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FOOD PROTECTION TRENDS

SCIENCE AND NEWS FROM THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

AUGUST 2005

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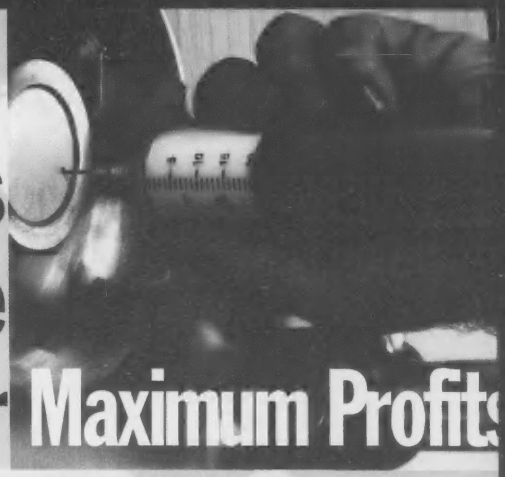

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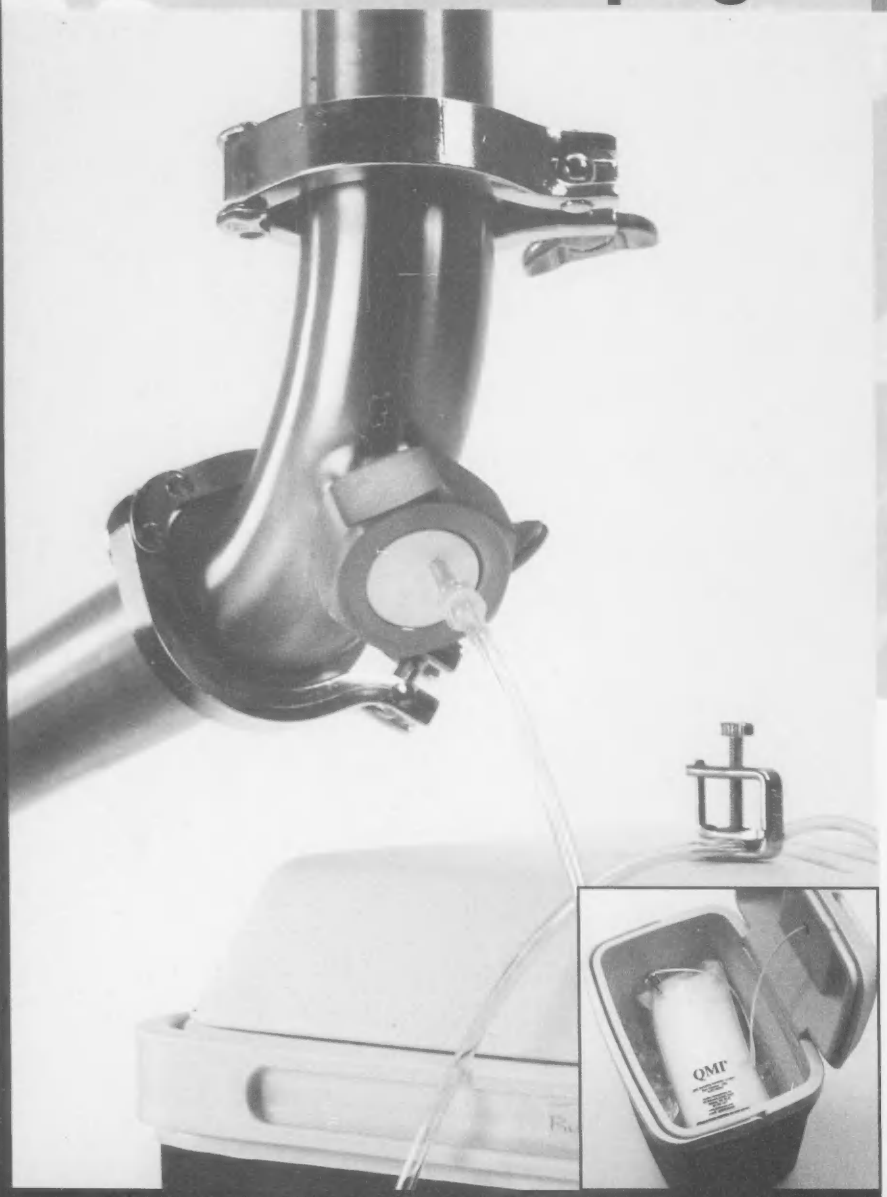

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International Association for Food Protection

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VOLUME 25, NO. 8

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FOOD PROTECTION TRENDS
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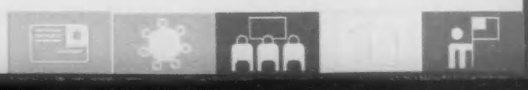

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"A VIEW FROM WISCONSIN"

By **KATHLEEN A. GLASS**
PRESIDENT

"I look forward to working with you in the future. Hope to see you in Baltimore for IAFP 2005"

It is difficult to believe that it has been an entire year since Paul Hall handed me the President's Gavel in sunny Phoenix at IAFP 2004. As I had anticipated last August, this has been a remarkable and productive year. During the past 12 months, I have been privileged to collaborate with many enthusiastic members and affiliates, Executive Board, and IAFP staff who are all committed to advance the mission of our Association. To wrap up my final month as President of our Association, I'd like to detail progress in our Strategic Plan and take a brief look forward to where our Association is headed.

International Commitment:

- IAFP is demonstrating their commitment to international members by hosting regional international meetings outside of North America. The first "IAFP Symposium on Food Safety" will be held in Prague, The Czech Republic on October 11–12, 2005. This conference will focus on "Recontamination Issues in the Food Industry." Conference information and registration materials are available on our Web site.
- The New Zealand Association for Food Protection will receive their charter at IAFP 2005 and will become the 10th Affiliate from outside the US.
- Two publications targeting consumer food safety have been translated in response to multilingual needs. *Before Disaster Strikes... A Guide to Food Safety in the Home* and *Food Safety at Temporary Events* are now available in Spanish language.

Publications:

- Accessibility to publications has been increased by adding back volumes to *JFP* online through 1999. Full-text articles from 2001–2003 *FPT* are now available online to members via the IAFP Web site.
- A special report written by ILSI Europe on "*Mycobacterium avium* Subsp. *paratuberculosis* (MAP) and the Food Chain" was reprinted in April 2005 *FPT*; currently, a task force is developing a review on Avian Influenza and its potential impact on the food industry.
- Ideas for applied food safety booklets will be solicited from PDGs during IAFP 2005; topics will be approved by the Executive Board to initiate work by the end of 2005.

Affiliates:

- Affiliates play a major role in advancing our Association's mission by providing educational programs that focus on the needs of local food safety professionals. Communication with Affiliate organizations is increasing and IAFP is being promoted at Affiliate meetings.
- Executive Board members were invited to be speakers by 17 Affiliates since May 2004 and Board members are scheduled to attend an additional five meetings this fall.
- IAFP Staff is currently evaluating the financial impact of a dues restructure to make IAFP Membership more affordable and to attract Affiliate members to become IAFP Members.

Outreach and Education:

- Travel grants were established to fund two students to attend IAFP 2005, one from Canada/US and other from outside this region. Next year will include an additional grant for a student from Canada/US and one that specifically targets a student from a developing country in Latin America, Africa or Asia, bringing the total travel grants for IAFP 2006 to four. Grant program will continue to expand as support from the IAFP Foundation increases.
- Procedure is being developed to host mid-year briefings that address critical food safety issues. Members of the Rapid Response Special Committee are alert to emerging issues and will work with government and industry partners to convene special meetings as the need arises.
- Recognition of IAFP among students and food science faculty is being promoted by expanding our Executive Board Speaker Program to universities. Through this program, faculty can invite Executive Board members to deliver guest lectures to food science or food microbiology classes, seminars, or clubs. The first lecture was delivered in spring 2005 with a second scheduled for fall 2005.

Foundation Fund:

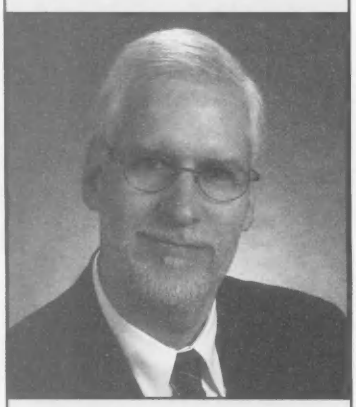
- The goal is to increase the Foundation Fund to $1 million by 2010. The Vision of the Foundation is to promote food safety around the world by supporting future food safety professionals and deserving scientists from developing countries through scholarships or travel grants to attend IAFP Annual Meetings, sponsoring international workshops, as well as continued funding for the Audiovisual Library, Ivan Parkin Lecture, Developing Scientist Award, speaker travel, and shipment of journals to developing countries.
- Kraft Foods demonstrated that they share in the Vision of the Fund by providing corporate contributions of $25,000 and $50,000, increasing the current balance to approximately $300,000.
- Donating to the Foundation Fund was made easier for individual members by adding a line item to the membership renewal form. Approximately 10% of our members have used this opportunity so far to contribute amounts ranging from $10 to $1,000.
- Foundation Fund Committee is currently developing promotional materials for a major fund raising campaign to be launched in 2006.

In addition, we have made progress in other areas. The IAFP Web site has been redesigned for a fresh look. A new Food Safety Innovation Award was established. Individual membership has increased 3% over the past year. The number of Sustaining Members has increased from 67 (including 2 Gold and 7 Silver) in January 2004 to 79 (including 4 Gold and 9 Silver) in June 2005. In 2004, we once again broke an Annual Meeting attendance record with 1,584 registrants and expect to exceed that number for IAFP 2005. Successful meetings and an increase in memberships have translated into achieving a positive general fund balance for the second consecutive year (compared with a negative balance for the preceding decade). Lastly, a new Professional Development Group focusing on Food Toxicology and Food Allergens was formed to provide a venue for members to discuss non-microbiology food safety issues.

The late Vince Lombardi, football coach of the Green Bay (Wisconsin) Packers said, *Individual commitment to a group effort... that is what makes a team work, a company work, a society work, a civilization work.* And it is the individual commitment to IAFP by our Members, Staff, and Executive Board that makes our Association work and is responsible for an extremely successful year. The future of IAFP continues to be bright as I pass the gavel to Jeff Farber, President of our Association for the next year, and as the leadership subsequently passes to Frank Yiannas, Gary Acuff, and Stan Bailey, who are equally committed to IAFP.

