors Institute for training food processing plant employees. It creates an awareness of quality control and regulations. Emphasis is on personal hygiene, equipment cleanliness and good housekeeping in a food plant. It is recommended for showing to both new and experienced workers. (Available in Spanish) The Food Processors Institute. 1993. (Reviewed 1998)
- F2270 Pest Control in Seafood Processing Plants**—(26 minute videotape). Videotape which covers procedures to control flies, roaches, mice, rats and other common pests associated with food processing operations. The tape will familiarize plant personnel with the basic characteristics of these pests and the potential hazards associated with their presence in food operations. (Reviewed 1998)
- F2280 Principles of Warehouse Sanitation**—(33 minute videotape). This videotape gives a clear, concise and complete illustration of the principles set down in the Food, Drug and Cosmetic Act and in the Good Manufacturing Practices, as well as supporting legislation by individual states. (American Institute of Baking—1993)
- F2271 Preventing Foodborne Illness**—(10 minute videotape). This narrated video is for food service workers, with emphasis on insuring food safety by washing one's hands before handling food, after using the bathroom, sneezing, touching raw meats and poultry, and before and after handling foods such as salads and sandwiches. Safe food temperatures and cross contamination are also explained. (Colorado Dept. of Public Health and Environment—1999)
- F2290 Product Safety & Shelf Life**—(40 minute videotape). Developed by Borden Inc., this videotape was done in three sections with opportunity for review. Emphasis is on providing consumers with good products. One section covers off-flavors, another product problems caused by plant conditions, and a third the need to keep products cold and fresh. Procedures to assure this are outlined, as shown in a plant. Well done and directed to plant workers and supervisors. (Borden—1987) — (Reviewed 1997)
- F2220 Proper Handling of Peracetic Acid**—(15 minute videotape). Introduces peracetic acid as a chemical sanitizer and features the various precautions needed to use the product safely in the food industry.

- F2230 Purely Coincidental**—(20 minute videotape). A parody that shows how foodborne illness can adversely affect the lives of families that are involved. The movie compares improper handling of dog food in a manufacturing plant that causes the death of a family pet with improper handling of human food in a manufacturing plant that causes a child to become ill. Both cases illustrate how handling errors in food production can produce devastating outcomes. (The Quaker Oats Company—1993.) (Reviewed 1998)
- F2310 Safe Food: You Can Make a Difference**—(25 minute videotape). A training video for food-service workers which covers the fundamentals of food safety. An explanation of proper food temperature, food storage, cross-contamination control, cleaning and sanitizing, and handwashing as methods of foodborne illness control is provided. The video provides an orientation to food safety for professional foodhandlers. (Tacoma—Pierce County Health Department—1990.) (Reviewed 1998)
- F2320 Safe Handwashing**—(15 minute videotape). Twenty-five percent of all foodborne illnesses are traced to improper handwashing. The problem is not just that handwashing is not done, the problem is that it's not done properly. This training video demonstrates the "double wash" technique developed by Dr. O. Peter Snyder of the Hospitality Institute for Technology and Management. Dr. Snyder demonstrates the procedure while reinforcing the microbiological reasons for keeping hands clean. (Hospitality Institute for Technology and Management—1991) (Reviewed 1998)
- F2325 Safe Practices for Sausage Production**—(3 hour videotape). This videotape is based on a series of educational broadcasts on meat and poultry inspections at retail food establishments produced by the Association of Food and Drug Officials (AFDO) and USDA's Food Safety and Inspection Service (FSIS), along with FDA's Center for Food Safety and Applied Nutrition. The purpose of the broadcast was to provide training to state, local, and tribal sanitarians on processes and procedures that are being utilized by retail stores and restaurants, especially those that were usually seen in USDA-inspected facilities. The program will cover the main production steps of sausage products, such as the processes of grinding, stuffing, and smoking, and typical equipment used will be depicted. Characteristics of different types of sausage (fresh, cooked and smoked, and dry/semi-dry) will be explained. Pathogens of concern and outbreaks associated with sausage will be discussed. The written manual for the program is available at www.fsis.usda.gov/fofo/hrds/STATE/RETAIL/manual.htm. (1999)
- F2460 Safer Processing of Sprouts**—(1 hour and 22 minute videotape). Sprouts are enjoyed by many consumers for their taste and nutritional value. However, recent outbreaks of illnesses associated with sprouts have demonstrated a potentially serious human health risk posed by this food. FDA and other public health officials are working with industry to identify and implement production practices that will assure that seed and sprouted seed are produced under safe conditions. This training video covers safe processing practices of sprouts including growing, harvesting, milling, transportation, storage, seed treatment, cleaning and sanitizing, sampling and microbiological testing. (CA Dept. of Health Services, Food and Drug Branch; U.S. Food and Drug Administration, and the Centers for Disease Control and Prevention—2000)
- F2330 Sanitation for Seafood Processing Personnel**—(20 minute videotape). A training video suited for professional foodhandlers working in any type of food manufacturing plant. The film highlights Good Manufacturing Practices and their role in assuring food safety. The professional foodhandler is introduced to a variety of sanitation topics including: (1) foodhandlers as a source of food contamination, (2) personal hygiene as a means of preventing food contamination, (3) approved food storage techniques including safe storage temperatures, (4) sources of cross-contamination, (5) contamination of food by insects and rodents, (6) garbage handling and pest control, and (7) design and location of equipment and physical facilities to facilitate cleaning. (Reviewed 1998)
- F2340 Sanitizing for Safety**—(17 minute videotape). Provides an introduction to basic food safety for professional foodhandlers. A training pamphlet and quiz accompany the tape. Although produced by a chemical supplier, the tape contains minimal commercialism and may be a valuable tool for training new employees in the food industry. (Clorox—1990) (Reviewed 1998)
- F2341 Science and Our Food Supply**—(45 minute videotape). Becoming food safety savvy is as easy as A-B-C! This video includes step-by-step journey food travels from the farm to the table; the Fight BAC™ Campaign's four simple steps to food safety, clean, cook, separate (combat cross contamination), and chill, and the latest in food safety careers. Other topics covered include understanding bacteria, food processing and transportation, and the future technology of food processing. (FDA-Center for Food Safety and Applied Nutrition—2001)
- F2350 ServSafe® Steps to Food Safety**—The ServSafe food safety series consists of six videos that illustrate and reinforce important food safety practices in an informative and entertaining manner. The videos provide realistic scenarios in multiple industry segments. English and Spanish are provided on each tape. (National Restaurant Association Education Foundation—2000)
- Step One: Starting Out with Food Safety**—(12 minute videotape). Defines what foodborne illness is and how it occurs; how foods become unsafe; and what safety practices to follow during the flow of food.
- Step Two: Ensuring Proper Personal Hygiene**—(10 minute videotape). Introduces employees to ways they might contaminate food; personal cleanliness practices that help protect food; and the procedure for thorough handwashing.
- Step Three: Purchasing, Receiving and Storage**—(12 minute videotape). Explains how to choose a supplier; calibrate and use a thermometer properly; accept or reject a delivery; and store food safely.
- Step Four: Preparing, Cooking, and Serving**—(11 minute videotape). Identifies proper practices for thawing, cooking, holding, serving, cooling and reheating food.

Step Five: Cleaning and Sanitizing—(11 minute videotape). Describes the difference between cleaning and sanitizing; manual and machine warewashing; how sanitizers work; how to store clean items and cleaning supplies; and how to setup a cleaning program.

Step Six: Take the Food Safety Challenge: Good Practices, Bad Practices — You Make the Call!—(35 minute videotape). Challenges viewers to identify good and bad practices presented in five short scenarios from different industry segments.

- F2430 Smart Sanitation: Principles & Practices for Effectively Cleaning Your Food Plant**—(20 minute videotape). A practical training tool for new sanitation employees or as a refresher for veterans. Employees will understand the food safety impact of their day-to-day cleaning and sanitation activities and recognize the importance of their role in your company's food safety program. (Silliker Laboratories Group—1996)
- F2370 Supermarket Sanitation Program—"Cleaning & Sanitizing"**—(13 minute videotape). Contains a full range of cleaning and sanitizing information with minimal emphasis on product. Designed as a basic training program for supermarket managers and employees. (1989) (Reviewed 1998)
- F2380 Supermarket Sanitation Program—"Food Safety"**—(11 minute videotape). Contains a full range of basic sanitation information with minimal emphasis on product. Filmed in a supermarket, the video is designed as a basic program for manager training and a program to be used by managers to train employees. (1989) (Reviewed 1998)
- F2390 Take Aim at Sanitation**—(8 minute videotape). This video features tips on food safety and proper disposal of single service items. Also presented is an emphasis on food contact surfaces as well as the manufacture, storage and proper handling of these items. (Foodservice and Packaging Institute, Inc.—1995). (Available in Spanish)
- F2391 Understanding Foodborne Pathogens**—(40 minute videotape). Explore the major causes of foodborne illness and review the practices used to minimize the risk of contracting or spreading a foodborne disease. Learn about microorganisms associated with foodborne illness such as parasites, viruses, fungi and bacteria. Study ways to reduce harmful pathogens through proper handling, storage and cooking. (Chipsbooks Company—2003)
- F2410 Wide World of Food Service Brushes**—(18 minute videotape). Discusses the importance of cleaning and sanitizing as a means to prevent and control foodborne illness. Special emphasis is given to proper cleaning and sanitizing procedures and the importance of having properly designed and constructed equipment (brushes) for food preparation and equipment cleaning operations. (1989) (Reviewed 1998)
- F2420 Your Health in Our Hands—Our Health in Yours**—(8 minute videotape). For professional foodhandlers, the tape covers the do's and don'ts of foodhandling as they relate to personal hygiene, temperature control, safe storage and proper sanitation. (Jupiter Video Production—1993). (Reviewed 1998)
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- OTHER**
- M4010 Diet, Nutrition & Cancer**—(20 minute videotape). Investigates the relationship between a person's diet and the risk of developing cancer. The film describes the cancer development process and identifies various types of food believed to promote and/or inhibit cancer. The film also provides recommended dietary guidelines to prevent or greatly reduce the risk of certain types of cancer.
- M4020 Eating Defensively: Food Safety Advice for Persons with AIDS**—(15 minute videotape). While HIV infection and AIDS are not acquired by eating foods or drinking liquids, persons infected with the AIDS virus need to be concerned about what they eat. Foods can transmit bacteria and viruses capable of causing life-threatening illness to persons infected with AIDS. This video provides information for persons with AIDS on what foods to avoid and how to better handle and prepare foods. (FDA/CDC—1989)
- M4030 Ice: The Forgotten Food**—(14 minute videotape). This training video describes how ice is made and where the critical control points are in its manufacture, both in ice plants and in on-premises locations (convenience stores, etc.); it documents the potential for illness from contaminated ice and calls on government to enforce good manufacturing practices, especially in on-premises operations where sanitation deficiencies are common. (Packaged Ice Association—1993)
- M4050 Personal Hygiene & Sanitation for Food Processing Employees**—(15 minute videotape). Illustrates and describes the importance of good personal hygiene and sanitary practices for people working in a food processing plant. (Iowa State—1993)
- M4060 Psychiatric Aspects of Product Tampering**—(25 minute videotape). This was presented by Emanuel Tanay, M.D. from Detroit, at the fall 1986 conference of CSAFDA. He reviewed a few cases and then indicated that abnormal behavior is like a contagious disease. Media stories lead to up to 1,000 similar alleged cases, nearly all of which are false. Tamper-proof packaging and recalls are essential. Tampering and poisoning are characterized by variable motivation, fraud and greed. Law enforcement agencies have the final responsibilities. Tamper proof containers are not the ultimate answer. (1987)
- M4070 Tampering: The Issue Examined**—(37 minute videotape). Developed by Culbro Machine Systems, this videotape is well done. It is directed to food processors and not regulatory sanitarians or consumers. A number of industry and regulatory agency management explain why food and drug containers should be made tamper evident. (Culbro—1987)
- M4071 Understanding Nutritional Labeling**—(39 minute videotape). Learn why the government initiated a standardized food labeling system and which foods are exempt. Explore each component listed on the label including cholesterol, carbohydrates, protein, fat, health or nutritional claims, serving size, percentage of daily value, and standard calorie reference/comparison. (Chipsbooks Company—2003)