As I close, I want to thank Paul Hall, Past President, and Affiliate Council Chair Stephanie Olmsted for their service, as well as all the Board members who preceded me and laid the foundation of this successful organization. My deepest gratitude goes to the entire IAFP staff, David, Lisa, Bev, Julie, Donna, Pam, Donna G., Didi, Farrah, Karla, and Nancy, for their dedication, professionalism, and assistance throughout the year. Finally, thank you for your support, your input, and enthusiasm this year. I look forward to working with you in the future. Hope to see you in Baltimore for IAFP 2005. As always, I welcome your comments and ideas. Please feel free to E-mail me at kglass@wisc.edu and let me know your view.

"COMMENTARY"
FROM THE EXECUTIVE DIRECTOR



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

"The Foundation has supported IAFP's efforts for more than 30 years and that has made a real impact on the quality of IAFP's programs"

My wife Connie and I recently had the opportunity to travel in China and frequently, my thoughts go back to the many scenes that we were able to observe. Yes, we experienced the Great Wall of China, saw the Terra Cotta Warriors, visited Beijing, Shanghai, Chongqing and other cities, cruised on the Yangtze River and even made the journey to Tibet, but the people of China made the most lasting memories. So many people and such a friendly population. In comparison to the United States, Canada and a lot of other countries, most of the Chinese have very few possessions but appear very happy in their lives.

This got me thinking about our fundraising effort for the IAFP Foundation Fund. So many times we focus on what our next acquisition (purchase of a "much needed" item) will be and do not think about those who have a much larger need of the basic essentials (food, water and shelter). We have so much to be grateful for – our health, our safe food, our friends and family – but how often do we think about those who need our help? There are countless people in public health and involved in food safety who, through their employment, help people on a daily basis and that is one of the joys of working for IAFP. Knowing that what we do, facilitating the transfer of food safety information, leads to a safer food supply and improved health for all consumers.

How does this all relate to the IAFP Foundation you might be asking. As I see it, the connection is that the Foundation has supported IAFP's efforts for more than 30 years and that has made a real impact on the quality of IAFP's programs. This includes the IAFP Annual Meeting, which has led to improved safe food for those who learn from our presentations and from the thousands of applied and research articles we have published. The Foundation supports many worthy IAFP programs including the Audiovisual Library (containing more than 100 food safety training presentations), distribution of IAFP journals to developing countries (through FAO in Rome), travel support for Annual Meeting speakers, the Developing Scientist Competition at Annual Meeting (since 1986), the Ivan Parkin Lecture at our Opening Session (also since 1986) and now, beginning this year, the Student Travel Scholarships. Each program supported by the Foundation "gives back" to food safety by strengthening the very system it supports.

Now is your opportunity to become actively involved in supporting the IAFP Foundation Fund and you too can "give back" to the food safety system. In the last year, more than 300 IAFP Members have made individual contributions to the Foundation. While this may sound like a large number, it still only represents 10% of our Membership. We are working to see this percentage grow and the amount of support for the Foundation will flourish! A little over a year ago, the Foundation set a goal of reaching $1 million in the Foundation Fund by the year 2010. While we have made great progress since 2000 when our goal was $100,000 in 2000, we have a big hill to climb to reach $1 million! Through the generous support of Kraft Foods, our numerous Sustaining Members and the individual contributors, we have been able to grow the Fund to $300,000 at present. You can see, we have made good progress since 2000.

At IAFP 2005 in Baltimore, the progress made to date by the IAFP Foundation Fund will be evident. There will be many times throughout the meeting when the Foundation support provides to IAFP will be mentioned. A new Foundation

supported program is our Student Travel Scholarship. In its first year, two students, one from the US and one from Australia, are receiving complete travel support to attend IAFP 2005. Already, the Foundation agreed to expand the program support for 2006 to enable four student Members to have their travel expenses supported! This is a direct example of how additional monies in the Foundation Fund can be used to help support IAFP growth.

Our new fundraising efforts will focus on our supporting companies. If we can persuade our corporate supporters to make minimal contributions to the Foundation Fund, our ability to support additional programs will grow along with the Fund balance. By focusing on companies, this does not mean we will reduce our efforts for individual contributions – just the opposite. We will continue to encourage individual contributions as in the past. With your contributions to the Foundation (whether corporate or individual), the programs supported by the IAFP Foundation will grow in the future and will help support safe food and public health. Think about how your support of the IAFP Foundation can improve basic essentials (food and water) for others and pass up your next acquisition. Please make your contribution today!

Support the Foundation Fund

The Foundation supports efforts of the Association by funding:

- Student Travel Scholarship Awards
- Ivan Parkin Lecture
- Speakers at our Annual Meeting
- Audiovisual Library
- Developing Scientists Competition
- Shipment of Surplus Journals to Developing Countries

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ARTICLES

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

International Association for Food Protection

Irrigation Treatments and the Presence of *Escherichia coli* on Ontario Field Strawberries

TING ZHOU[1], ROBIN MCKELLAR,[*] SANDRA JONES,[2] PAM FISHER,[2] HONGDE ZHOU,[3] KELLEY KNIGHT,[1] and XIU-ZHEN LI[1]

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SUMMARY

Consumer demand for fresh and minimally-processed fruits and vegetables is increasing. Outbreaks of foodborne illness have been attributed to these products, and in some cases irrigation practices have been implicated in the transfer of pathogens from contaminated water to the crop. We therefore examined the influence of irrigation methods and water quality on the incidence of *Escherichia coli* on Ontario-grown strawberries. Three irrigation methods were investigated: trickle irrigation with well water, trickle irrigation with surface water, and overhead irrigation with surface water. Both strawberry and water samples were taken from at least 5 producers for each irrigation system at early, middle and late periods in the harvesting season. *E. coli* was present in approximately half of the surface water samples at levels of 0.07–2.45 log CFU 100 ml^{-1}, although, *E. coli* was not found on fruit treated with surface water. *E. coli* (1.17–2.64 log CFU g^{-1}) was found on three samples of fruit that had been irrigated with well or municipal water. Irrigation water generally met the revised 2002 Canadian Water Quality Guidelines (maximum of 100 *E. coli* per 100 ml). Overhead irrigation with surface water does not seem to result in transfer of *E. coli* to berries; however, further experimentation is warranted.

INTRODUCTION

Ontario is an important strawberry production area in Canada, and more than 90% of Ontario field strawberries are sold for fresh consumption. Irrigation is an essential tool for berry producers, providing frost protection, crop cooling and moisture stress prevention. Irrigation provides the root zone of the plant with the amount of water required during periods of need. In Ontario, common methods of irrigation include overhead irrigation, in which water is applied through sprinklers over the entire field, and trickle or drip irrigation, in which water is applied directly to the soil around each plant. In most strawberry fields where trickle irrigation is used, irrigation lines are buried and water is applied to the plant's root zone. For overhead irrigation, large volumes of unfiltered water are applied intermittently to the entire crop surface. Trickle irrigation systems supply lower volumes of filtered water to the soil around the plant so that only the roots are watered.

For crops that are at relatively high risk of contamination—those that are grown close to the ground and consumed raw — it is appropriate to choose a method of irrigation that poses the least risk. Overhead irrigation systems are of particular concern, since much of the crop comes into contact with the water *(3, 4)*. Outbreaks of foodborne illness linked to the consumption of fresh produce have increased in recent years *(15)*, and the source of implicated foodborne pathogens

A peer-reviewed article

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E-mail: mckellarr@agr.gc.ca

TABLE 1. Influence of irrigation systems on presence of *E. coli* on strawberries and in irrigation water

Producer	Water Source	Irrigation Method[1]	Water (log CFU 100 ml^{-1})			Berries (log CFU g^{-1})		
			Early	Middle	Late	Early	Middle	Late
1	Municipal water	A	NA[2]	0	0	NA	0	0
2	Municipal water	A	0	0	0	0	0	0
3	Well	A	0	0	0	NA	0	1.78
4	Municipal water	A	NA	NA	1.58, 1.45, 1.34	0	1.17	1.48, 2.64, 2.20, 1.18, 1.65, 1.00
5	Well	A	0	0	NA	0	0	NA
6	River	B	NA	0	NA	NA	0	NA
		C	1.00, 1.18, 1.00	NA	2.45, 2.45, 2.41	0	NA	0
7	Pond fed by runoff	B	0	0	1.40, 1.60, 1.00	NA	0	0
8	Spring-fed pond	B	NA	0	NA	NA	0	NA
9	Spring-fed pond	B	NA	1.00	0.78, 0.70, 0.85	NA	0	0
10	Spring-fed pond	B	0	1.65, 1.58, 1.61	NA	0	0	NA
11	Spring-fed pond	C	1.38, 1.63, 1.64	NA	1.23, 1.15, 1.24	0	0	0
12	Spring-ed pond	C	0	0	0	0	NA	0
13	Spring-fed pond with aeration	B	NA	1.48, 1.48, 1.70	NA	0	0	0
		C	NA	1.40, 1.40, 1.00	1.18, 1.00, 1.18	0	0	0
14	Well-filled pond	C	0	1.00, 1.18, 1.18	1.00, 1.20, 1.04	0	0	0

[1]A, trickle irrigation with well or municipal water; B, trickle irrigation with surface water; C, overhead irrigation with surface water

[2]NA, no data available

has been attributed in many cases to contact of the product with contaminated water *(4, 17)*. Irrigation of vegetables with contaminated water has been shown to increase the incidence of pathogens on produce *(1, 5, 12, 13)*. Pathogens were deposited on the edible surface or internalized within the plant when plants were exposed to high levels of pathogens from irrigation water in a laboratory setting *(16, 18)*. Recent work has shown that a one-time application of contaminated irrigation water to radishes and carrots can lead to long-term persistence of *Salmonella enterica* Serovar Typhimurium on the vegetables *(8)*. In another study, cabbage transplants were inadvertently overhead irrigated with contaminated water, and *Escherichia coli* was isolated from the roots, although not from the edible portion, of the crop *(19)*.

In 1987, the Canadian Council of Ministers of the Environment (CCME) released Canadian Water Quality Guidelines that include guidelines for agricultural water used for irrigation and livestock. The guidelines at that time proposed tentative maximum concentrations of 100 fecal coliform bacteria per 100 ml and 1000 total coliform bacteria per 100 ml of irrigation water from surface or ground water sources. These guidelines were designated as tentative in light of discussions on the use of appropriate indicator organisms. The guidelines were updated in 2002 and have changed from 100 fecal coliform bacteria to 100 fecal coliform (*E. coli*) per 100 ml of irrigation water. This change reflects the current thought that *E. coli* is one of the best indicators of microbial quality in surface water.