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- D1060 Frozen Dairy Products
- D1070 The Gerber Butterfat Test
- D1080 High-Temperature, Short-Time Pasteurizer
- D1090 Managing Milking Quality
- D1100 Mastitis Prevention and Control
- D1105 Milk Hauler Training
- D1110 Milk Plant Sanitation: Chemical Solution
- D1120 Milk Processing Plant Inspection Procedures
- D1125 Ohio Bulk Milk Hauling
- D1130 Pasteurizer - Design and Regulation
- D1140 Pasteurizer Operation
- D1150 Processing Fluid Milk (slides)

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- E3010 The ABCs of Clean - A Handwashing & Cleanliness Program for Early Childhood Programs
- E3020 Acceptable Risks?
- E3030 Air Pollution: Indoor
- E3031 Allergy Beware
- E3040 Asbestos Awareness
- E3055 Effective Handwashing - Preventing Cross-Contamination in the Food Service Industry
- E3060 EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Ceriodaphnia)
- E3070 EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Fathead Minnow Larva)
- E3075 EPA: This is Superfund
- E3080 Fit to Drink
- E3110 Garbage: The Movie
- E3120 Global Warming: Hot Times Ahead
- E3130 Kentucky Public Swimming Pool & Bathing Facilities
- E3135 Plastic Recycling Today: A Growing Resource
- E3140 Putting Aside Pesticides
- E3150 Radon
- E3160 RCRA - Hazardous Waste
- E3161 The New Superfund: What It is & How It Works - (1) Changes in the Remedial Process: Clean-up Standards & State Involvement Requirements
- E3180 The New Superfund: What It is & How It Works - (2) Changes in the Remedial Process: Removal & Additional Program Requirements
- E3190 The New Superfund: What It is & How It Works - (3) Enforcement and Federal Facilities
- E3210 The New Superfund: What It is & How It Works - (4) Emergency Preparedness & Community Right-to-Know
- E3220 The New Superfund: What It is & How It Works - (5) Underground Storage Tank Trust Fund & Response Program
- E3230 The New Superfund: What It is & How It Works - (6) Research & Development/Closing Remarks
- E3240 Sink a Germ
- E3245 Wash Your Hands

- E3250 Waste Not: Reducing Hazardous Waste
- E3251 Would Your Restaurant Kitchen Pass Inspection?

FOOD

- F2260 100 Degrees of Doom...The Time & Temperature Caper
- F2265 A Day in the Deli
- F2450 A Guide to Making Safe Smoked Fish
- F2005 A Lot on the Line
- F2007 The Amazing World of Microorganisms
- F2008 A Recipe for Food Safety Success
- F2009 Basic Personnel Practices
- F2440 Cleaning & Sanitizing in Vegetable Processing Plants: Do It Well, Do It Safely!
- F2010 Close Encounters of the Bird Kind
- F2013 Control of *Listeria monocytogenes* in Small Meat and Poultry Establishments
- F2015 Controlling *Listeria*: A Team Approach
- F2111 Controlling *Salmonella*: Strategies that Work
- F2037 Cooking and Cooling of Meat and Poultry Products (2 Videos)
- F2030 "Egg Games" Foodservice Egg Handling and Safety
- F2020 Egg Handling & Safety
- F2021 Egg Production
- F2036 Emerging Pathogens and Grinding and Cooking Comminuted Beef (2 Videos)
- F2035 Fabrication and Curing of Meat and Poultry Products (2 Videos)
- F2500 *FastTrack Restaurant Video Kit*
- F2501 Tape 1 - Food Safety Essentials
- F2502 Tape 2 - Receiving and Storage
- F2503 Tape 3 - Service
- F2504 Tape 4 - Food Production
- F2505 Tape 5 - Warewashing
- F2039 Food for Thought - The GMP Quiz Show
- F2040 Food Irradiation
- F2045 Food Microbiological Control (6 Videos)
- F2050 Food Safe - Food Smart - HACCP & Its Application to the Food Industry (Part 1&2)
- F2060 Food Safe - Series I (4 Videos)
- F2070 Food Safe - Series II (4 Videos)
- F2080 Food Safe - Series III (4 Videos)
- F2133 Food Safety First
- F2090 Food Safety: An Educational Video for Institutional Food Service Workers
- F2100 *Food Safety for Food Service - Series I*
- F2101 Tape 1 - Cross Contamination
- F2102 Tape 2 - HACCP
- F2103 Tape 3 - Personal Hygiene
- F2104 Tape 4 - Time and Temperature Controls
- F2104 *Food Safety for Food Service - Series II*
- F2104 Tape 1 - Basic Microbiology and Foodborne Illness
- F2105 Tape 2 - Handling Knives, Cuts and Burns
- F2106 Tape 3 - Working Safely to Prevent Injury
- F2107 Tape 4 - Sanitation
- F2120 Food Safety: For Goodness Sake, Keep Food Safe
- F2110 Food Safety is No Mystery
- F2130 Food Safety: You Make the Difference
- F2125 Food Safety Zone: Basic Microbiology
- F2126 Food Safety Zone: Cross Contamination
- F2127 Food Safety Zone: Personal Hygiene
- F2128 Food Safety Zone: Sanitation
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- F2135 Get with a Safe Food Attitude
- F2129 Food Technology: Irradiation
- F2136 GLP Basics: Safety in the Food Micro Lab
- F2137 GMP Basics: Avoiding Microbial Cross-Contamination
- F2140 GMP Basics: Employee Hygiene Practices
- F2143 GMP Basics: Guidelines for Maintenance Personnel

- F2148 GMP - GSP Employee
- F2150 GMP: Personal Hygiene and Practices in Food Manufacturing
- F2147 GMP Basics: Process Control Practices
- F2151 *GMP Food Safety Video Series*
- F2151 Tape 1: Definitions
- F2152 Tape 2: Personnel and Personnel Facilities
- F2153 Tape 3: Building and Facilities
- F2154 Tape 4: Equipment and Utensils
- F2155 Tape 5: Production and Process Controls
- F2160 GMP: Sources & Control of Contamination during Processing
- F2160 *GMPs for Food Plant Employees: 5 Volume Video Series Based on European Standards and Regulations*
- F2161 Tape 1: Definitions
- F2161 Tape 2: Personnel and Personnel Facilities
- F2163 Tape 3: Building and Facilities
- F2164 Tape 4: Equipment and Utensils
- F2165 Tape 5: Production/Process Controls
- F2266 HACCP: A Basic Understanding
- F2180 HACCP: Safe Food Handling Techniques
- F2169 HACCP: Training for Employees--USDA Awareness
- F2172 HACCP: Training for Managers
- F2170 The Heart of HACCP
- F2171 HACCP: The Way to Food Safety
- F2173 Inside HACCP: Principles, Practices & Results
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- F2250 On the Line
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- F2271 Preventing Foodborne Illness
- F2280 Principles of Warehouse Sanitation
- F2290 Product Safety & Shelf Life
- F2220 Proper Handling of Peracetic Acid
- F2230 Purely Coincidental
- F2310 Safe Food: You Can Make a Difference
- F2320 Safe Handwashing
- F2325 Safe Practices for Sausage Production
- F2460 Safer Processing of Sprouts
- F2340 Sanitation for Seafood Processing Personnel
- F2340 Sanitizing for Safety
- F2341 Science and Our Food Supply
- F2350 SERVSAFE® Steps to Food Safety (6 Videos)
- F2430 Smart Sanitation: Principles & Practices for Effectively Cleaning Your Food Plant
- F2370 Supermarket Sanitation Program - "Cleaning & Sanitizing"
- F2380 Supermarket Sanitation Program - "Food Safety"
- F2390 Take Aim at Sanitation
- F2391 Understanding Foodborne Pathogens
- F2410 Wide World of Food-Service Brushes
- F2420 Your Health in Our Hands - Our Health in Yours

OTHER

- M4010 Diet, Nutrition & Cancer
- M4020 Eating Defensively: Food Safety Advice for Persons with AIDS
- M4030 Ice: The Forgotten Food
- M4050 Personal Hygiene & Sanitation for Food Processing Employees
- M4060 Psychiatric Aspects of Product Tampering
- M4070 Tampering: The Issue Examined
- M4071 Understanding Nutritional Labeling



NEW MEMBERS

AUSTRALIA

Prue Bramwell
RMIT University
Bundoora, Victoria

BRAZIL

Ellen A. Lopes
Food Design Consultoria E
Planejamento S/C Ltda
São Paulo

CANADA

Carol Smith
bioMérieux Canada, Inc.
St. Laurent, Quebec

Conrad Powell
Connors Bros., Ltd.
Black's Harbour, Nouveau-Brunswick

David M. Westcott
Vanderpol's Eggs Ltd.
Abbotsford, British Columbia

GERMANY

Ewald Usleber
University of Giessen – Dairy Science
Braunfels

MEXICO

R. M. Villegas
Ciudad Obregon, Sonora

PORTUGAL

Joao Ribeiro
Egas Moniz, CRL
Monte De Caparica

Claudia Soares
Egas Moniz, CRL
Lisboa

SAUDI ARABIA

Yasser B. Jad
Saudi Arabian Airlines Catering
Jeddah

SPAIN

Carlos Franco Abuin
Lugo

Ana Rodriguez
IPLA-CSIC
Villaviciosa, Asturias

UNITED KINGDOM

Arjan Narbad
Institute of Food Research
Norwich, Norfolk

UNITED STATES

CALIFORNIA

Melissa L. Calicchia
Los Angeles

Juan Castro
Huxtable's Kitchen
Vernon

Thomas H. Grove
bioCenrex
Manhattan Beach

Yadata F. Tadassa
USDA/ARS
Moreno Valley

COLORADO

Patricia A. DiPersio
Colorado State University
Fort Collins

DISTRICT OF COLUMBIA

John F. Schulz
Marriott International
Washington

IOWA

Zheng Lu
Iowa State University
Ames

MARYLAND

Ru-Ching Hsia
USDA/ARS
Beltsville

MISSOURI

Robert A. Berger
Danisco USA Inc.
St. Louis

NORTH CAROLINA

Stephenie L. Drake
North Carolina State University
Raleigh

PENNSYLVANIA

Maria G. Jaworski
Hershey Foods Co.
Hershey

SOUTH DAKOTA

Mark A. Schuttloffel
City of Sioux Falls Health Dept.
Sioux Falls

TEXAS

Todd A. Clark
Contract Cleaning Services, Inc.
Dallas

UPDATES

IDFA's Cary Frye, Allen Saylor Elected to IDF Posts

The International Dairy Foods Association (IDFA) has announced that Cary Frye, IDFA vice president of regulatory affairs, and Allen Saylor, IDFA director of regulatory affairs and international standards, were recently elected as Standing Committee chairs within the International Dairy Federation (IDF). Effective immediately, Frye becomes the chair of the IDF Standing Committee on Food Labeling and Terminology, and Saylor becomes chair of the IDF Standing Committee of Food Additives.

Frye and Saylor will serve two-year terms in their respective posts, which lead committees that develop the international dairy community's official positions on a wide spectrum of issues under review by the Codex Alimentarius Commission. Finalized Codex rules are used in resolving trade disputes within the World Trade Organization (WTO). In addition, many countries use Codex standards to define their dairy products, which means that US dairy exporters must comply with these standards in the course of normal trade.

At IDFA, Frye manages numerous dairy regulatory issues, including product safety and nutrition, quality control, dairy standards of identity, labeling, and weights and measures. She has been active within IDF on such Codex issues as health and nutrition claims, and trans fatty acid and organic food labeling. Prior to joining IDFA in 1997, Frye worked for 10 years at Crowley Foods, where she directed the research and development and the quality assurance departments. She has also

served in quality assurance positions for H. P. Hood, Kraft Foods and International Cheese Company, Inc.

Saylor's primary responsibilities at IDFA cover a broad range of state, federal and international regulatory matters including National Conference on Interstate Milk Shipments (NCIMS) issues related to the Grade A program, the HACCP food safety system, the US Department of Agriculture (USDA) Plant Survey and Manufacturing Milk program, and biosecurity issues. He has been involved in IDF and Codex issues since 1996. In June, he was honored by the Food and Drug Administration (FDA) for his work as a member of the HACCP Committee Pilot Plant Evaluation Team within the NCIMS. Prior to IDFA, Saylor held a variety of dairy regulatory positions at USDA, FDA and the North Dakota Department of Agriculture.

International Fresh-cut Produce Association Names New President

Craig Delaney, chairman of the board for the International Fresh-cut Produce Association and executive vice president and chief financial officer of Ready Pac Produce, has announced the appointment of Jerry Welcome as the association's new president, replacing Edith Garrett who stepped down January 1.

Welcome, who most recently served as vice president, member services, for the Packaging Machinery Manufacturers Institute (PMMI), brings extensive experience in packaging, food and agricultural policy, and legislative affairs to the IFPA position.

In his position at PMMI, Welcome was responsible for overseeing the

education and workforce development, technical services, public affairs and communications and membership programs of the Institute. His duties included working on promotional activities for PMMI's PACK EXPO trade shows, overseeing development and publication of the group's monthly newsletter, and managing its Internet strategies. He also brings experience in such management areas as member relations, strategic planning, board and committee support, training certification and industry relations.

He spent a total of nine years on Capitol Hill, working for House Speaker Thomas P. O'Neill as a speaker's assistant, and seven years as a staff policy analyst on the House Agriculture Committee for Representative Thomas S. Foley (D-WA) and Representative E. Kika de la Garza (D-TX). Welcome also served five years as director of legislative affairs for the American Meat Institute (AMI), managing the legislative agenda of the AMI.

Welcome assumed his new position at IFPA on February 2, 2004.

Bettcher Industries Appoints Linquist as Regional Sales Representative

Bettcher Industries, Inc. has announced the appointment of Tim Linquist as regional sales representative. Linquist will support customers located in the 14-state West Coast region, including the important meat, poultry and seafood processing states of California, Colorado, Oregon and Washington.

Tim has a background in agri-business and meat processing. He holds a Bachelor of Science degree in agri-business from California Polytechnic University.

New Food and Drug Administration Requirements Will Affect Food Mailed to the United States

Canada Post has announced that the United States Government has added new regulations to their Public Health Security and Bioterrorism Preparedness Act regarding food articles exported to the USA.

Effective December 12, 2003, Prior Notice is required for every food type shipment for consumption in the United States. All food type shipments, regardless of value, sold or sent as a gift, will require a United States Customs entry Prior Notice and approval from the Food and Drug Administration (FDA) before the item leaves Canada. Any food type package sent to the USA that does not have the pre-approved FDA label attached will be returned to sender at the sender's expense. Excluded from the Prior Notice rule is food made by an individual in his/her personal residence and sent by that individual as a personal gift to an individual in the USA.

Questions regarding these new US government regulations should be directed to the FDA in the United States at 301.575.0156 or the FDA Web site at www.fda.gov.

An Outbreak of *Escherichia coli* O157 Infection following Exposure to a Contaminated Building

Infection with *Escherichia coli* O157 causes an estimated 70,000 diarrheal illnesses per

year in the United States and can result in hemolytic-uremic syndrome and death. Environmental contamination with *E. coli* O157 may be a public health problem.

The objective was to determine risk factors for *E. coli* O157 infection during an outbreak investigation at a county fair and to evaluate environmental contamination as a possible cause of the outbreak.

Case-control study of 23 patients (median age, 15 years) and 53 age-matched controls who had attended the Lorain County, OH, fair between August 20 and August 26, 2001. Case-patients had laboratory-confirmed *E. coli* O157 infection, hemolytic-uremic syndrome, or bloody diarrhea within 7 days of attending the fair; controls attended the fair and did not have diarrhea.

The main outcome measures were risk factors for infection and isolates of *E. coli* O157 from environmental specimens.

Six (26%) case-patients were hospitalized and 2 (9%) developed hemolytic-uremic syndrome. Case-patients were more likely than controls to have visited building A (a multipurpose community facility on the fairgrounds; matched odds ratio [MOR], 21.4 [95% confidence interval {CI}, 2.7–170.7]). Among visitors to building A, illness was independently associated with attending a dance in the building (MOR, 7.5; 95% CI, 1.4–41.2), handling sawdust from the floor (MOR, 4.6; 95% CI, 1.1–20.0), or eating and/or drinking in the building (MOR, 4.5; 95% CI, 1.2–16.6).

Twenty-four (44%) of 54 specimens collected from building A 6 weeks after the fair grew Shiga toxin-producing *E. coli* O157. Isolates from sawdust, the rafters, and other surfaces were identical by

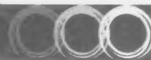
molecular fingerprinting to patient isolates. Sawdust specimens collected 42 weeks after the fair also grew the same *E. coli* O157 strain.

Absence of evidence implicating specific food or beverage sources and the recovery of *E. coli* O157 from the rafters suggest that airborne dispersion of bacteria contributed to the contamination. Because *E. coli* O157 can survive in the environment for more than 10 months, humans may be at risk of infection long after an environment is initially contaminated.

Tests Show *Salmonella* in Meat and Poultry Products Declines 66 Percent

Agriculture Secretary Ann M. Veneman has announced that the rate of *Salmonella* in raw meat and poultry dropped by 66 percent over the past six years and by 16 percent compared with 2002. "The Bush Administration is committed to protecting the public health and improving our food safety systems. These results show that we are making progress in our efforts to enhance meat and poultry inspection systems. This is good news for consumers," said Veneman.

The USDA Food Safety and Inspection Service (FSIS) is the public health regulatory agency responsible for ensuring that meat, poultry and egg products are safe, wholesome and accurately labeled. FSIS has more than 8,000 inspection personnel stationed in meat and poultry plants across the nation to ensure compliance with federal laws and regulations. As part of an extensive science-based food safety



system, FSIS collects and analyzes *Salmonella* samples in seven categories of raw meat and poultry as one way to verify compliance with food safety requirements.

Of the random samples collected and analyzed between Jan. 1 and Oct. 31, 2003 by FSIS, 3.6 percent tested positive for *Salmonella*, as compared with 4.29 percent in 2002; 5.03 percent in 2001; 5.31 percent in 2000; 7.26 percent in 1999; and 10.65 percent in 1998.

"These figures demonstrate that strong, science-based enforcement of food safety rules is driving down the rate of *Salmonella*," said Agriculture Undersecretary for Food Safety Dr. Elsa Murano. "These data validate our scientific approach to protecting public health through safer food." USDA recently announced data showing similar reductions in *E. coli* O157:H7 in ground beef and *Listeria monocytogenes* in ready-to-eat meat and poultry products.

Earlier this year, USDA outlined a series of new, science-based initiatives to better understand, predict and prevent microbiological contamination of meat and poultry products, thereby improving health outcomes for American families. These steps include increased training of inspectors, expediting the approval of new technologies, creation of a risk assessment coordination team and conducting research on priority areas.

In addition to these efforts, consumer knowledge of safe food handling and cooking is essential. Veneman said that USDA is working to enhance consumer education through a variety of programs including a traveling Food Safety Mobile that takes the information directly to consumers.

"It is important that consumers and food handlers know how to properly cook and handle food," said Veneman. "USDA has a wealth of information available."

Rosemary Extract Can be Used to Maintain the Original Color of Irradiated Chicken, Which Can be Lost during the Electronic Pasteurization Process

Spice can do more than just enhance the taste of food. One spice can prevent chicken from losing its original colors even after being irradiated.

The spice with the extra benefit is rosemary extract. Its effects could be useful for marketing irradiated chicken. Irradiation kills pathogenic bacteria on chicken, but it can make the chicken become pinker. The effect on the chicken is only cosmetic, but that alone might discourage buyers who would be suspicious of its appearance.

"Color is one of the most important criteria by which consumers select any packaged food product," said Navam Hettiarachchy, a food science professor in the University of Arkansas Division of Agriculture. "Differences in color can be perceived in terms of meat quality."

A Food Safety Consortium research group directed by Hettiarachchy examined the effects of rosemary and found that it enables irradiated chicken to maintain its original level of redness and lightness. Irradiated chicken breasts that had been infused with rosemary maintained the color and color changes were minimized for 12 days of storage.

"Rosemary is used as an antioxidant in several food products. Antioxidants prevent rancidity. It's a natural extract used in several food products," Hettiarachchy explained.

Irradiated chicken's pink color remains even after cooking, which

could cause consumers to be skeptical. "Consumers are apprehensive because they think the chicken is undercooked or not cooked right. So the industry is looking for products that maintain the natural color of poultry products," Hettiarachchy said.

"Antioxidant components in rosemary prevent lipid oxidation and can reduce color change during irradiation," Hettiarachchy said.

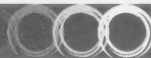
Additional research should be done on sensory evaluation of irradiated chicken. Hettiarachchy tested the chicken in the lab and did not find any objectionable flavor, but she said a formal sensory testing process should be conducted to confirm her belief.

"Rosemary has a nice spicy flavor that blends well with the chicken. I don't foresee any consumers objecting to its use. If irradiation is to be accepted by consumers, rosemary would be one of the natural extracts that would have a lot of consumer demand," Hettiarachchy said.

Seeing *Salmonella* Move through Pigs

Imagine being able to photograph a *Salmonella* infection as it moves through a live pig and show the process as patches of colors. That's what's being proposed by Donald C. Lay, research leader at the Agricultural Research Service's Livestock Behavior Research Unit in West Lafayette, IN, and Scott T. Willard of Mississippi State University. Willard is an expert in biophotonics, a new technology that uses light to mark molecular changes.

About two million *Salmonella* cases are found in livestock in the United States each year, costing an average \$1.4 billion. Certain swine seem prone to shedding *Salmonella*



bacteria in manure when stressed by the transport and mixing with different herds that's associated with going to market.

Scientists don't know how bacteria migrate through an animal's body, including where they might "hide" and what causes them to be suddenly shed. These gaps are largely due to an inability to follow the progression of infection in live animals.

Lay and Willard have shown they can treat bacteria to give off light, making it possible to track infections in living piglets and through tissues of adult pigs after slaughter. Now they've received a US Department of Agriculture grant to further pursue the work. Their goal: to adapt the technique so cameras can see through the denser mass of live, 250-pound, market-ready pigs, which is more difficult than seeing through five-pound piglets.

Lay and Willard will research ways to improve swine management by identifying animals that are more susceptible to infection, and by designing techniques to prevent those swine from spreading infection to their herd mates.