Many strawberry growers rely on surface water sources for irrigation, and the quality of these sources can fluctuate over the growing season. In a survey conducted in the United States, 76% of fruit and vegetable growers used surface water for irrigation, but few tested the quality of the water *(14)*. A wide range of water sources in use on farms indicate a substantial risk of pathogen transfer, particularly as the demand for irrigation water increases *(9)*. Irrigation procedures currently employed by strawberry producers may be a vehicle for transmitting pathogens to the berry surface, but there is no definitive evidence that this occurs. Outbreaks of foodborne illness have been attributed to strawberries *(15)*; therefore we undertook a limited survey of strawberry producers in southwestern Ontario to determine the extent to which irrigation practices could impact the quality of berries. Information on coliforms and *E. coli* in irrigation water and on berries was obtained, and because *E. coli* is generally accepted as the most appropriate indicator of fecal contamination, the results pertaining to this indicator are reported here.

MATERIALS AND METHODS

Sampling

Fourteen strawberry producers from 6 counties in southwestern Ontario participated in this project. Five producers used only trickle irrigation with well water or municipal water (A; control); four used only trickle irrigation with surface water (B); three used only overhead irrigation with surface water (C); and the remaining two used both methods B and

C, but in different fields (Table 1). Samples of berries and irrigation water were taken during early, middle and late periods in the harvesting season, within 48 h of the last irrigation. Because of weather conditions and other uncontrollable factors, samples were not taken from each producer at each time interval (Table 1).

For each producer at each time period when sampling was done, a total of six replicate berry samples were taken from different areas of the field (except for the total of four samples from Producer #3). Each sample consisted of 50 berries taken from several plants in a designated area (approximately 1m^2). Designated pickers using gloves sanitized with alcohol (Commercial Alcohol, ON, Canada) placed berries into sterile stomacher bags (Simport Plastics Ltd., PQ, Canada). For each producer at each time period, a total of three replicate 100 ml water samples were taken from the outflow of the irrigation system, and placed in sterile plastic water sampling bottles (Fisher Scientific, ON, Canada). All samples were placed on ice in coolers and transported to the testing laboratory within 24 hours. Upon arrival at the laboratory, samples were stored at 4°C for no more than 18 h prior to analysis.

Microbiological analysis

Berries were tested for *E. coli* by use of the Health Canada MFHPB-34 method *(6)*. A Stomacher 400 (Seward Medical, London, UK) was used to macerate each bag of berries, and an initial 1:10 dilution in buffered peptone water (Difco Laboratories, Detroit, MI, USA) was prepared. Appropriate dilutions were made as required. Dilutions were plated in duplicate onto Petrifilm™ Coliform/*E. coli* plates (Catalogue No. 06414, 3M, London, ON, Canada), incubated at 35°C for 24 ± 2 h, and colonies were counted according to manufacturer's instructions.

Water samples taken at each sampling time were analyzed by use of the filtration technique of the Ministry of Health and Long Term Care well water protocol and Ministry of Environment water testing protocols, based on Standard Methods for the Examination of Water and Waste Water *(2)*. Water (100 ml) was aseptically filtered through a 0.45 µm ISO-GRID filter (Neogen Corp., Lansing, MI, USA). Filters were placed onto a Petri plate containing Differential Coliform (DC) medium (Oxoid Ltd., Hampshire, England). The plates were incubated at 37°C for 24 ± 2 h, and colonies were counted according to manufacturer's instructions.

RESULTS AND DISCUSSION

This study involved 14 producers with 16 sites from six counties in southwestern Ontario over a three-week period from June 26th to July 16th of 2003. Because berries ripen at different times during the growing season, depending on the location, the nominal 48-h sampling window after irrigation was often difficult to achieve. In addition, availability of pickers and incidences of rain often precluded sampling at the designated times. As a result, samples for all of the times (early, middle and late) were obtained only for seven out of the total of 16 berry plots. A full statistical analysis could not be performed on the data, because of the limited number of replicate samples. In spite of these limitations, important findings were obtained.

Within this study, there were many different sources of surface water. As expected, there was considerable variation in *E. coli* counts among water samples taken from different producers. *E. coli* was present in water samples at 0.70–2.45 log CFU 100 ml^{-1}, and was found in approximately half of the surface water samples (Table 1). When *E. coli* was found at a particular sampling time, it was usually found in all three replicate samples, with one exception. *E. coli* was found only in well water at one sampling time (three replicates). Generally, *E. coli* was present in surface water most often at the middle and late harvest sampling times.

E. coli was found on only three berry samples, and counts ranged from 1.17–2.64 $\log_{10}$ CFU g^{-1}. *E. coli* was detected in samples of both water and berries, from Producer #4, irrigating with municipal water, at the late sampling time, and in one of six replicate berry samples at the middle sampling time. Producer #3, irrigating with well water, had only one of four berry samples positive at the late sampling time, while the corresponding water sample was negative. Samples of fruit irrigated with surface water were *E. coli* negative, in spite of the incidence of this microorganism in the corresponding water samples (Table 1). With so few berry samples testing positive for *E. coli*, it is difficult to determine if there is any corrrelation with corresponding counts in water. Positive water samples were generally < 2 log CFU 100 ml^{-1}, so even direct contact between water and the berries would be expected to transfer very few cells per g of fruit.

It is generally believed that counts of total fecal coliforms are a poor indicator of fecal contamination; thus *E. coli* counts have been proposed as a better indicator of microbial water quality in fresh water systems *(5, 10)*. The Canadian guidelines recommend a maximum of 100 *E. coli* (or fecal coliform bacteria) per 100 ml of irrigation water, and in the present study only one water sample (from a river) exceeded this limit. The reason for the presence of *E. coli* in surface water or berries reported here is unknown. None of the water sources or fields were fenced to exclude animals; however, there was no evidence of animal contamination. All producers had stated that the distance to the nearest livestock pasture/operation or to the nearest field receiving manure was greater than 1 km (0.62 mile), and none of the producers reported using manure as fertilizer within the four months preceeding the study. Producers involved in this study who were using some type of surface water typically collected it from a pond surrounded by banks, or if the pond was fed by capturing runoff, they directed the runoff through grassed waterways that acted as a filter before the water entered the pond. Other possible sources of contamination include either birds, or handling of berries by pickers. Relatively little information is available on the quality of irrigation water in Canada. Hyland et al. *(7)* examined fecal coliform and *E. coli* levels within the Oldman River basin of Southern Alberta. They attributed high bacterial counts during the summer and after rainfall events to runoff from agricultural land. In contrast, Little et al. *(11)* found no relationship between fecal coliform or *E. coli* levels and land use in a study of the Lower Little Bow River watershed in Alberta.

The presence of *E. coli* in some samples of berries irrigated with treatment A was unexpected. These producers were using well or municipal water and trickle irrigation, which is assumed to be low risk, since the water doesn't generally contact the berries. Irrigation water samples from Producer #4, who used municipal water, had *E. coli* counts < 2 $\log_{10}$ CFU 100 ml^{-1}. The water samples were taken from the field end of the irrigation line; therefore, contamination may have originated in the irrigation system and not in the original water source. This producer also had *E. coli* on berries, so it is possible in this instance that the water had contributed to contamination of the fruit. Because some samples of fruit were very ripe or even showing signs of decay at the time of sampling, other microorganisms that may have given a false positive

result for *E. coli* in the medium used may have been present (Wang et al., unpublished). Further work is necessary to determine the extent to which irrigation of strawberries with water contaminated with *E. coli* could contribute to transfer of this microorganism to the fruit.

In conclusion, *E. coli* was found most commonly in surface water used for irrigation, particularly later in the strawberry growing season. However, there was no clear indication that *E. coli* in irrigation water can find its way onto berries. Further work should be done, focusing in particular on treatment C (overhead irrigation), as this is still the treatment that we expect to be related to increased *E. coli* counts with berries. More frequent sampling during the growing season would also be appropriate, and sampling conditions and procedures should be better controlled. The results of this study suggested that sampling during irrigation or during poor weather conditions may influence quality of berries. Samples should be taken at different times prior to, during, and after irrigation, and quality possibly linked to the presence of visible soil on the plant or berries. It will be important to know under what conditions irrigation is initiated and the length of the irrigation period. The influence of sampling after rain could also be determined.

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Secret Shopper: Grocery Store Employee Food Handling Practices from a Customer's Perspective

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SUMMARY

Food safety is critical along the entire agri-food chain, but it should be emphasized particularly in grocery stores because this may be the last opportunity to prevent food from becoming contaminated before it is purchased. The responsibility for safe food handling has increased for the newer North American supermarkets, which offer a variety of additional food services and products. This research reports on food handling trends discovered by observing the food handling practices of grocery store employees and by inquiring about specific food safety -related topics in supermarkets across southern Ontario. Ten researchers, trained to portray customers, visited 13 randomly selected supermarkets in Southern Ontario, three times. Observations and information were evaluated against the content of supermarket training programs and current literature. The triangulation of results was used to establish and confirm the observed trends. During the store visits, a number of poor food handling practices were observed including improper glove use; cross contamination between raw and ready-to-eat meats and poultry; improper food storage; and poor personal hygiene. In addition, although many grocery store employees appeared confident in their food safety knowledge, when asked for storage and handling advice, many were unaware of the proper methods within their department and were willing to offer incorrect advice. This advice often conflicted with the food handling information posted throughout the grocery store. This research highlights the need for more interactive training specific to individual departments within a supermarket, and will help in the improvement of training resources for grocery store food handlers.

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INTRODUCTION

The retail food industry is Canada's second largest retail sector. It employs approximately one-sixth of Canadians and sells more than $70 billion in food each year *(3)*. Research has demonstrated that 95 per cent of consumers are completely confident that the food in grocery store establishments is safe as long as the building remains clean and the food is of high quality *(9)*. However, this high consumer confidence can drop quickly in case of a highly publicized food safety crisis. Such a drastic decline in consumer confidence was experienced in Japan during the 2001 mad cow crisis when overall beef sales decreased by 20–30 per cent *(22)*. More recently, the results of a published journal article related to the environmental contaminants in farmed and wild salmon received wide-spread media attention and has caused a decline (approximately 20 per cent) in farmed fish sales in Canada *(12, 20)*.

Food is always at risk of microbial contamination anywhere along the agri-food chain. Research has shown that as many as 97 per cent of foodborne illnesses are a result of improper food handler practices in food-service establishments and homes *(13)*. Food safety is especially critical in grocery stores because this may be the last opportunity, before the food is purchased, to control potential hazards that can cause foodborne illness.

TABLE 1. Observational checklist used by secret shoppers during store visits

A	**Grocery Store Sanitation**
1.	Overall is the store clean?
2.	Overall are the employees clean (good personal hygiene)?
3.	Are any employees handling food obviously ill (coughing, sneezing, complaining of sickness)?
4.	Does the store sell fresh and dated products?
5.	Are food items with expired dates removed from the shelves?
6.	Are there any spills?
7.	Are spills cleaned up quickly?
8.	Is there any evidence of pests (mice, flies, birds)?
9.	Are liquid nonfoods (cleaning compounds) separated from foods and paper goods?
10.	Is there food safety information available to the public (brochures, signs, handouts, warnings)?
11.	Is there food safety information posted behind the counters for the employees (hand washing signs, reminders to clean etc.)?
B.	**Supermarket Restroom Sanitation**
1.	Is the washroom clean?
2.	Is the washroom in good working order?
3.	Is there hot and cold running water?
4.	Is soap provided?
5.	Are paper towels provided?
6.	Is a waste bin provided?
7.	Are any hand washing signs or reminders posted?
8.	Is there a cleaning schedule posted?
C.	**Fresh Produce**
1.	Is the produce stored at least 185 cm (6 inches) above the floor?
2.	Is the area under the produce shelves/racks clean?
3.	Is there any evidence of mold, slime or rotting debris that could contaminate the food?
4.	Are the misters clean (not slimy)?
D.	**Bakery**
1.	Are tongs available in self-serve bun bins?
2.	Are employees wearing hair restraints (hair nets or hats)?
E.	**Food Bar (self serve)**
1.	Are sneeze guards in place?
2.	Are sneeze guards clean?
3.	Are utensils available for each individual food item?
4.	Are cold foods cold to the touch?
5.	Are hot foods steaming hot?
6.	Are disposable containers available upside down?
F.	**Butcher, Raw meat counter**
1.	Are there plastic bags available at the meat counter?
2.	Do employees wear gloves to handle product?
3.	Do employees wash hands before and after glove use?
4.	Do employees change gloves in between serving customers?
5.	Are disinfectants/sanitizers obviously available and ready for use?

An increased responsibility for food safety has been placed on the newer North American supermarket chains or big-box grocery stores, which offer a variety of additional food services such as in-store bakeries, butchers, hot and cold delis, juice bars and fresh seafood. The addition of each of these services increases the amount of food handling in the store, particularly the handling of high-risk foods such as raw meat, poultry, seafood, and ready-to-eat meals.

The current status of Canadian grocery store food safety training is difficult to ascertain, as different retail chains use different food safety programs, some of which are public and others private. The Ontario government has established minimum standards that must be followed in any setting where food is handled in Ontario under the Health Protection and Promotions Act (HPPA). This Act covers topics such as maintenance, equipment, food temperatures, washroom policies, safe food handling and employee hygiene in food premises. The HPPA guidelines are used by most grocery stores to create training programs. Local health units and health inspectors also provide information to grocery stores on food handling training *(25)*.

An example of a training program used by an Ontario grocery store chain is a three-day training course offered to all department managers. This particular course was developed and is delivered by in-house personnel. The first day covers basic critical control points in the grocery store. During the second day, managers are taught basic food safety principles, including principles related to background microbiology, hand washing, food storage and contamination. On the third day, a health inspector tests the managers and is also available to answer food-safety related questions. Once the three-day training is complete, managers are expected to return to their departments and deliver a four-hour training session for new employees. New employees are not supposed to handle food until they have received the four-hour training session.

A number of studies have indicated that although training may increase food safety knowledge, a positive increase in food handling behavior does not always result *(13, 21)*. The objectives of this research project were threefold: (1) to observe the food handling behaviors of grocery store employees across southern Ontario and compare these behaviors with HPPA guidelines; (2) to determine what

TABLE 1. *(continued)* Observational checklist used by secret shoppers during store visits

G.	**Seafood**
1.	Is raw seafood separate from cooked seafood (seafood dishes, cooked shrimp or crab)?
2.	Are utensils clean?
3.	Are utensils only used for one type of seafood?
4.	Do employees wear gloves to handle product?
5.	Do employees wash hands before and after glove use?
6.	Do employees change gloves in between serving cooked and raw seafood?
7.	Is there a strong "fishy" odor around the fish counter?
8.	Are employees wearing hair restraints (hairnets or hats)?
9.	Are disinfectants/sanitizers obviously available and ready for use?
10.	Is the seafood stored in ice or does it seem cold to the touch?
H.	**Hot and Cold Deli**
1.	Do employees wear gloves to handle product?
2.	Do employees wash hands before and after glove use?
3.	Do employees change gloves in between handling/serving cooked and raw meat?
4.	Are employee aprons clean, without food stains?
5.	Are employees wearing hair restraints (hairnets or hats)?
6.	Is the meat slicer cleaned in between use or at least once every 4 hours?
7.	Are raw and cooked meat products kept separate?
8.	Are disinfectants/sanitizers obviously available and ready for use?
9.	Do products from the deli counter feel cold to the touch?
I.	**Cold food/Freezer**
10.	Are freezers and refrigerators stocked higher than the fill line?
11.	Are the freezers kept below -18°C (0°F) and are the refrigerators kept below 5°C (41°F)?
12.	Are freezers and refrigerators clean?
13.	Are RTE products separate from raw products?
J.	**Dairy**
1.	Are the dairy fridges cold (below 5°C or 41°F)?
2.	Is the product rotated using FIFO?
3.	Does the dairy department smell clean?
K.	**Canned food**
1.	Do any can ends bulge?
2.	Are any cans dented on the seam or edge?
3.	Are any cans rusty?
4.	Are any cans leaking?
L.	**Cashiers**
1.	Are conveyor belts clean?
2.	Do cashiers place raw meat in a separate bag?

advice food retail/grocery store employees offer to individuals seeking food safety information; and (3) to identify areas that should be improved in the development of grocery store training programs.

METHODS

Store selection

A list of grocery stores was compiled for chain stores in two south central Ontario cities and the surrounding areas. The list included all stores listed in the business pages and yellow pages of telephone directories under the heading "Supermarket/Grocery Store." To meet the selection criteria, each store was required to offer services including bakery, fresh seafood, butcher/fresh meat, hot and cold deli, fresh produce and dairy. Twenty-five grocery stores met the selection criteria. Of the 25 stores, at least one store per town was included and a maximum of five stores from the major cities were randomly chosen. Based on time constraints and volunteer availability, a total of 13 stores were chosen for visits.

Once the stores were selected, three informal interviews were conducted with grocery store employees to determine what current training programs were used and who receives training. Relevant literature was also reviewed and a defined list of questions and a checklist were created, based on the content of the different training programs and literature. The questions developed based on this research are displayed in Table 1 and the checklist in Table 2.

Ten researchers of various age and appearance were recruited and trained to portray customers. All researchers had previous knowledge and experience in food safety. The training consisted of a one-hour meeting during which the project leader administered an inter-coder reliability test, gave instructions of how the project was to be conducted and clearly defined all of the terms and procedures for the study. At this time, researchers also practiced asking questions and became familiar with the observation checklist.

Inter-coder reliability tests were used to ensure the reliability of all researchers' coding techniques, by examining the extent to which different observers or coders, using the same instrument, obtained equivalent results *(8)*. The inter-coder reliability test determined that coders were in 97 per cent agreement with one another.

TABLE 2. Informal interview questions asked of grocery store employees by secret shoppers

Questions
A. General Food Safety
1. What does this date mean (expiry date)?
2. Do I have to eat my food before this date?
B. Produce Department
1. Could you tell me what the difference is between the organic produce and the regular produce?
2. Is the organic produce better/safer for me?
3. The other day I think I heard something about alfalfa sprouts (or green onions) and bacteria...do you know anything about this?
C. Butcher Department
1. How long can I keep this for before I cook it?
2. What is the best way to store it?
3. Could you tell me the best way to cook this?
D. Seafood Section
1. How long can I keep this for before I cook it?
2. What is the best way to store it?
3. Could you tell me how to cook this?
E. Hot Deli Department
1. Should I eat this right away or is it okay to eat tomorrow?
2. If I eat it tomorrow should reheat it? How?
F. Cold Deli Department
1. How long should I keep this meat for before it goes bad?
2. The other day I heard something about pregnant women having to cook their deli meats, do you know anything about this?
G. Cashier
1. Do you ever get a chance to wash your hands?
2. Why did you separate the meat?

From November 2003 to January 2004, secret shoppers individually visited the selected supermarkets; each store was visited three times by different researchers. Full notes on the visits were recorded immediately after the shoppers had left the store.

Data analysis

The information obtained from the secret shoppers' notes was transcribed and content analysis was performed to identify common trends. Observations and information were also evaluated against the content of supermarket training programs and current literature. The results were triangulated to establish and confirm the observed trends. Descriptive statistics were calculated for all variables. Mann-Whitney analyses ($P < 0.05$) were used to identity significant differences between stores in locations with populations greater than 100,000 and stores located in towns with populations less than 100,000. Kruskal-Wallis analyses ($P < 0.05$) were used to determine if significant differences based on store size existed in checklist observations and responses to questions.

RESULTS

Demographic characteristics for the sample grocery stores are shown in Table 3. To allow the grocery stores to remain anonymous, the names of the towns and of the store chains cannot be mentioned; therefore, demographics were established based on the size of the city or town in which the stores were located and the number of checkout counters available at each store. The majority of stores were located in cities with populations greater than 100,000 (61 per cent) and the average number of checkouts in each store was 10–12 (38 per cent).

The checklist used in this study provided a way to scan the stores quickly for food safety concerns. During the store visits, many food safety practices were observed, some of which were positive and others negative (as determined by frequency). Some of the observed positive food safety practices included store cleanliness and sanitation, and prevention of cross contamination in self-serve areas by providing tongs and adequate storage temperatures. Table 4 presents the notable safe food handling practices.

Observed negative food safety concerns included improper hand washing, improper glove use, improper stocking of frozen food products and failure to separate raw meats from ready-to-eat (RTE) products during checkout. The commonly observed unsafe food handling practices are identified in Table 5.

As described by Linton et al. *(16)*, there are many food handling errors that can cause foodborne illness in food retail establishments — poor personal hygiene, cross contamination and temperature abuse. Research has also described failure to avoid unsafe foods, neglect of cleaning and sanitation, improperly trained staff and unaware consumers as other threats to food safety *(11, 17, 24)*.

Cleanliness

Clean refers to the removal of oil, grease, dirt, and debris by use of soap and water *(25)*. By keeping a food retail establishment clean, the potential for cross contamination is reduced and pest infestations are minimized. Cleaning not only refers to the removal of dirt from floors and other visible surfaces, but also includes the removal of dirt from under equipment and hard-to-reach places. Figure 1 presents the frequency with which food handling practices grouped within the "cleanliness" category were observed.