Investigation of Two Clusters of Shiga Toxin-Producing *Escherichia coli* Cases in South Australia

Shiga toxin-producing *Escherichia coli* (STEC) is an important cause of gastrointestinal illness in developed countries, and outbreaks have been reported in many countries including Australia. STEC infection can cause bloody diarrhea, with 3-7 percent of sporadic cases developing hemolytic uremic syndrome (HUS), a serious condition, defined by thrombocy-

topenia, anemia and renal failure, which can result in death. In Australia, the number of reported STEC cases was 38, 48 and 52 in the years 2000, 2001 and 2002 respectively. South Australia reported 38 (73%) of the 52 cases in 2002. Current surveillance STEC practices in South Australia involves screening of all bloody stools with a polymerase chain reaction (PCR) test for the toxin genes, which contributes to the number of cases reported from this state. Samples positive for toxin are tested for virulence and serotype genes. This procedure complements standard epidemiological practices.

Relatively few STEC outbreaks have been reported in Australia. *The Communicable Diseases Intelligence Report* describes the investigation of two clusters of STEC cases in South Australia, observed in February and March 2003.

USDA Announces Unified Food Safety Research Agenda; Additional Research Needs for Meat, Poultry and Egg Products Outlined

Agriculture Secretary Ann M. Veneman has announced a unified food safety research agenda to improve the efficiency and effectiveness of food safety programs. The research agenda is one of several key initiatives USDA is implementing to enhance food safety and improve food inspection systems.

"Assuring the safety of our food supply is a priority for the Bush Administration. Through a unified research effort we will continue to make progress to sustain and increase food safety," said Veneman. USDA also released a list of additional research needs specific to

meat, poultry and egg products that the Food Safety and Inspection Service (FSIS) will encourage non-governmental entities to address. The government research agenda will complement these efforts by industry and academia.

Dr. Rodney Brown, deputy under secretary for Research, Education, and Economics, and Dr. Garry L. McKee, administrator of the Food Safety and Inspection Service, discussed the agenda during a tour of the Richard B. Russell Research Center in Athens, GA. USDA's Research, Education, and Economics (REE) mission area worked with USDA's Office of Food Safety, other government food safety agencies and stakeholders to develop the unified research agenda. The unified agenda, which prioritizes research needs and maximizes use of available resources, includes research to:

- Investigate the ecology, epidemiology, virulence and genetic characteristics related to pathogenicity for *E. coli* O157:H7, *Salmonella*, *Listeria monocytogenes* and other foodborne pathogens to identify targeted control measures;
- Develop effective on-farm, feedlot, transportation, handling and other pre-processing intervention strategies for reducing the incidence and levels of antibiotic-resistant microorganisms and key foodborne pathogens in meat, poultry, eggs and fresh produce;
- Develop, validate and transfer technology of new and improved processing methods to reduce or eliminate key foodborne pathogens in meat, poultry, fresh produce, seafood and ready-to-eat foods; and



- Develop rapid and sensitive detection methods for abnormal prions to prevent the possible spread of transmissible spongiform encephalopathies.

FSIS released a food safety vision document in July that outlines key steps to improve food safety and protect public health. In addition to the research agenda, the vision paper identifies strategies to improve workforce training, streamline technology implementation, identify best management practices and risk analysis coordination.

FSIS is a public health regulatory agency that protects consumers by ensuring that meat, poultry and egg products are safe, wholesome and accurately labeled. FSIS does not conduct its own research. Rather, the agency identifies research necessary to fulfill its public health mission.

Within the REE mission area, the Agricultural Research Service is USDA's chief in-house scientific research agency and the Cooperative State Research, Education and Extension Service is USDA's chief research funding agency.

The complete USDA-unified food safety research agenda is available at: www.reeusda.gov/ree. The research priorities specific to meat, poultry and egg products and the vision document, in addition to other food safety information, are available at: <http://www.fsis.usda.gov>.

The Rabbit as a New Reservoir Host of Enterohemorrhagic *Escherichia coli*

Alexis Garcia and James G. Fox from the Massachusetts Institute of Technology, Cambridge, MA investigated the prevalence of enterohemorrhagic *Escherichia coli* (EHEC) in rabbits

acquired from two commercial vendors and a local petting zoo.

Fecal samples from 34 Dutch Belted (DB) and 15 New Zealand White (NZW) rabbits were cultured; and isolates were biotyped, serotyped, tested by polymerase chain reaction (PCR), and genotyped by repetitive-element sequence-based PCR (Rep-PCR). Seven (25%) of 28 DB rabbits acquired from one commercial source were positive for EHEC, including O153:H- and O153:H7. One of 11 NZW rabbits from the same source was positive for eae-, stx1+ O153 strains. In contrast, six DB rabbits from another commercial source and four rabbits from a petting zoo were negative for EHEC. Rep-PCR demonstrated that the O153 EHEC and O145 enteropathogenic *E. coli* were two distinct clones.

The study indicates that rabbits are a new reservoir host of EHEC that may pose a zoonotic risk for humans.

Laboratories Must be Accredited by 2005 New Food Safety Chief Tells Conference

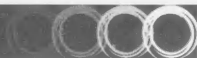
Over 63,000 samples of food are analyzed every year by the official laboratories, the new chief executive of the Food Safety Authority of Ireland (FSAI) Ann Westby told the first FSAI international laboratory conference held in Ireland. The testing of food samples for either microbiological or chemical contamination underpins food safety control systems throughout the country in efforts to reduce the incidence of foodborne illness. Ms. Westby stated that she wanted all food laboratories dealing with the FSAI in Ireland fully accredited to ISO 17025 by end of 2005, so that

there would be uniform quality standards in all laboratories.

Speaking to over 160 laboratory personnel at New and Emerging Issues for Food Laboratories, Ms. Westby praised laboratory personnel for the extensive level and range of analyses carried out in Ireland. She stated that while a lot had been done to date to develop food laboratory structures in Ireland, there was still a lot more areas that require development and investment to achieve an optimum level of efficiency and effectiveness, with the ultimate goal of further protecting human health from foodborne illness.

"Food analysis benefits consumers through the speedy detection of problems leading to better control of potential foodborne illness. Laboratory work provides the scientific basis to link human cases of infection to contaminated food and to providing information to the sampling and inspecting officers to assist in tracking infections throughout the entire country. Rapid detection of foodborne outbreaks allows control measures to be put in place quickly and reduces the number of people falling ill. It is only by identifying the strains of bacteria, the source of a food contamination and/or establishing the common links between affected people, will a contaminated food product or bad hygiene practice be stopped," Ms. Westby said.

Ms. Westby also acknowledged the contribution made by private laboratories and those laboratories owned by specific food businesses providing "own check" testing services to the food industry. This allows industry to self monitor compliance with food legislation and measure the quality of the food it produces.



Speakers at the conference included Prof. Dr. Elke Anklam, Institute for Reference Materials and Measurements, EC; Dr. Bernard Hegarty, FSAI; Ms. Caroline Conroy, La Touche Bond Solon; Dr. Michele Lees, Eurofins Scientific, France; Dr. Mark Woolfe, Food Standards Agency UK; Raymond Ellard, FSAI and Dr. Eleanor McNamara, South Western Area Health Board.

At the event, the FSAI launched the first edition of a *Laboratory Guide*, which provides an overview of each of the food laboratory working under service contract to the FSAI. It details the main areas of each organizations work and the type of analysis carried out. In addition the *Guide* provides the legislative framework under which samples are tested. It is available on the FSAI Web site www.fsai.ie.

"Great progress has been made since the first round of service contracts with the laboratories in the official agencies, in developing numerous multi-agency laboratory networks to promote cross-agency working. It is important that laboratories are resourced sufficiently to achieve the highest standards of operation and I am urging all laboratories to be fully accredited by 2005 when the next round of service contracts are agreed with the FSAI. It is heartening that a number of laboratories have already achieved this high standard and are accredited, however, for those that are not accredited and they need to make this a matter of utmost priority," Ms. Westby continued.

Ms. Westby advised the industry that the range of sampling and testing carried out by the official

agencies means that food retailers or suppliers have no hiding place if they supply or sell substandard products. "Food laboratories in Ireland carry out testing on every conceivable product or commodity from eggs, milk, meat, right through to fish, fats, flavorings, ice cream and alcohol. They are testing for a wide range of microbiological and chemical parameters including pesticides, antibiotics, metals, food contact materials and bacteria. Through shared information among all our laboratories both private and public, a food incident can be recognized and corrective action applied rapidly. Industry has a clear legal responsibility to place safe foods on the market and those found in breach will feel the force of the full arm of the law and the consequential penalties."

In memory of...

Dennis E. Decker

IAFP would like to extend our deepest sympathy to the family and friends of Dennis Decker who recently passed away. IAFP will always have sincere gratitude for his contribution to the association and the profession.

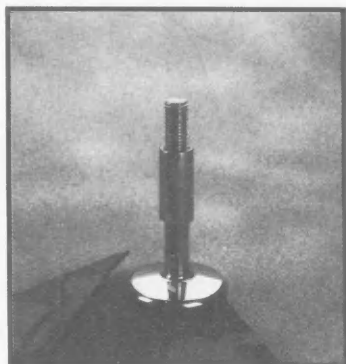
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If you have any questions,
E-mail Julie Cattanach at
jcattanach@foodprotection.org

INDUSTRY PRODUCTS



Sunnex

Sunnex Showcases New USDA-approved Stainless Steel Machine Mounts for Sanitary Environments

Sunnex, a manufacturer of anti-vibration and leveling machine mounts, introduces a new series of stainless steel machine mounts. Fully approved by the USDA, satisfying its strict requirements, Sunnex's stainless steel machine mounts are ideal for extremely hygienic environments, including the beverage industry, and food processing for the meat, poultry, and dairy industries.

The Sunnex stainless steel mounts are designed with an FDA-approved rubber sole that contains no voids, which is vulcanized to the housing of the mount for a completely hygienic seal with no spaces for bacteria or germs to grow. Composed of AISI 304 stainless steel that is highly resistant to corrosion, Sunnex's stainless steel mounts feature a full range of motion from a 10 degree pivot to correct for uneven floors, and provides secure footing and complete vibration control.

Also available in a fully USDA accepted version with thread casing to

eliminate exposure to bacteria, and a hygienically designed standard series with maximum thread range, both models come in AISI 316 stainless steel for aggressively corrosive environments. Additionally, alternate designs of Sunnex's stainless steel mounts include a swivel up to 20 degrees and one or two anchoring holes to affix to the floor. The Series supports loads up to 7,500 lbs.

Sunnex
800.445.786;
www.sunnexonline.com
Natick, MA

Grocery Meat Inspectors Now Able to Expose Inaccurate Fat Labeling Using Revolutionary New Fat Tester by Data Support Company

Supermarkets across the nation are measuring fat content in ground beef and ground pork using 50-year-old antiquated technology that produces inaccurate results. Further, local meat inspectors use the same outdated fat testers, leading to erroneous fat percentages on package labeling that never get revealed.

The patented HFT-2000 uses microprocessor-based, chemical-free technology to yield a digital readout of fat content in minutes at the touch of a button. Traditional fat testers, which are used by thousands of supermarkets and municipal grocery meat department inspectors alike, use outdated technology to measure fat and are inaccurate when testing ground beef or ground pork leaner than 20 percent fat. While traditional fat testers boast an accuracy of

± 2 percent, the HFT-2000 accurately measures fat content to within 0.5 percent and can measure samples with as low as 1 percent fat content.

Daniel Banayan, president of DSC and the inventor of the HFT-2000, realized early on that these serious issues existed in the fat analysis industry. A chemical engineer by trade, he spent years researching fat analysis methods and recognized the need for a low-priced analyzer with high accuracy. Banayan also conducted a "Supermarket Ground Beef Fat Level Survey" which indicated that outdated testing equipment with a high margin of error and lean-level limitations was the cause of enormous profit loss in meat departments nationwide.

"The use of outdated fat testing equipment spells trouble for several reasons. A pound of lean ground beef obviously costs more than a pound of fat. If the label and pricing reflects 20 percent fat due to outdated measurement methods, yet the beef is really only 10 percent fat, the store loses a substantial amount of profit," Banayan said.

Banayan continued, "On the other hand, if the meat is labeled at 10 percent fat when it's actually more, this spells big trouble for consumers who are being misled. Unfortunately, supermarket meat inspectors are unable to expose the inaccuracies of improperly labeled meat because a majority of them use the same obsolete testing equipment."

The "plug and weigh" 9-pound HFT-2000, already being used in 400 Costco stores nationwide, is easy to use and requires minimal user training. Its accurate fat content analysis is based on the instrument's ability to

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measure the moisture content of a sample over a range of temperatures. Simply place a palm-sized amount of beef in the instrument's weighing chamber, close the lid and select the appropriate program from the front panel. The HFT-2000 does the remainder of the work and automatically shuts off when the test is complete (10 to 15 minutes). The results are displayed on the digital screen. Easy cleanup is also key; users simply discard the disposable filter pads and aluminum tray.

DSC, Inc.
800.726.5883;
www.dsctest.com
Encino, CA

DuPont Qualicon BAX® System Adopted by USDA Food Safety and Inspection Service to Detect *Salmonella* in Raw Food Products

The BAX® system, a genetics-based screening method developed by DuPont Qualicon, has been adopted by the United States Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS) to detect *Salmonella* in food plants that process raw meat and poultry.

"This measure increases efficiency in detecting pathogens and saves valuable agency time and resources. This is another tool that will help us protect public health," said FSIS Administrator Dr. Garry L. McKee.

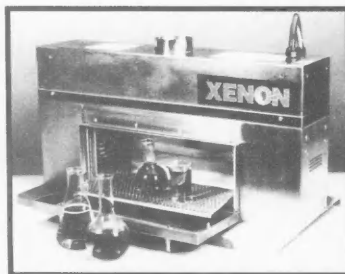
An evaluation of more than 300 random meat and poultry samples demonstrated that the BAX® system was as accurate as the current method used by FSIS, but reduced reporting time of negative results by one to two days. FSIS has already adopted the BAX® system for detecting *Salmonella* in ready-to-eat foods and for detecting *Listeria mono-*

cytogenes in raw meat and poultry. The agency also plans to evaluate the BAX® system for detecting *E. coli* O157:H7 this year.

Eating food that is contaminated with *Salmonella* can result in salmonellosis, a serious, sometimes fatal, infection. The Centers for Disease Control estimate 40,000 cases of salmonellosis are reported in the United States each year.

The BAX® system uses advanced molecular technology to detect target bacteria in raw ingredients, finished food products and environmental samples. In addition to *Salmonella*, assays are also available for detecting *Listeria monocytogenes*, *Listeria* genus, *E. coli* O157:H7 and *Enterobacter sakazakii*. The automated system is user-friendly and fits easily onto a laboratory bench top. Introduced in November 2000, hundreds of automated BAX® systems are already in use by governments, food companies and laboratories around the world.

DuPont Qualicon
800.863.6842;
www.qualicon.com
Wilmington, DE



Xenon Corporation

Xenon Corp. Pulsed UV Sterilization System Facilitates Research and Scale-up Needs

A compact, benchtop, pulsed UV light system that has proven to be an effective research and development tool in university, government, and commercial laboratories for the

study of killing microorganisms rapidly has been introduced by Xenon Corporation.

The SteriPulse-XL® Pulsed UV Light System rapidly delivers high peak energy which is 100,000 times more powerful than the sun and can kill microorganisms' DNA that mercury lamps cannot. Designed for starting and stopping, this benchtop system permits the use of small laboratory samples to provide proof-of-principle validation and establish process variables.

Featuring a slide-out shelf, the SteriPulse-XL® Pulsed UV Light System consists of a sterilization chamber, lamp module, and a control unit. This versatile laboratory system lets manufacturers determine scale-up requirements and can be modified for on-line production use. This benign, mercury-free system doesn't create or use VOCs or suspended airborne particulates.

Xenon Corporation
800.936.6695;
www.xenoncorp.com
Woburn, MA

SUREdate, Inc. Develops a Completely Mobile and Automated System to Label and Date Food for the Food Service Industry

The system uses the latest technology including hand-held computers armed with proprietary software and wireless communication to high-speed, mobile thermal printers. This combination allows for dating and labeling food products accurately at any receiving, production or storage area in a food service operation. SUREdate's patent-pending system allows for the industry standard of color coding for different days of the week using just one label with multiple colors and blocking out, leaving only the relevant day. SUREdate makes label-

INDUSTRY PRODUCTS

ing and dating food products fast, easy and accurate. The benefits include increased productivity, increased quality and brand protection, as well as reduced cost and food safety risk.

An ideal system for any food service operation that wants to improve quality, reduce costs and lower risk, SUREdate offers a total solution in labeling and dating food to the food service industry.

SUREdate, Inc.
877.644.8505;
www.suredateit.com
Winter Park, FL

Praxair Completes HACCP Validation for Better Than Fresh™ Juice Process

Praxair, Inc. has announced that it has successfully completed on-site microbial validation for its non-thermal Better Than Fresh™ beverage treatment process as required by the FDA Juice HACCP (Hazard Analysis Critical Control Point) Regulation. The Better Than Fresh system installed at Sun Orchard Inc.'s Haines City, FL facility uses dense-phase carbon dioxide (CO₂) to kill pathogens and spoilage microorganisms while maintaining the fresh-squeezed quality of orange juice).

"The completion of the on-site validation of the Better Than Fresh process is a major step in the final development and introduction of the new juice product line to the marketplace. The resulting juice product will provide the retail consumer with a fresh tasting alternative to fresh and not-from-concentrate juices found in the grocer's dairy and produce departments," said Marc Isaacs, Sun Orchard president and CEO.

"This is an important milestone in the continuing commercialization of the Better Than Fresh process," stated

Sam Johnston, Praxair business development manager. This on-site microbial validation confirms that the Better than Fresh™ process meets food safety guidelines for orange juice.

Praxair, Inc.
800.Praxair;
www.praxair.com/food
Danbury, CT



Spiroflow Systems, Inc.

Spiroflow Systems Introduces New Flexible Screw Conveyor for Conveying Applications

Spiroflow has recently designed and manufactured a Flexible Screw Conveyor for product applications in the food, chemical, plastics and other industries.

The Flexible Screw Conveyor (FSC) allows the operator to use for diverse applications. The system's UHMWPE tube and steel spiral can be easily disassembled and cleaned with little downtime to reduce product contamination when moving and switching products.

The conveyor is easily controlled with an integrated pre-programmed

PLC or by existing facility controllers. The conveyor, featuring locking swivel wheels for stability, is easy to maneuver, especially in tight facility locations.

Spiroflow offers a number of different tube diameters and lengths to accommodate required rates up to 100,000 cubic feet per hour.

The FSC is favored by many industries including chemical and food where there is often a need for multiple applications. A USDA Dairy Accepted/3-A Authorized model is also available.

Spiroflow Systems, Inc.
704.291.9595;
www.spiroflowsystems.com
Charlotte, NC

Tiny "Fixed Life" Gas Detector in Three New Versions by Crowcon

Crowcon has developed three new variants of Eikon, its tiny single-gas detector. Running without parts or maintenance for a guaranteed two years, Eikon is now available in versions to detect sulfur dioxide, ammonia and chlorine. Joining an existing line comprising oxygen, carbon monoxide and hydrogen sulfide versions, the new units bring the convenience of a maintenance-free gas detector to industries including water treatment, refrigeration, brewing, paper and fertilizer production.

Measuring 2 3/4" in height, Eikon is an intrinsically safe personal monitor which runs continuously from the moment it is activated by the user removing a "rip strip." Because it cannot be turned off and has no external controls, it is tamper-proof. Accidental removal or loss is prevented by a patented cam grip which attaches the unit securely to clothing.

Sealed against dust and water ingress, Eikon warns of gas hazards with a powerful audible alarm (94 dBA at 12") and four high-intensity LEDs visible from all angles.

To check correct operation, the user can trigger the LEDs and an audible test tone – which is distinct from the alarm tone by tapping the detector twice on a hard surface.

As the end of the unit's life nears, this test produces a triple flash from the number of LEDs which correspond to the number of weeks remaining. A special Eikon Accessory provides easy one-touch testing in the presence of gas: to prevent wastage and ensure safety, a minimal volume of gas is delivered into a sealed testing chamber. Up to 2,000 tests are possible with one gas cylinder.

Additional functions including calibration, zeroing and status reporting are carried out by swiping cards through an optional bar-code reader, the Commander. This removes the possibility of human error and eliminates the need to purchase a separate PC. Full status reports can be printed using an optional Mini-Printer which interfaces directly with the Accessory.

Crowcon Detection Instruments
800.5.CROWCON;
www.crowcon.com
Milford, OH

Hardy Diagnostics Introduces the SystemSure II™

The SystemSure II™ is a low-cost instrument for ATP bioluminescence hygiene testing. This palm-sized instrument is the smallest and lightest (only 260 gm; 17×17×3 cm) luminometer available today. Sensitive, the SystemSure II™ can detect ATP down to 1 femtomole. The Luminometer's menu-driven operation from the keyboard is simple to operate and can store up to 500 results.

Programmable pass/fail levels are included in the system's internal software. Data is easily downloaded to Microsoft Excel. The SystemSure II™ combines simplicity, compact size, and a economical price. Designed to be used with the Ultrasnap™ ATP swab.

Hardy Diagnostics
800.266.2222;

www.@hardydiagnostics.com
Santa Maria, CA

Safe Food Handling is in the Bag — FoodHandler Introduces New Line of NSF-certified Bags

FoodHandler®, the name in gloves and food safety products and programs, recently introduced a new line of NSF-certified disposable bags offering enhanced protection from food-borne illnesses. All FoodHandler NSF-certified bags meet these demanding standards — so you and your customers can be sure that our bags are safe for food contact, made in clean, inspected plants and durable enough to handle the toughest foodservice tasks.

FoodHandler NSF-certified bags are available in a variety of styles and sizes including PanPals™ high-heat pan liners and cooking bags, food storage bags and food dispensing bags. NSF-certified bags from FoodHandler are part of our overall safe food handling program, which includes ServSafe® certification seminars, food safety training, glove and handwashing audits and much more.

FoodHandler
800.338.4433;
www.foodhandler.com
Westbury, NY

Visit our Web site
www.foodprotection.org

IAFP 2004 Proposed Symposia



- Heat Resistant Spoilage Microorganisms
in the Juice and Beverage Industry
- Agricultural Water Quality and Safety
Credibility in Science
- Extending Shelf Life of Conventionally
Pasteurized Milk for Quality and Safety
- Quantitative Foodborne Pathogen Analysis
- Impact of Environmental Viral and
Parasitic Contamination on Food Safety
- Quorum Sensing and Food Safety
- Salmonella* Control in Broiler Chickens:
The Scandinavian Experience
- Molecular Characterization of Foodborne
Pathogens
- Application of Secondary Inhibitors
in Ready-to-Eat Meat and Poultry
Processing
- Hygienic Design and Construction of Dairy
Food Equipment
- Sanitation – Because You Have to be Clean
to be Safe
- Retail Food Safety Risks – Protecting
Public Health and Changing Behaviors
- Biofilms and Their Impact on Food Safety
- Indicator Organisms – Where's the Value?
- Food Toxicology 101: Basics for the Food
Safety Professional
- The Global Food Safety Initiative (GFSI)
- Optimizing Data and Minimizing Risk
- Seafood Packaging
- Update Foodborne Disease Outbreaks
- Mycobacterium paratuberculosis*:
A Novel Concern
- Post-processing Intervention Technologies
- Subtyping – Tying It All Together
- New Methods in Microbiology

Visit our Web site for updated information
www.foodprotection.org

IAFP 2004 Networking Opportunities



IAFP FUNCTIONS

NEW MEMBER RECEPTION

Saturday, August 7, 2004 • 4:30 p.m. – 5:30 p.m.