TABLE 3. Frequency of demographic information for grocery stores (n=13)

Demographic Information	Frequency (n=13)
Population of Store Location	
>200, 000	4 (30.7%)
>100, 000	4 (30.7%)
>50, 000	3 (23.1%)
<50, 000	2 (15.4%)
Average number of Checkout Counters per store	
<6	1 (7.7%)
7-9	2 (15.4%)
10-12	5 (38.5%)
13-15	3 (23.1%)
16-18	1 (7.7%)
19-21	0 (0.0%)
22+	1 (7.7%)

TABLE 4. Safe-food handling practices commonly observed by secret shoppers

Description of safe-food handling practices
Overall store cleanliness (surfaces and equipment was clean, including under shelves and under equipment; dairy and seafood departments smelled clean and there was no evidence of pests—mice, flies, birds).
Stores shell fresh and dated products, and expired items have been removed from the shelf.
Non-foods (cleaning compounds, light bulbs) were kept separate from foods.
Washrooms were in good working order and provided soap and paper towels for employees and customers to wash hands.
Serving utensils (tongs, spoons) were clean and available in self-serve areas (self-serve bar, bakery bun bins).
Appropriate temperature storage in individual departments (cold foods were cold to the touch, hot foods were steaming hot, most freezers were below -18°C (0°F) and most refrigerators were below 5°C (41°F).

TABLE 5. Unsafe food handling practices commonly observed by secret shoppers

Description of unsafe food handling practices
Employees did not wash hands before and after glove use.
Employees did not change gloves in between serving cooked and raw meat.
Freezers and/or refrigerators were stocked higher than the fill line.
Cashiers failed to separate raw meat from ready-to-eat food items.

All of the 13 grocery stores evaluated were considered clean and well maintained. As expected in any fast-paced, high-traffic environment, spills were observed at 56 per cent of the store visits; however, one-third of the observed spills were cleaned up within one hour (approximately the duration of a secret shopper visit).

The presence of pests such as birds, rodents or insects can be used as an indication of store cleanliness *(19)*. One visit reported evidence of birds in the store; although this would normally be considered a concern, this store was under construction at the time of the visit, and evidence of birds was not reported for the other two visits to the same store.

Penner and Willingham *(19)* suggest that an additional way to evaluate a store's cleanliness is to examine the condition of the washroom. The washroom does not have to be new or well decorated, but it should be clean and should supply the proper necessities for good personal hygiene — hot and cold running water, soap, paper towels and a proper place to dispose of waste. More than half (64 per cent) of the restrooms visited were considered clean, and almost all (97 per cent) were in good working order. Hot and cold running water was provided in 85 per cent of the restrooms, and soap and paper towels were provided in 94 per cent and 90 per cent respectively.

Cleanliness is critical in the produce section of a grocery store, as most of this food commodity is an exposed and readily available food source for pests. Most of the stores visited (90 per cent) stored produce at least 185 centimeters (six inches) from the floor, preventing the produce from being contaminated by drips or splashes *(25)*. Seventy-nine per cent of stores kept the area under the produce shelves clean, eliminating accessibility to rodents.

Personal hygiene

For this research, the working definition for personal hygiene encompassed many topics related to food handlers — hair restraints, jewelry, illness, glove use, clean clothing and hand washing. Figure 2 displays the frequency with which food handling practices grouped within the "hygiene" category were observed.

The overall hygiene of the employees in each store was observed to be high (100 per cent); however, in 5 per cent of the visits, employees who handled food appeared to be sick (frequent coughing,

FIGURE 1. Frequency that safe food handling practices within the "Cleanliness" category were observed during secret shopping

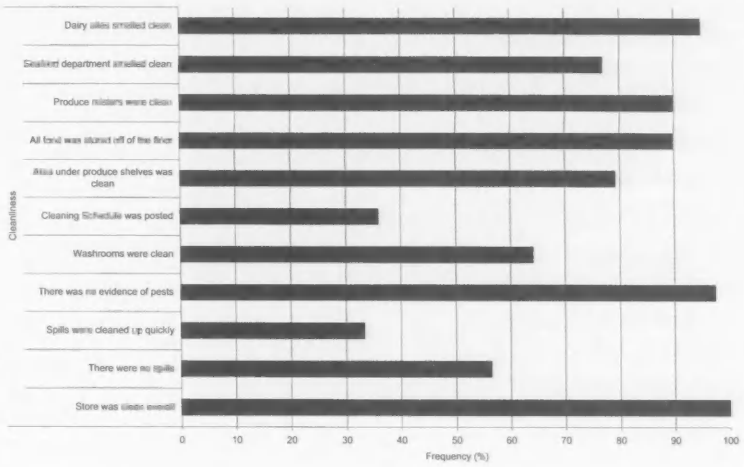
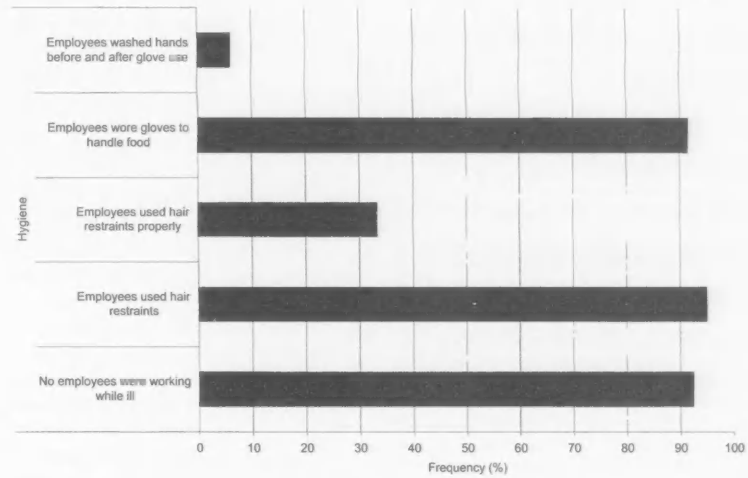


FIGURE 2. Frequency that safe food handling practices within the "Hygiene" category were observed during secret shopper visits



sneezing, or blowing the nose). Since ill workers can be a source of contamination, it is important that workers who display signs of sickness (coughing, sneezing) not be allowed to handle food *(23)*.

The definition of proper hairnet use is the use of a hair restraint — hairnet, chef's hat, baseball cap or bandana — to confine hair and to prevent hair from falling into food and to stop food handlers from touching hair to move it out of the face *(25)*. More than 85 per cent of the time, employees from all departments were observed wearing hair restraints, but despite the high compliance with hair restraint guidelines, 62 per cent of employees wearing hair restraints were observed as wearing them incorrectly. For example, it was observed that hairnets were commonly worn over the back section of employees' hair leaving the front half (bangs) free to contaminate food.

Hand washing has been widely recognized as a necessary hygienic practice for preventing foodborne illness *(15)*. Proper hand washing can be described as washing hands with soap and warm running water for no less than 20 seconds and then drying with a paper towel before starting work, before handling food, before beginning and after finishing a job, and whenever the hands are visibly dirty *(25)*. Proper hand washing was observed to present a problem for grocery store employees. When hand washing should have been observed — before and after handling food or before and after glove use — less than 10 per cent of employees washed their hands before using gloves and more than 70 per cent of employees skipped hand washing entirely, using gloves instead.

Glove use has recently become popular in food retail establishments because of the assumption that physical barriers prevent food handlers from contaminating food; however, research has shown that the majority of gloves are permeable to bacteria *(18)*. Researchers have also argued that mandatory glove use can cause overall hygiene to decline and that gloves are commonly misused *(1)*. The observed frequency with which employees neglected to wash hands before and after glove use raises the concern that workers' hands may have contaminated food. It was also observed that 45 per cent of store employees failed to change gloves between tasks. In one case, a deli employee who had been handling raw chicken from the hot-deli served a secret shopper ready-to-eat meat from the cold deli, without changing gloves. Another example of glove misuse involved an employee in a seafood department who was cleaning raw fish containers and then, without changing gloves, proceeded to serve a secret shopper cooked shrimp.

Cashiers must also be aware of personal hygiene issues, especially hand washing, because every piece of food that goes into a customer's bag is handled at checkout. During checkout, secret shoppers inquired about cashiers' hand washing practices. It was found that only 62 per cent of cashiers claim to wash hands or use hand sanitizers while working. Many cashiers identified time as a barrier to hand washing. "We have no time to wash our hands," and "I could wash my hands on my break, but that is my time and I don't want to waste it."

Cross contamination

Cross contamination involves the transfer of pathogenic microorganisms from one surface to another. For this research, cross contaminating actions included failure to separate ready-to-eat food from raw food, failure to adequately cover foods, use of unwashed equipment,

FIGURE 3. Frequency that safe food handling practices within the "Cross Contamination" category were observed during secret shopper visits

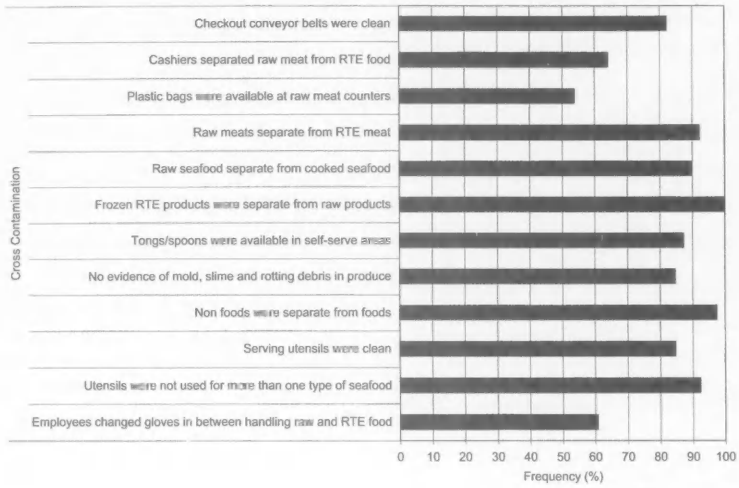
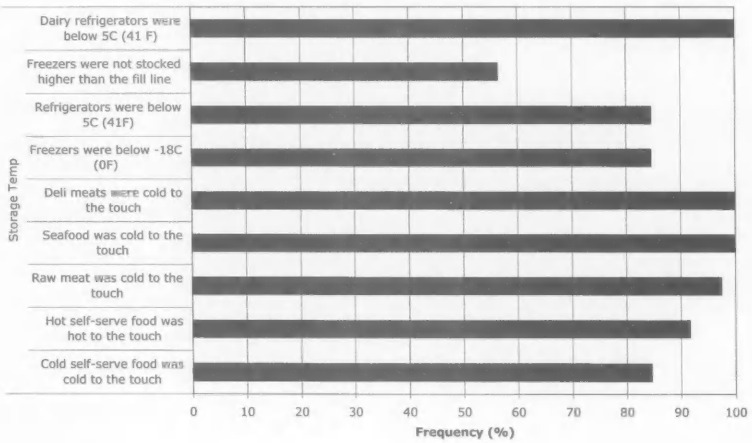


FIGURE 4. Frequency that safe food handling practices within the "Storage Temperature" category were observed during secret shopper visits



and use of one utensil for multiple ready-to-eat dishes. Figure 3 depicts the frequency with which food handling practices grouped within the "cross contamination" category were observed.