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

AFFILIATE RECEPTION

Saturday, August 7, 2004 • 5:30 p.m. – 7:00 p.m.

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

COMMITTEE MEETINGS

Sunday, August 8, 2004 • 7:00 a.m. – 5:00 p.m.

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

STUDENT LUNCHEON

Sunday, August 8, 2004 • 12:00 p.m. – 1:30 p.m.

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

OPENING SESSION

Sunday, August 8, 2004 • 7:00 p.m. – 8:00 p.m.

Join us to kick off IAFP 2004 at the Opening Session. Listen to the prestigious Ivan Parkin Lecture delivered by Martin Cole, Chief Research Scientist, Food Science Australia, North Ryde, Australia.

CHEESE AND WINE RECEPTION

Sunday, August 8, 2004 • 8:00 p.m. – 10:00 p.m.

Sponsored by Kraft Foods, Inc.

An IAFP tradition for attendees and guests. The reception begins immediately following the Ivan Parkin Lecture on Sunday evening in the Exhibit Hall.

IAFP JOB FAIR

Sunday, August 8 through Wednesday, August 11, 2004

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

COMMITTEE AND PDG CHAIRPERSON

BREAKFAST (By invitation)

Monday, August 9, 2004 • 7:00 a.m. – 9:00 a.m.

Chairpersons and Vice Chairpersons are invited to attend this breakfast to report on the activities of your committees.

EXHIBIT HALL RECEPTION

Monday, August 9, 2004 • 5:00 p.m. – 6:30 p.m.

Join your colleagues in the exhibit hall to see the latest trends in food safety techniques and equipment. Discuss with exhibitors their latest products or use this time to view the poster presentations. Grab a drink and take advantage of this great networking reception.

JOHN H. SILLIKER LECTURE

Tuesday, August 10, 2004 • 3:45 p.m.

This plenary session will feature R. Bruce Tompkin, Retired Vice President — Product Safety, ConAgra Refrigerated Foods. He will deliver a presentation titled "Guess Who's Come to Stay — The Resident Pathogen Issue."

BUSINESS MEETING

Tuesday, August 10, 2004 • 4:45 p.m. – 5:30 p.m.

You are encouraged to attend the Business Meeting to keep informed of the actions of YOUR Association.

PRESIDENT'S RECEPTION (By invitation)

Tuesday, August 10, 2004 • 5:30 p.m. – 6:30 p.m.

This by invitation event is held each year to honor those who have contributed to the Association during the year.

PAST PRESIDENTS' DINNER (By invitation)

Tuesday, August 10, 2004 • 6:30 p.m. – 10:00 p.m.

Past Presidents and their guests are invited to this dinner to socialize and reminisce.

AWARDS BANQUET

Wednesday, August 11, 2004 • 7:00 p.m. – 9:30 p.m.

Bring IAFP 2004 to a close at the Awards Banquet. Award recipients will be recognized for their outstanding achievements and the gavel will be passed from Dr. Paul Hall to Incoming President Dr. Kathy Glass.

IAFP 2004 Event Information



EVENING TOURS

MONDAY NIGHT SOCIAL AT RAWHIDE WESTERN TOWN

Monday, August 9, 2004 • 6:30 p.m. – 10:00 p.m.

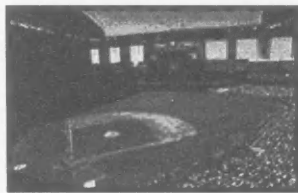


Step back in time to the days when the West ran wild! This is the Wild West of good guys, bad guys, balladeers, shoot-outs, saloon girls, and delightfully

crooked card dealers. Upon arrival at Rawhide, you will have the opportunity to stroll down Main Street, browse in the numerous shops and boutiques, witness a blacksmith at work and watch Rawhide's street entertainers. Satisfy your appetite by stopping in the Steakhouse and Saloon for a "Chuckwagon Feast". Grab your partners, jump on the bus and get ready for a rip-roarin' good time — YEE HA!

DIAMONDBACKS BASEBALL GAME

Saturday, August 7, 2004 • 6:00 p.m. – 10:00 p.m.



Enjoy a night at the ballpark as the Arizona Diamondbacks take on the Atlanta Braves at Bank One Ballpark. From its signature swimming pool to its

retractable roof, Bank One Ballpark has become one of the game's most recognizable landmarks. Since the air-conditioned facility first opened its doors, fans have enjoyed the opportunity to watch the Arizona Diamondbacks without worrying about Phoenix's summer heat. Ticket price includes admission to the game and transportation to and from the JW Marriott Desert Ridge Resort.

GOLF TOURNAMENT



GOLF TOURNAMENT – Arnold Palmer Signature Course at Wildfire Golf Club

Saturday, August 7, 2004 • 6:00 a.m. – 11:00 a.m.

Everyone is invited to play in this best-ball golf tournament on the Arnold Palmer Signature Course at Wildfire Golf Club. A desert-style course of championship length, with generous fairways and large, bent-grass greens, the Palmer Course is challenging to all levels of golf skill. Begin IAFP 2004 with a round of golf playing before a backdrop of the Camelback Mountains!



DAYTIME TOURS

SEDONA AND VERDE VALLEY TOUR

Saturday, August 7, 2004 • 8:00 a.m. – 4:00 p.m.



Known worldwide for its brilliant red rock mountains, breathtaking scenery and quaint artisan shops, Sedona is a "must see" destination for visitors to Arizona.

During the drive north, you will travel through the diverse terrain of the Sonoran Desert, Verde Valley and Camp Verde. Along the way, the guide will provide interesting narration about the area and answer questions.

Prior to reaching Sedona, we will stop at Montezuma's Castle, a twelfth century cliff dwelling built by the Sinagua Indians. This is considered one of the best-preserved cliff dwellings in the Southwest. Upon arrival in Sedona, your guide will point out the numerous red rock formations for which Sedona is famous — Snoopy Rock, Bell Rock, Chapel Rock, Submarine Rock and others. Lunch will be served at a quaint local eatery. Guests will have time to explore the galleries and shops of Main Street and Tlaquepaque.

CITY TOUR AND OLD TOWN SCOTTSDALE

Sunday, August 8, 2004 • 10:00 a.m. – 3:00 p.m.



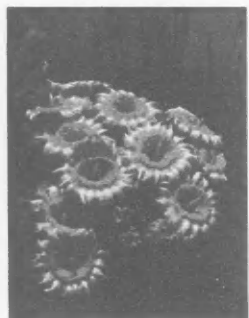
With amazing sunsets and spectacular mountain views, Arizona is a site to behold! The City Tour meanders through the amazing aspects of the

valley. Each tour is unique in that the guide will stop along the way at several of the most beautiful sites and private homes in the valley.

The Wrigley Mansion is well known for its unique architecture, the Biltmore Resort has had the pleasure of Frank Lloyd Wright's touch and the State Capitol is majestic against the blue sky backdrop of the city. This tour provides an opportunity to stop and enjoy the unique shopping experiences of Old Town Scottsdale as well as a delicious lunch. Old Town encompasses over a square mile of themed shopping streets. Walking the sidewalks of this section of Scottsdale, one can find everything from Native American jewelry and artwork to western clothing.

DESERT BOTANICAL GARDEN AND HEARD MUSEUM TOUR

Monday, August 9, 2004 • 8:00 a.m. – 1:00 p.m.

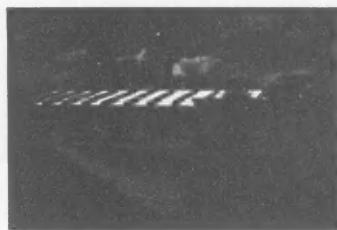


Two of the Southwest's most unique visitor attractions, The Desert Botanical Garden and Heard Museum, have teamed up to present an unbeatable tour designed to acquaint visitors with the diversity of the region and the resourcefulness of its Native American people. This tour includes visits to both attractions

plus lunch at the Heard Museum Cafe. Your visit begins at the Desert Botanical Garden which displays more than 10,000 desert plants in a spectacular outdoor setting. Plants and People of the Sonoran Desert, a three-acre permanent exhibit with authentic historic and prehistoric structures, shows how Sonoran Desert dwellers have used native plants for thousands of years for food, construction, fiber, and medicines. Continuing on you will visit the amazing Heard Museum, a museum of Native American cultures and art. The Heard Museum is internationally recognized for its collections of Native American artifacts and contemporary fine art.

FRANK LLOYD WRIGHT – TALIESIN WEST TOUR

Tuesday, August 10, 2004 • 8:00 a.m. – 12:00 p.m.



Taliesin West in Scottsdale is considered one of Frank Lloyd Wright's greatest architectural masterpieces. From its inception, the buildings

at Taliesin West astounded architectural critics with their beauty and unusual form. Taliesin West still serves as a living, working educational facility with an on-site architectural firm. By touring Taliesin West visitors are able to broaden their appreciation of architecture and Wright's continuing contribution to it through his theories of organic design.

If you're interested in an in-depth, intimate look at Taliesin West, this exclusive experience is a must! Visit the Cabaret Cinema, Music Pavilion, Seminar Theater and Wright's private office — all linked by dramatic terraces, gardens and walkways overlooking the rugged Sonoran Desert and Valley below. You'll have the chance to talk to a Wright associate, have leisurely mid-morning refreshments in the colorful Taliesin Fellowship dining room and explore the dramatic Taliesin West living room — called the "Garden Room" by Wright. You'll sit in Wright-designed furniture and experience firsthand the drama of being a guest in Wright's famous Garden Room.

SOUTHWESTERN COOKING CLASS

Wednesday, August 11, 2004 • 10:30 a.m. – 1:00 p.m.

This hands-on class explores the magic and mysteries of tamales, one of the great culinary traditions of the America's. While making tamales you will learn the secrets of choosing a filling and flavoring them with different types of wrappers, from cornhusks to banana leaves. You will also learn how to choose and make a complementary salsa to create a more satisfying and dynamic taste experience. This class is a total emersion into tamales and salsas that provides you with all the knowledge and skills to create your own tamales at home! Following the class you will enjoy lunch at Blue Sage.

HOSPITALITY ROOM

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



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

MEETING INFORMATION

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

Registration includes:

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

4 EASY WAYS TO REGISTER

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



Online: www.foodprotection.org



Fax: 515.276.8655



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



Phone: 800.369.6337; 515.276.3344

The early registration deadline is July 7, 2004.
After this date, late registration fees are in effect.

REFUND/CANCELLATION POLICY

Registration fees, less a \$50 administration fee and any applicable bank charges, will be refunded for written cancellations received by July 23, 2004. No refunds will be made after July 23, 2004; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 16, 2004. **Event and tour tickets purchased are nonrefundable.**



EXHIBIT HOURS

Sunday, August 8, 2004	8:00 p.m. – 10:00 p.m.
Monday, August 9, 2004	9:30 a.m. – 1:30 p.m. 3:00 p.m. – 6:30 p.m.
Tuesday, August 10, 2004	9:30 a.m. – 1:30 p.m.