All of the grocery stores took measures to prevent cross-contamination. In the freezer/refrigerator section of 100 per cent of stores, raw and ready-to-eat foods were stored separately. On two occasions, it was observed that different seafood departments failed to keep raw seafood separate from the cooked seafood. The contamination of produce was prevented by keeping vegetable misters clean and by removing moldy, rotting or damaged produce from the shelves.

Cross contamination could occur in the bakery department and in the self-serve section as a result of improperly covered food and contamination from consumers who fail to use the proper serving utensils. Therefore, such areas should provide clean sneeze guards to cover the food and individual utensils for each item within the bar; disposable containers should be stored upside down. All of the stores evaluated took appropriate measures to ensure that the food in the bakery and self-serve bars was safe. More than three-quarters of the stores had sneeze guards in place, provided clean utensils for individual food items, and stored disposable containers upside down to prevent contamination. Tongs were provided at the self-serve bins 97 per cent of the time. Thirty-eight per cent of the stores also posted reminders to customers to use the tongs when selecting their baked goods.

Cashiers must ensure that non-food items are kept separate from food items and that raw meats are bagged separately so that juices do not drip so as to contaminate ready-to-eat foods. Sixty-four percent of cashiers properly separated raw and ready-to-eat food items. When asked why foods were separated, a common response was, "Separate bags keep the juices from getting on the other food."

The other cross-contamination concern that cashiers must address is conveyor belt cleanliness. Conveyor belts, which are often contaminated with raw meat juices and other potentially hazardous liquids, could easily come into contact with ready-to-eat foods such as fresh fruits and vegetables or deli meats *(19)*. When cashiers were asked how frequently the conveyor belts were cleaned, 80 per cent answered that the belts were cleaned at least twice a day or when something juicy leaks on the conveyor belt. Only 10 per cent of cashiers indicated that they never clean the conveyor belts.

Temperature control

Improper temperature control is a problem often identified as a contributing factor in foodborne illness *(16)*. Unsafe temperature control may consist of improper cooling, inadequate cooking or reheating, unsuitable thawing methods or unsafe cold and hot holding practices. In grocery stores the most common form of temperature control is cold and hot storage. Figure 4 displays the frequency with which food handling practices grouped within the "storage temperature" category were observed.

Frozen food should be hard, not mushy, and there should be no ice crystals inside the package. Freezer thermometers should read less than -18°C (0°F) and refrigerators should be kept below 5°C (41°F) *(19)*. Approximately 85 per cent of grocery stores were observed to keep freezers and refrigerators at the recommended temperatures. Storage problems were more frequently observed for the open freezers, which are commonly used to display seasonal items like frozen turkeys or store specials. The prod-

FIGURE 5. Frequency that safe food handling practices within the "Unsafe Food" category were observed during secret shopper visits

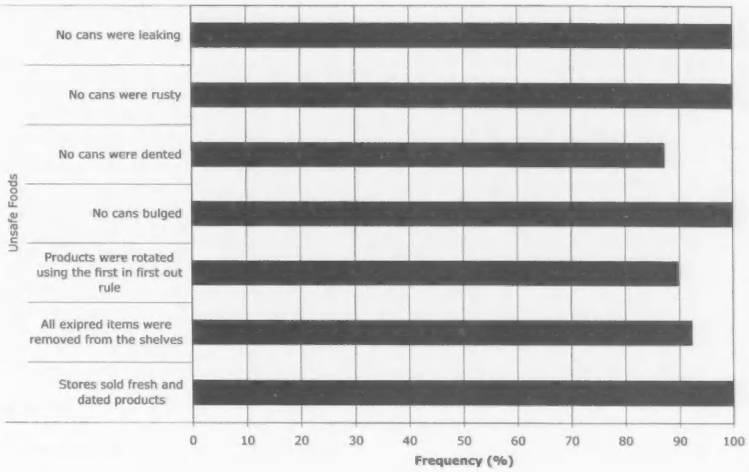
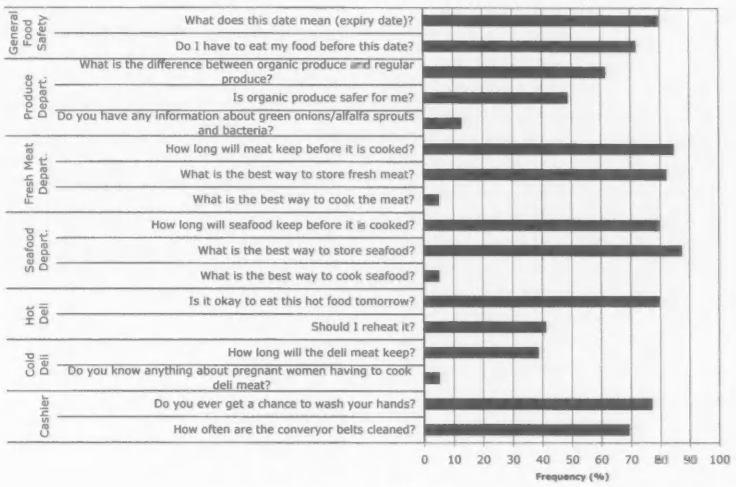


FIGURE 6. Frequency of accurate responses given by grocery store employees to secret shoppers



ucts within these freezers should not be stacked higher than the fill or load line on these units. During this research, conducted during the month of December, open freezers were commonly stocked with turkeys and hams in preparation for Christmas and other religious occasions. These freezers were observed to be over stocked 43 per cent of the time. Piling products above the fill line, increases food safety risks because food is likely to thaw and then refreeze *(19)*.

Cold temperatures must also be maintained in the dairy department. It has been shown that although milk stored at 2°C (35°F) stays fresh for 20 days, storage at 5°C (41°F) drops the time to 10 days and milk may last only five days at 7°C (45°F) *(19)*. All of the grocery stores were observed to keep their dairy refrigerators below 5°C (41°F). Proper storage temperatures were also observed for 100 per cent of butcher, deli and seafood departments.

More stores are providing self-service food bars, which offer foods varying from self-serve salad bars to hot soups. In self-serve areas, cold foods should be cold to the touch (4°C/40°F or below) and hot foods should be steaming hot (above 60°C/140°F) *(25)*. Thirty-eight per cent of the stores did not offer hot food such as soup in their self-serve bars, but for those that did, 91 per cent ensured that temperatures were steaming. Eight-four per cent of the stores that offered cold food ensured that the foods were cold to the touch.

Unsafe foods

Most food commodities could be considered unsafe after having been exposed to unfavorable conditions *(7)*. Therefore, it is the responsibility of the grocery store to monitor the store environment and remove any food that may have been exposed to an unfavorable condition or that may otherwise pose a threat to the consumer. Figure 5 displays the frequency that food handling practices grouped within the "unsafe foods" category were observed. All of the stores sold fresh and dated products and during 92 per cent of store visits, expired items had been removed from the selves. Some of the stores (30 per cent) had a policy in place that allowed customers who find expired food on the shelves to receive a fresh replacement of that food, free.

The importance stores place on expired products was also reflected in store employees' knowledge of expiry dates and what they mean. When asked what the date on a food product meant, 79 per cent of employees were able to identify the date as an expiry date and 71 per cent were able to provide information about the date, including that the food should not be eaten after the date. Seven per cent of employees reluctantly said that some foods (crackers, potato chips) could be consumed after the expiry date; however, each of these employees also stated that this practice was not recommended and it was the customer's choice.

Preserved foods such as those found in cans and jars have a long shelf life and are generally considered safe; however, there are some problems associated with these foods, especially if there is a defect in the packaging. Although usually associated with home-canned products, *Clostridium botulinum* can grow in improperly canned or damaged low-acid canned goods (e.g., corn or beans). Therefore, it is important that store employees are aware of the indicators for unsafe canned foods: bulging, dented or rusty cans, and any product that shows signs of leaking, including stained labels. One hundred per cent of the stores were free of bulging, rusty and leaking cans, and 87 per cent were free of dented cans.

Foods can become unsafe not only by microbiological contaminants, but also by physical and chemical ones *(14)*. Therefore non-food items, such as bleach or glass lightbulbs, should be stored separately from edible items *(19)*. All of the grocery stores avoided the possibility of physical and chemical contamination by providing separate aisles for non-food products such as liquid soaps, cleaning compounds, laundry products, insect repellents, stationary supplies and light bulbs.

Information

As consumers' food safety awareness increases, a reciprocal increase in food safety information must occur. A study by the Canadian Food Inspection Agency *(3)*, determined that consumers use supermarkets as a source of food safety information. Almost half of the grocery stores visited (48 per cent) were observed to provide food safety information for their customers. This information came in a variety of forms, for example, meat, poultry and seafood storing, handling and cooking directions; information on meat and poultry internal cooking temperatures; hand washing reminders; Fight BAC!™ messages printed on produce bags; warnings to wash specialty fruit from foreign countries; reminders to use tongs in self-serve areas; and notifications of managers who have had food safety training. Food safety information was also available behind the counters to remind employees of safe food handling practices. This information mainly consisted of hand washing signs and cleaning instructions.

Consumers also receive information from grocery store employees by inquiring about specific products and practices. Figure 6 presents the frequency of correct responses to various food safety related questions. As can be seen, information gaps exist throughout the grocery store, especially in the produce department and cold deli department. Employees also demonstrated that they were unaware of safe cooking practices for raw meat, poultry and seafood.

Produce department

Choosing among the varieties of available produce is not the only choice consumers have to make in grocery produce sections. There is also the decision of whether to buy organic or conventional produce, which is often confusing as many people are unaware of the differences that exist between the two commodities. To determine if grocery store employees were properly equipped to deal with questions regarding organic and conventional produce, secret shoppers inquired about the differences between organic and conventional produce and the health benefits associated with the different commodities. Just over half (61 per cent) of grocery store employees adequately answered the question regarding differences between organic and conventional produce. Many answers included statements using words like pesticide free, all natural, no genetic modification and organic fertilizers. Fifteen per cent of employees provided customers with false information about the safety of organic produce. Some of the incorrect statements were: "Organics are grown in mineral water so they are safer because the water is cleaner;" and "Organic food is grown in a greenhouse so it is pure." Despite these statements, almost half (48 per cent) of the employees felt that the choice between buying organic and conventional was personal, although many were willing to give an opinion about selling organic produce. For instance one employee mentioned, "They (organics) come with a lot of dirt, they are really messy and you have to wash them," while another pointed out, "We have a hard time selling organic because it doesn't last as long or look as nice [as conventional]." The lack of information available to grocery store employees was emphasized when one produce manager said, "I can only tell you what I know and I only know what the store tells me. We need more information to give to the customers."

The need for more information was also demonstrated when produce department employees were asked about different vegetables that have received media coverage in the past few years — alfalfa sprouts and green onions. More than half (64 per cent) of the employees had never heard of any problems related to either commodity. Only five out of 39 employees were familiar with the problems associated with green onions and alfalfa spouts; however all of these employees quickly assured the customer that both vegetables were safe to eat. Comments meant to reassure customers included, "They put them [sprouts] in a new container and they are safe now"; "You won't get anything from our food, I'll guarantee it" and "I heard about that [hepatitis A in green onions], it was in the States, but I don't think we have to worry about that here [in Canada]." A noteworthy result was observed when two employees, who admittedly did not know anything about any problems associated with sprouts or green-onions and bacteria, were willing to go out of their way to look through a produce book to find the answer.

Cold deli

An area in which food safety-related information was lacking not only for customers but also for employees was the cold-deli section. When employees were asked about the proper storage times for luncheon meats, only 38 per cent could correctly answer "three to four days" *(5)*. On seven individual occasions, secret shoppers were advised that opened luncheon meats could be safely stored for longer than one week.

Listeria monocytogenes, which has been associated with numerous outbreaks, has been receiving media attention for the past few years *(11)*. While this microorganism is commonly associated with unpasteurized soft cheeses, it has also been found in luncheon meats and hot dogs. It is recommended that pregnant women reheat luncheon meats to steaming hot in order to kill *Listeria monocytogenes*, a cause of miscarriage *(4, 26)*. When secret shoppers inquired about this practice at deli counters, 71 per cent of employees had never heard that pregnant woman were advised to reheat luncheon meats. Some responses to the inquiry about cooking deli meats were "Oh, it [deli meat] is okay, it is nice and fresh"; "My daughter just had a baby and didn't cook hers. Nothing happened"; and "I've never heard of that, just refrigerate it."

Cooking instructions for meat, poultry and seafood

Secret shoppers also inquired about the proper way to store and cook meat, poultry, and seafood products. In answering questions about cooking meat, more than 50 per cent of employees gave suggestions that had no relation to food safety. However, when employees did mention food safety related information, 78 per cent of responses were incorrect. Seventy-five per cent of employees recommended using color as an indicator of doneness: "You will know it is cooked when it is brown." Research has demonstrated that the use of color as a visual cue is an ineffective indicator for doneness and that the use of a thermometer is more effective *(10)*. Only two employees recommended using a thermometer to determine doneness. Although most employees were unable to provide adequate

cooking instructions for consumers, 40 per cent of the grocery stores posted safe food handling and proper cooking instructions for meat, seafood and poultry in the appropriate departments. However, only five per cent of employees advised secret shoppers to read the posted instructions.

When non-parametric statistical tests were performed to determine whether significant relationships existed between checklist observations and question responses and demographic information, no significant effects were found.

DISCUSSION

Food handling practices that are easy to monitor or control, such as storage temperature and cleanliness, have been addressed by today's supermarkets with the addition of refrigerator thermometers, cleaning schedules, visual inspections, and audits. The practices that appear to present a problem, however, were observed to lie with employee-controlled food handling practices, such as personal hygiene. The food handling errors observed in this research — failure to wash hands before and after handling food, glove misuse and improper separation of raw and ready-to-eat food at check out — can lead to cross contamination, a major factor in foodborne illness *(6)*.

Hand washing has been recognized as one of the most effective measures to prevent cross contamination and to minimize the transfer of microorganisms to ready-to-eat foods *(6)*. Since the hands of a food worker play a central role in bacterial transfer among food and various surfaces (door handles, utensils, cutting boards), the most alarming result of this study was that 70 per cent of employees failed to wash hands before and after handling food. The act of hand washing was often replaced by putting on a pair of gloves. Gloves, however, should not replace hand washing, a practice that must be stressed to employees.

As demonstrated by Medeiros et al. *(17)*, food safety training must focus on the practices most important in preventing foodborne illness. Therefore, grocery store training programs should re-evaluate the content of their current training programs and consider placing greater emphasis on preventing cross contamination through proper hand washing and proper glove use. Because it is also necessary that the information offered by training programs be relevant to the intended audience, it may be necessary to provide different training programs to different departments.

Although food safety training programs may increase food handlers' knowledge about correct food handling behaviors, increased knowledge does not always cause an appropriate behavioral change *(13)*. To design effective training for food handlers, the underlying factors involved in food handling behaviors at the workplace should be understood *(7)*.

Implementation barriers, such as staffing issues, faulty equipment and a lack of time, often prevent food handlers from carrying out safe handling practices *(7)*. Although food handlers may be aware of the need to carry out certain practices, without the adequate resources these practice become difficult and sometimes impossible to implement. Therefore, food handlers should understand the consequences of failing to carry out a specific food handling practice. Such consequences often act at motivational triggers, forcing employees to carry out practices despite the barriers. Therefore, research is needed to identify the motivational triggers necessary to promote safe food handling in a grocery store setting.

CONCLUSIONS

Retail food stores represent a critical link in the prevention of foodborne illness, since this is often the last stage of food handling before food is purchased for consumption. Therefore, grocery store training tools must be effective in ensuring that food handlers not only are knowledgeable about safe food handling practices, but also carry out the appropriate actions to keep food safe. This research has demonstrated that although grocery stores are doing a satisfactory job at ensuring the safety of food, there is room for improvement. Based on the results of this study, the following recommendations can be made:

- Retail training programs need to focus on the importance of hand washing and proper glove use, emphasizing that gloves do not replace hand washing.
- Grocery store employees need to understand the importance of safe freezer stocking practices, so that unsuspecting customers are not purchasing unsafe food.
- Grocery stores need to provide information about current food safety issues, such as *Listeria*, hepatitis A and organic food, so that employees can address consumer questions either by directly answering the question or by directing the consumer to the appropriate information within the store.
- if food safety information is available for customers, employees should be aware of the location of this information and should also refer customers to it.

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Microflora Isolated from Mexican Mennonite-style Cheeses

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SUMMARY

Microflora isolated from 10 freshly manufactured Mexican Mennonite-style cheese samples were compared to assess the relative importance of various types of bacteria in the manufacture of the cheese. Eight of the commercially manufactured samples were made from raw milk, while two were made from pasteurized milk inoculated with mixed commercial starter cultures. Generally, coliforms, enterococci, and coagulase-positive staphylococci were present in raw milk cheeses but not in pasteurized milk cheeses. Levels of mesophilic and thermophilic lactococci did not differ greatly between the two groups, being present at relatively high levels (10^6–10^8 colony forming units per gram) in all samples. Thermophilic lactobacilli were slightly less prevalent in pasteurized milk cheeses (1–1.5 $\log_{10}$ fewer bacteria), while levels of mesophilic lactobacilli and *Leuconostoc* spp., as well as non-*Lactobacillus* mesophiles, were significantly lower in a single pasteurized sample (4–5 $\log_{10}$ reductions). This survey of the groups of bacteria present in Mennonite-style cheeses demonstrated the variety of microflora that may be found even in a single type of cheese. The distinction between raw milk and pasteurized milk cheeses, as well as between the two pasteurized milk cheeses, demonstrates the potential for using pasteurized milk to produce typical Mennonite-style cheese with a greatly lowered bacterial content.

INTRODUCTION

Mennonites in the Mexican state of Chihuahua contribute to the state's agriculture by producing Mennonite-style cheese, as they have for nearly a century. Mennonite-style cheese, known as Chihuahua cheese in Mexico, is a semi-hard young cheese that is similar in flavor to a mild Cheddar or brick, and that often is made from raw cow's milk *(8)*. Because the raw milk cheeses normally are held for no more than 14 days before being sent to market and are consumed within 30 days, they do not meet the legal 60-day holding requirement for cheeses to be sold in the United States *(3)*. However, because the growing Hispanic population in the United States increasingly is interested in obtaining cheeses with flavors and properties with which they are familiar, demand is increasing for a pasteurized milk product with taste and functional properties similar to those of the traditional cheese.

Raw milk cheeses are considered more "pure" in the artisanal sense *(7)*, and many Mexican cheesemakers are reluctant to begin pasteurizing their cheese milk. However, raw milk cheeses can suffer from pathogen contamination as well as short shelf life due to growth of spoilage organisms. The difference in flavor between raw milk and pasteurized milk cheeses frequently is attributed to the presence of native microflora in the raw milk imparting a different character to the

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cheese during the cheesemaking process *(1, 19, 20)*. If this is true for Mennonite-style cheese, the challenge is to identify the microbe(s) associated with the cheese that may be responsible for its unique flavor and functional characteristics and then to reproduce the unique characteristics with a generally recognized as safe (GRAS) starter culture.

Currently there is no federally recognized standard for Mennonite-style cheese in the United States, and very little information has been gathered on the physical, sensory, or microbiological characteristics of this style of cheese. In general, the available data on Mexican Mennonite-style cheese are scanty, and the majority of studies relate to the pathogenic potential of such raw milk cheeses *(5, 6, 12, 14, 17, 18)*. Diaz-Cinco et al. *(6)* reported that all samples tested failed to adhere to Mexican federal regulations *(15, 16)* regarding microbiological quality.

Several studies of artisanal or raw milk cheese microflora have identified groups of bacteria suspected to be involved in cheese flavor development *(1, 9, 10)*. Albenzio et al. *(1)* directly compared raw and pasteurized milk Canastrato Pugliese cheeses made under controlled conditions and concluded that the higher bacterial content and diversity in the raw milk cheese samples contributed to increased lipase esterase activity, which could result in faster ripening. Sampling both raw and pasteurized milk cheeses allows comparison of properties and provides increased knowledge about the contribution of starter and nonstarter cultures to the development of cheese flavor and physical attributes. In the present study, we compared the bacterial contents of eight raw milk and two pasteurized milk Mennonite-style cheeses, to begin to understand the contribution of diverse bacterial types to the unique characteristics of Mennonite-style cheese.