DAYTIME TOURS

Saturday, August 7, 2004	
Sedona and Verde Valley Tour (Lunch included)	8:00 a.m. – 4:00 p.m.
Sunday, August 8, 2004	
City Tour and Old Town Scottsdale (Lunch included)	10:00 a.m. – 3:00 p.m.
Monday, August 9, 2004	
Desert Botanical Garden and Heard Museum Tour (Lunch included)	8:00 a.m. – 1:00 p.m.
Tuesday, August 10, 2004	
Frank Lloyd Wright – Taliesin West Tour	8:00 a.m. – 12:00 p.m.
Wednesday, August 11, 2004	
Southwestern Cooking Class (Lunch included)	10:30 a.m. – 1:00 p.m.

EVENING EVENTS

Saturday, August 7, 2004	
Diamondbacks Baseball Game	6:00 p.m. – 10:00 p.m.
Sunday, August 8, 2004	
Opening Session	7:00 p.m. – 8:00 p.m.
Cheese and Wine Reception <i>Sponsored by Kraft Foods North America</i>	8:00 p.m. – 10:00 p.m.
Monday, August 9, 2004	
Exhibit Hall Reception	5:00 p.m. – 6:30 p.m.
Monday Night Social at Rawhide Western Town	6:30 p.m. – 10:00 p.m.
Wednesday, August 11, 2004	
Awards Banquet Reception	6:00 p.m. – 7:00 p.m.
Awards Banquet	7:00 p.m. – 9:30 p.m.

GOLF TOURNAMENT

Saturday, August 7, 2004	
Golf Tournament Arnold Palmer Signature Course at Wildfire Golf Club	6:00 a.m. – 11:00 a.m.

HOTEL INFORMATION

For reservations, contact the hotel directly and identify yourself as an IAFP 2004 attendee to receive a special rate of \$139 per night, single/double or make your reservations online. This special rate is available only until July 7, 2004.

JW Marriott Desert Ridge Resort
5350 E. Marriott Dr.
Phoenix, Arizona 85054
Phone: 800.228.9290 • Fax: 480.293.3738
Web site: www.marriott.com/phxdr
(Group Code INTINTA)

Attendee Registration Form



**International Association for
Food Protection®**

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

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

Employer _____ Title _____

Mailing Address (Please specify: Home Work) _____

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

Telephone _____ Fax _____ E-mail _____

Regarding the ADA, please attach a brief description of special requirements you may have. Member since: _____

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

PAYMENT MUST BE RECEIVED BY JULY 7, 2004 TO AVOID LATE REGISTRATION FEES

REGISTRATION FEES:	MEMBERS	NONMEMBERS	TOTAL
Registration (Awards Banquet included)	\$ 365 (\$415 late)	\$ 555 (\$605 late)	_____
Association Student Member (Awards Banquet included)	\$ 75 (\$ 85 late)	Not Available	_____
Retired Association Member (Awards Banquet included)	\$ 75 (\$ 85 late)	Not Available	_____
One Day Registration:* <input type="checkbox"/> Mon. <input type="checkbox"/> Tues. <input type="checkbox"/> Wed.	\$ 200 (\$225 late)	\$ 305 (\$330 late)	_____
Spouse/Companion* (Name): _____	\$ 55 (\$ 55 late)	\$ 55 (\$ 55 late)	_____
Children 15 & Over* (Names): _____	\$ 25 (\$ 25 late)	\$ 25 (\$ 25 late)	_____
Children 14 & Under* (Names): _____	FREE	FREE	_____
*Awards Banquet not included			
EVENTS:		# OF TICKETS	
Golf Tournament – Arnold Palmer Signature Course (Saturday, 8/7)	\$ 105 (\$115 late)	_____	_____
Diamondbacks Baseball Game (Saturday, 8/7)	\$ 26 (\$ 36 late)	_____	_____
Student Luncheon (Sunday, 8/8)	\$ 5 (\$ 15 late)	_____	_____
Monday Night Social at Rawhide Western Town (Monday, 8/9)	\$ 42 (\$ 52 late)	_____	_____
Children 14 and under	\$ 37 (\$ 47 late)	_____	_____
Awards Banquet (Wednesday, 8/11)	\$ 50 (\$ 60 late)	_____	_____
DAYTIME TOURS:			
(Lunch included in daytime tours except on Tuesday)			
Sedona and Verde Valley Tour (Saturday, 8/7)	\$ 90 (\$100 late)	_____	_____
City Tour and Old Town Scottsdale (Sunday, 8/8)	\$ 55 (\$ 65 late)	_____	_____
Desert Botanical Garden and Heard Museum Tour (Monday, 8/9)	\$ 78 (\$ 88 late)	_____	_____
Frank Lloyd Wright – Taliesin West Tour (Tuesday, 8/10)	\$ 70 (\$ 80 late)	_____	_____
Southwestern Cooking Class (Wednesday, 8/11)	\$ 65 (\$ 75 late)	_____	_____

PAYMENT OPTIONS:

Check Enclosed

Credit Card # _____

Name on Card _____

Signature _____

Check box if you are a technical, poster, or symposium speaker.

TOTAL AMOUNT ENCLOSED \$ _____
US FUNDS on US BANK

Expiration Date _____

JOIN TODAY AND SAVE!!!
(Attach a completed Membership application)

EXHIBITORS DO NOT USE THIS FORM

COMING EVENTS

MARCH

- **2-4, Basic HACCP**, Washington, D.C. For more information, call 800.355.0983; E-mail: fpi@nfpa-food.org.
- **3-5, Ice Cream Technology Conference**, Embassy Suites Golf Resort, Phoenix, AZ. For more information, call 202.737.4332; or go to www.idfa.org.
- **4-5, ASI Lead Auditor Workshop**, St. Louis, MO. For more information, call Jeanette Huges at 800.477.0778 ext. 113; E-mail: jhuges@asifood.com.
- **8-9, HACCP I: Documenting HACCP Prerequisites**, GFTC, Guelph, Ontario. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **9-11, Basic HACCP in Spanish**, Miami, FL. For more information, call 800.355.0983; E-mail: fpi@nfpa-food.org.
- **15-16, Managing Allergens in Food Processing Establishments**, Washington, D.C. For more information, call 800.355.0983; E-mail: fpi@nfpa-food.org.
- **15-16, Microbiology IV: Sampling and Interpreting Results**, GFTC, Guelph, Ontario. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **16-18, IDFA SmartMarketing 2004**, Astor Crowne, Plaza, New Orleans, LA. For more information, E-mail: training@idfa.org.
- **17-19, Food Safety Summit and Expo**, Washington, D.C. For more information, call 800.746.9646 or www.foodsafetysummit.com.
- **17-19, Idaho Environmental Health Association Annual Educational Conference**, BSU Convention Center, Boise, ID. For more information, contact Jim Lane at 208.734.5900, x309.
- **18, HACCP for the Hospitality Industry**, GFTC, Guelph, Ontario. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **25-28, IAFIS 2004 Annual Conference**, Camelback Inn Marriott Resort, Golf Club and Spa, Scottsdale, AZ. For more information, call 703.761.2600 or E-mail: info@iafis.org.
- **29-31, First World Congress on Organic Food: Meeting the Challenges of Safety and Quality for Fruits, Vegetables, and Grains**, Kellogg Hotel and Conference Center, Michigan State University, East Lansing, MI. For more information, E-mail: mitzelf3@cvm.msu.edu.
- **30-31, Dairy Pricing 101: IDFA's Milk Procurement Workshop**, Embassy Suites O'Hare, Rosemont, IL. For more information, call 202.737.4332; or go to www.idfa.org.
- **30-31, IDFA Biosecurity Workshop**, Embassy Suites O'Hare, Rosemont, IL. For more information, E-mail: training@idfa.org.
- **30-31, 2004 Public Health Conference**, Iowa State University Center, Scheman Bldg., Ames, IA. For more information, go to www.iowapha.org.
- **31-April 2, Missouri Milk, Food and Environmental Health Association Annual Educational Conference**, Ramada Inn Convention Center, Columbia, MO. For more information, contact Linda Haywood at 417.829.2788.

APRIL

- **16-21, Conference for Food Protection**, San Marcos Resort, Chandler, (Phoenix) AZ. For more information, call Trevor Hayes at 408.848.2255; E-mail: TWHgilroy@aol.com.
- **19, Microbiology V: Listeria**, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **19-23, Dairy Technology Workshop**, Birmingham, AL. For more information, call 205.595.6455; E-mail: us@randolphconsulting.com.
- **20-22, ASTM Committee E27 on Hazard Potential of Chemicals**, Little America Hotel and Towers, Salt Lake City, UT. For more information, contact Scott Orthey at 618.832.9730; E-mail: sorthey@astm.org.

- **23, International Fresh-cut Produce Association 17th Annual Meeting and Exhibition**, Reno, NV. For more information, call 703.299.6282; E-mail: info@fresh-cuts.org.
- **30, Eighth Annual Symposium on Industrial and Fermentation Microbiology**, Radisson Center, LaCrosse, WI. For more information, call Dr. S. N. Rajagopal at 608.785.6976; E-mail: rajagopa.s@uwlax.edu.

MAY

- **4-5, Plant Operations Conference**, Hilton Chicago Hotel and Tower, Chicago, IL. For more information, call 202.737.4332; or go to www.idfa.org.
- **4-6 HACCP for Juice Processors**, Atlanta, GA. For more information, call 800.355.0983; E-mail: fpi@nfpa-food.org.
- **15-20, IFFA Delicat**, Frankfurt, Germany. For more information, contact Dirk Ebener at 770.984.8016; E-mail: info@usa.messefrankfurt.com.
- **18-19, Cultured Dairy Products Conference**, Hyatt Regency, Minneapolis, MN. For more information, call 202.737.4332; or go to www.idfa.org.
- **18-19, Pennsylvania Association of Milk, Food and Environmental Sanitarians Annual Meeting**, Nittany Lion Inn, State College, PA. For more information, contact Gene Frey at 717.397.0719.

IAFP UPCOMING MEETINGS

AUGUST 8-11, 2004
Phoenix, Arizona

AUGUST 14-17, 2005
Baltimore, Maryland

AUGUST 13-16, 2006
Calgary, Alberta, Canada

COMING EVENTS

- **18-20, Ingredients & Ingredient Functionality Workshop**, University of Nebraska Food Processing Center, Lincoln, NE. For more information, contact Pauline Galloway at 402.472.9751; E-mail: pgalloway2@unl.edu.
- **19, Dairy HACCP Workshop**, University of Wisconsin-Madison, Madison, WI. For more information, contact Marianne Smukowski at 608.265.6346 or go to www.wisc.edu/foodsci/.
- **25-26, Dairy Cost Accounting Workshop**, Sofitel Chicago O'Hare, Rosemont, IL. For more information, call 202.737.4332; or go to www.idfa.org.
- **26, Metropolitan Association for Food Protection Annual Spring Meeting**, Rutgers, Cook College, New Brunswick, NJ. For more information, contact Carol Schwar at 908.689.6693.

JUNE

- **7-11, 5th World Congress Foodborne Infections and Intoxications**, Berlin, Germany. For more information, call 49.30.8412.1939; E-mail: officewk5@bfr.bund.de.
- **8-9, Wisconsin Cheese Grading Short Course**, University of Wisconsin-Madison, Madison, WI. For more information, contact Scott Rankin at 608.263.2008 or go to www.wisc.edu/foodsci/.
- **18-20, Food Allergens: Issues and Solutions for the Food Product Manufacturer**, Hotel Sofitel, O'Hare, Chicago, IL. For more information, contact Pauline Galloway at 402.472.9751; E-mail: pgalloway2@unl.edu.

- **18-25, International Workshop/Symposium on Rapid Methods and Automation in Microbiology XXIV**, Kansas State University, Manhattan, KS. For more information, contact Debbie Hagenmaier at 800.432.8222; E-mail: debbieh@ksu.edu; outside USA call 785.532.5575.
- **23-24, IDFA's Washington Conference**, Washington Court Hotel, Washington, D.C. For more information, call 202.737.4332; or go to www.idfa.org.

JULY

- **14-15, 10th Annual Hawaii Lodging, Hospitality and Foodservice Expo**, Neal Blaisdell Center, Honolulu, HI. For more information, call 800.525.5275; E-mail: kanter@lava.net.



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An Assessment of the Microbiological Risks Involved with Egg Washing under Commercial Conditions M. L. Hutchison,* J. Gittins, A. Walker, N. Sparks, T. J. Humphrey, C. Burton, and A. Moore	4
Independent Effects of Acetic Acid and pH on Survival of <i>Escherichia coli</i> in Simulated Acidified Pickle Products F. Breidt, Jr., J. S. Hayes, and R. F. McFeeters	12
Impact of Cold and Cold-Acid Stress on Poststress Tolerance and Virulence Factor Expression of <i>Escherichia coli</i> O157:H7 D. Ehanafi, B. Leenanon, W. Bang, and M. A. Drake	19
Simultaneous Detection of <i>Escherichia coli</i> O157:H7, <i>Salmonella</i> , and <i>Shigella</i> in Apple Cider and Produce by a Multiplex PCR Yong Li and Azlin Mustapha	27
Intrinsic Mechanism Decreases Susceptibility of <i>Escherichia coli</i> O157:H7 to Multiple Antibiotics Sherene S. Golding and Karl R. Matthews	34
Frozen Storage of <i>Escherichia coli</i> O157 in Buffered Peptone Water and Its Detection on Bovine Carcasses H. E. Tennent, G. T. Innocent, L. M. Fishie, D. J. Taylor, W. B. Steele, S. A. McEwen, W. J. Reilly, G. J. Gunn, S. W. J. Reid,* and D. J. Mellor	40
A Rapid and Automated Fiber Optic-Based Biosensor Assay for the Detection of <i>Salmonella</i> in Spent Irrigation Water Used in the Sprouting of Sprout Seeds Marianne F. Kramer* and Daniel V. Lim	46
Modeling the Boundaries of Growth of <i>Salmonella</i> Typhimurium in Broth as a Function of Temperature, Water Activity, and pH Konstantinos P. Koutsoumanis, Patricia A. Kendall, and John N. Sofos	53
Thermal Inactivation of <i>Enterobacter sakazakii</i> in Rehydrated Infant Formula Sharon G. Edelson-Mammel and Robert L. Buchanan	60
Development of Predictive Models for the Survival of <i>Campylobacter jejuni</i> (ATCC 43051) on Cooked Chicken Breast Patties and in Broth as a Function of Temperature K. S. Yoon,* C. N. Burnette, and T. P. Oscar	64
Effect of Reheating on Viability of a Five-Strain Mixture of <i>Listeria monocytogenes</i> in Vacuum-Sealed Packages of Frankfurters following Refrigerated or Frozen Storage Anna C. S. Porto, Jeffrey E. Call, and John B. Luchansky	71
Reduction and Survival of <i>Listeria monocytogenes</i> in Ready-to-Eat Meats after Irradiation Sally C. C. Foong, Glenda L. Gonzalez, and James S. Dickson	77
Growth of Heat-Treated Enterotoxin-Positive <i>Clostridium perfringens</i> and the Implications for Safe Cooling Rates Karin G. Andersen, Tina B. Hansen, and Susanne Knachel	83
Distribution of Aflatoxin-Producing <i>Aspergillus flavus</i> and <i>Aspergillus parasiticus</i> in Sugarcane Fields in the Southernmost Islands of Japan Haruo Takahashi,* Hisashi Kamimura, and Masakatsu Ichinoe	90
Fungi, Aflatoxins, and Cycloplazonic Acid Associated with Peanut Retailing in Botswana Fingani A. Mphande, Bupe A. Siame,* and Joanne E. Taylor	96
Norovirus Cross-Contamination during Food Handling and Interruption of Virus Transfer by Hand Antisepsis: Experiments with Feline Calicivirus as a Surrogate S. Bidawid,* N. Malik, O. Adegbunrin, S. A. Sattar, and J. M. Farber	103
Comparison of Biogenic Amine Profile in Cheeses Manufactured from Fresh and Stored (4°C, 48 Hours) Raw Goat's Milk Sonia Novella-Rodríguez, M. Teresa Veciana-Nogués, Artur X. Roig-Sagués, Antonio J. Trujillo-Mesa, and M. Carmen Vidal-Cerou	110
Biogenic Amine Formation and "Zapatera" Spoilage of Fermented Green Olives: Effect of Storage Temperature and Debitting Processes P. García García, C. Romero Barranco, M. C. Durán Quintana, and A. Garrido Fernández	117
Putrescine, Cadaverine, and Indole Production by Bacteria Isolated from Wild and Aquacultured Penaeid Shrimp Stored at 0, 12, 24, and 36°C R. A. Benner, Jr.,* W. F. Staruszkiewicz, and W. S. Otwell	124
Effects of On-Board and Dockside Handling on the Formation of Biogenic Amines in Mahimahi (<i>Coryphaena hippurus</i>), Skipjack Tuna (<i>Katsuwonus pelamis</i>), and Yellowfin Tuna (<i>Thunnus albacares</i>) Walter F. Staruszkiewicz,* James D. Barnett, Patricia L. Rogers, Ronald A. Benner, Jr., Lynn L. Wong, and John Cook	134
Analysis of Radiation-Induced Hydrocarbons and 2-Alkylcyclobutanones from Dried Shrimps (<i>Penaeus aztecus</i>) Kyong-Su Kim,* Hye-Young Seo, Jeong-Min Lee, Eun-Ryong Park, Jun-Hyoung Kim, Cheul-Hee Hong, and Myung-Woo Byun	142
Antimicrobial and Antioxidant Activities of Natural Extracts In Vitro and In Ground Beef Juhee Ahn, Ingolf U. Grün, and Azlin Mustapha	148
Antigenotoxic Effects of Water Extract from Korean Fermented Soybean Paste (Doen-jang) Jong-Gyu Kim*	156

* Asterisk indicates author for correspondence.

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Statistical Distributions Describing Microbial Quality of Surfaces and Foods in Food Service Operations Rebecca Montville and Donald W. Schaffner	162
Combined Effect of Electron-Beam (beta) Irradiation and Organic Acids on Shelf Life of Pork Loins during Cold Storage Bang-Hyun Kim, Aera Jang, Sang O. Lee, Joong S. Min, and Moochul Lee	168
PCR Identification of Beef, Sheep, Goat, and Pork in Raw and Heat-Treated Meat Mixtures Miguel A. Rodríguez, Teresa García, Isabel González, Luis Asensio, Pablo E. Hernández, and Rosario Martín	172
Research Notes	
<i>Salmonella</i> in Sesame Seed Products Stefan O. Brockmann,* Isolda Piechotowski, and Peter Kimmig	178
Evidence of <i>Salmonella</i> Internalization into Fresh Mango during Simulated Postharvest Insect Infestation Procedures Ana Lucia Penteado, B. Shawn Eblen, and Arthur J. Miller	181
Bacterial Contamination of Recirculating Brine Used in the Commercial Production of Moisture-Enhanced Pork G. Gordon Greer,* Frances Nattress, Bryan Dills, and Lynda Baker	185
Enrichment and DNA Extraction Protocols for the Simultaneous Detection of <i>Salmonella</i> and <i>Listeria monocytogenes</i> in Raw Sausage Meat with Multiplex Real-Time PCR Xiaowen Wang, Narayanan Jothikumar, and Mansel W. Griffiths	189
Effect of Prestorage Treatments and Storage Conditions on the Survival of <i>Salmonella</i> Enteritidis PT4 and <i>Listeria monocytogenes</i> on Fresh Marine and Freshwater Aquaculture Fish C. C. Tassou,* K. Lambropoulou, and G.-J. E. Nychas	193
Antibacterial Efficacy of Finnish Spice Essential Oils against Pathogenic and Spoilage Bacteria Mari Nevas,* Anna-Riitta Korhonen, Mia Lindström, Pekka Turkki, and Hannu Korkeala	199
Comparison of the Mouse Bioassay and Enzyme-Linked Immunosorbent Assay Procedures for the Detection of Type A Botulinum Toxin in Food J. L. Ferreira,* S. J. Ellisberg, P. Edmonds, and M. A. Harrison	203
Selective Efficacy of Culture Media Recommended for Isolation and Enumeration of <i>Salmonella</i> spp. M. R. Bragulat, E. Martínez, G. Castella, and F. J. Cabañes	207
Simplified Qualitative Method for Canavanine in Seeds and Sprouts Kathleen T. Rajkowski	212

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DuPont Food Risk Assessment	Inside Front Cover
Food Processors Institute	61
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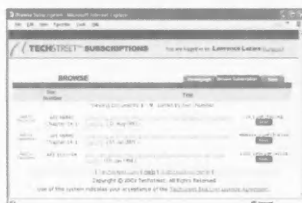


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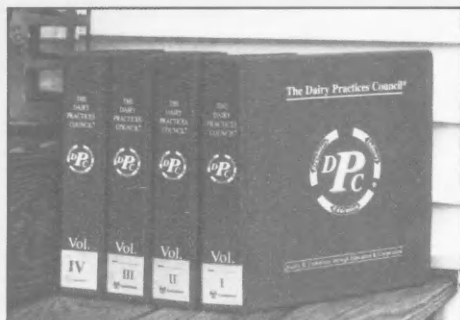
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- 35 Dairy Plant Waste Management
- 36 Dairy Farm Inspection
- 37 Planning Dairy Stall Barns
- 38 Preventing Off-Flavors in Milk
- 39 Grade A Fluid Milk Plant Inspection
- 40 Controlling Fluid Milk Volume and Fat Losses
- 41 Milkrooms and Bulk Tank Installations
- 42 Stray Voltage on Dairy Farms
- 43 Farm Tank Calibrating and Checking
- 45 Gravity Flow Gutters for Manure Removal in Milking Barns
- 46 Dairy Odor Management
- 48 Cooling Milk on the Farm
- 49 Pre- & Postmilking Teat Disinfectants
- 50 Farm Bulk Milk Collection Procedures
- 51 Controlling the Accuracy of Electronic Testing Instruments for Milk Components
- 53 Vitamin Fortification of Fluid Milk Products
- 54 Selection of Elevated Milking Parlors
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- 56 Dairy Product Safety (Pathogenic Bacteria) for Fluid Milk and Frozen Dessert Plants
- 57 Dairy Plant Sanitation
- 58 Sizing Dairy Farm Water Heater Systems
- 59 Production and Regulation of Quality Dairy Goat Milk
- 60 Trouble Shooting Microbial Defects: Product Line Sampling & Hygiene Monitoring
- 61 Frozen Dessert Processing
- 62 Resources For Dairy Equipment Construction Evaluation
- 63 Controlling The Quality And Use Of Dairy Product Rework
- 64 Control Points for Good Management Practices on Dairy Farms
- 65 Installing & Operating Milk Precoolers Properly on Dairy Farms
- 66 Planning A Dairy Complex - "100+ Questions To Ask"
- 69 Abnormal Milk - Risk Reduction and HACCP
- 71 Farmers Guide To Somatic Cell Counts In Sheep
- 72 Farmers Guide To Somatic Cell Counts In Goats
- 73 Layout of Dairy Milk Houses for Small Ruminant Operations
- 78 Biosecurity for Sheep and Goat Dairies
- 80 Food Allergen Awareness In Dairy Plant Operations
- 83 Bottling Water in Fluid Milk Plants
- 100 Food Safety in Farmstead Cheesemaking
- 103 Approving Milk and Milk Product Plants for Extended Runs

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