MATERIALS AND METHODS

Cheeses

Samples of 8 raw milk Mexican Mennonite-style cheeses from different companies, as well as 2 pasteurized milk cheeses made by a single company but by use of different manufacturing techniques, were obtained directly from manufacturers in the state of Chihuahua within 2 days of manufacture in early June. Cheese samples (1-kg blocks, vacuum packaged by the manufacturers) were collected over a one-week period, refrigerated at 4°C, and shipped overnight in coolers with ice packs to the Eastern Regional Research Center for study. All samples, upon examination by a trained sensory taste panel (manuscript in preparation), exhibited similar scores on flavor points. The two pasteurized milk cheeses (made with commercial blended Cheddar cheese starter cultures) were examined as a control for the selective media, as well as a possible source of local bacteria that contribute, as nonstarter lactic cultures, to creating the unique properties of Mennonite-style cheese.

Sampling

Cheese samples were opened aseptically. Internally derived 10-g portions of each cheese were frozen as chunks in sterile 50-ml tubes at -80°C until microbiological analysis could be completed (within 4 months). For analysis, a 10-g sample was thawed at room temperature (25°C) and homogenized in a Stomacher 400C (Seward Ltd., London, UK) for 2 min at medium speed (230 RPM) with 90 ml of sterile sodium citrate (2% w/v; J.T. Baker). Decimal dilutions were prepared in sterile phosphate buffered saline (PBS; 0.9% sodium chloride w/v, 0.23% sodium phosphate monobasic w/v, 0.115% sodium phosphate dibasic w/v; J.T. Baker). Plating was performed in duplicate (N=2). To test for statistical significance of differences between pasteurized and raw milk cheese groups, a Student's t-test *(13)* was performed on the average log CFU g^{-1} for each bacterial type.

Microbiological analysis

The following bacterial types were selected aerobically, without overlay: (i) mesophilic lactobacilli on MRS agar (Difco) at 30°C for 48 hours; (ii) thermophilic lactobacilli on MRS agar at 43°C for 48 hours; (iii) mesophilic lactococci on M17 agar (Difco) at 30°C for 48 hours; (iv) thermophilic lactococci on M17 agar at 43°C for 48 hours; (v) total coliforms on violet red bile agar (VRB; EM Science) at 32°C for 24 hours; (vi) fecal coliforms on Fluorocult VRB agar (EM Science) at 43°C for 24 hours; (vii) enterococci on kanamycin esculin azide agar (EM Science) at 37°C for 24 hours; (viii) presumptive *Leuconostoc* on MRS agar supplemented with 100 µg ml^{-1} vancomycin at 30°C for 48 hours; (ix) presumptive *Staphylococcus* on Baird Parker agar (Difco) supplemented with egg yolk tellurite (Remel) at 37°C for 24 hours.

RESULTS AND DISCUSSION

Preliminary investigation prior to receipt of samples determined that the recoverable microbial counts did not decrease significantly when cheese samples were frozen as chunks at -80°C; thus the microbiological profile of each cheese reflects a similar age from the time of packaging. Certain bacterial groups (lactococci, lactobacilli, mesophiles) frequently are reported in the literature as contributing to flavors and physical properties of various cheese types *(1, 4, 8, 9, 10, 11, 19)*. Therefore, we assayed for the presence of bacteria from these groups. In general, pathogens were not targeted for analysis, but prior to sensory panel involvement, each incoming cheese sample was examined by a commercial certified laboratory, and declared free of select pathogens (*Listeria monocytogenes*, *Salmonella*, *E. coli* O157:H7, *Campylobacter*, *Yersinia* [enrichment], and staphylococcal enterotoxin).

Bacterial content is presented in Table 1 as the $\log_{10}$ of colony forming units (CFU) per gram cheese for each selection type. Coliforms, enterococci, and coagulase positive staphylococci have been isolated from raw milk cheeses and may be associated with flavor development *(1, 4, 9, 10)*; thus they were assayed for. Total and fecal coliforms were present at levels of 10^3 CFU g^{-1} and above in all raw milk cheeses; which is similar to the levels Diaz-Cinco and colleagues reported in their sampling of Mennonite-style cheese *(6)*, and lower than previously reported for raw milk Cheddar cheese *(4)*. Coliforms were undetectable in the pasteurized milk cheeses ($P < 0.001$), in accordance with previous studies *(1, 4)*.

Coagulase positive staphylococci, found at relatively high concentrations in most raw milk cheese samples (10^4 CFU g^{-1}), were not detected in pasteurized milk cheeses I and J, or in raw milk cheese H. It was unexpected to have a raw milk cheese fall into the same group as the pasteurized in any selection ($P < 0.001$). This particular cheese may have been made from heated milk, as native alkaline phosphatase had been inactivated, an indicator of pasteurization, but the manufacturer reported the cheese as raw milk-derived.

There was a 2–3 $\log_{10}$ variation in the counts of enterococci among the raw milk cheeses for these types of bacteria commonly associated with spoilage and disease, but they were present at easily detectable levels in all raw milk cheese samples (10^4 CFU g^{-1}). However, these

TABLE I. Log counts (expressed as CFU g^{-1} cheese) of the types of bacteria isolated from cheeses from Chihuahua, México. Values are expressed as mean log count (N = 2). Limit of detection on selection plates is 2. ND = none detected

	Raw								Pasteurized	
Microbial group	A	B	C	D	E	F	G	H	I	J
Total coliforms	3.50	3.30	5.05	4.37	5.47	4.34	4.96	2.90	ND	ND
Fecal coliforms	3.33	3.22	4.65	3.00	5.15	4.29	4.39	2.84	ND	ND
Coag$^+$ *Staph*	4.29	4.58	6.86	6.06	4.25	5.30	4.43	ND	ND	ND
Enterococci	6.05	5.69	6.06	6.55	6.79	6.98	6.40	3.91	1.00	ND
Leuconostoc	8.71	8.60	7.14	7.79	8.02	8.28	7.79	7.61	3.42	6.97
Thermophilic cocci	8.01	8.46	7.71	8.48	8.02	7.28	7.92	6.41	7.45	7.15
Mesophilic cocci	8.70	8.64	7.97	8.75	8.08	8.60	8.17	7.57	7.30	7.30
Thermophilic lactobacilli	7.72	9.08	7.45	8.15	7.70	7.13	7.97	6.27	5.92	6.08
Mesophilic lactobacilli	8.71	8.64	8.04	8.64	8.52	8.41	8.28	7.63	3.94	7.24
Mesophiles	8.55	8.13	7.56	8.74	8.93	8.47	8.02	7.30	4.64	6.94

bacteria were not detected, or were detected only as a single anomalous colony on a single plate, in the pasteurized milk cheeses, I and J ($P < 0.001$ raw versus pasteurized for each selection type). The value for enterococcal load in the H cheese was the lowest among the raw milk cheeses, possibly another indication that a heated milk procedure had been used in its preparation. This result emphasized the difference in native microflora content between raw and pasteurized milk cheeses, which was not unexpected. As the raw and pasteurized milk cheeses analyzed in this study achieved similar scores in the taste panel analysis, it is possible that the inclusion of native nonlactic microflora in the form of raw milk is unnecessary for development of typical flavor profiles in Mennonite-style cheese.

Population levels of lactococci displayed little variability, ranging from $\log_{10}$ 7.1 – 8.5 (thermophilic) and 7.3 – 8.8 (mesophilic). This was true for pasteurized, as well as raw milk, cheese samples, suggesting that at the level of lactococcal content there was not a great deal of difference among the samples of cheese. The growth of lactococci early during the cheesemaking process results in production of lactate, which can be used as a carbon source for nonstarter lactobacilli that bloom later *(11)*. Further, differences in starter strains of lactococci can result in remarkable differences in cheese product. In fact, there is a recent movement toward isolating "wild" lactic bacteria for the purpose of adding new and interesting flavors to artisanal cheeses *(2, 19, 20)*. Therefore, the lactococcal strains isolated from the Mennonite-style cheeses will have to be analyzed in detail to understand their contributions to unique cheese properties.

Selection results for thermophilic lactobacilli demonstrated a slightly depressed (1–1.5 $\log_{10}$) population in the pasteurized milk cheeses, compared with their raw milk counterparts. This difference may be accounted for by the increased inoculum present in raw milk, or it may be a result of different *Lactobacillus* strains being present in raw milk versus pasteurized, starter culture-inoculated milk. Genetic testing will shed light on this question. Lactobacilli generally are considered to play an important role in the ripening and flavor development of Cheddar, which is similar to the Mennonite-style cheese *(11)*. The specific manner in which flavor is affected by nonstarter lactic bacteria is highly debated, however, as is the role of particular strains of lactobacilli.

Mesophilic lactobacilli and *Leuconostoc* populations, as well as non-*Lactobacillus* mesophiles, displayed the interesting characteristic of being depressed in one pasteurized milk cheese (J) by 4–5 $\log_{10}$, while being only slightly depressed in the other (K) when compared against the raw milk samples. All 10 cheese samples analyzed in this study scored similarly with the descriptive analysis sensory panel, suggesting that the lower loads of these bacteria may be sufficient to affect cheese flavor and quality in the production of Mennonite-style cheese.

That commercial manufacturers are making and selling pasteurized milk Mennonite-style cheeses successfully suggests that there is no need for non-GRAS organisms to be included in the cheese to achieve a "typical" flavor profile. In the present study we have attempted to identify, on the basis of selective plating, differences among cheeses that scored similarly when tested by a trained sensory evaluation panel. The absence of enterococci, staphylococci, and coliforms from pasteurized milk samples suggested that their presence in raw milk cheese did not contribute significantly to the unique flavor of Mennonite-style cheese. In fact, removal of these organisms likely would contribute not only to the healthfulness of the product, but also to an extension of shelf life, which could benefit producer and consumer alike.

Other differences, primarily between the raw and pasteurized milk groups, were noted. Almost as interesting as the differences among *Lactobacillus* population levels was the similarity of lactococcal counts in all cheese samples, supporting the important aspect of the starter culture's behavior in the first critical steps of setting curd and lowering pH. The specific

strains of lactococci isolated from the cheese samples will be investigated further, as will the lactobacilli, to understand better the representation and distribution of various strains and their contributions to the development of cheese flavor and functionality.

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D1010 **The Bulk Milk Hauler: Protocol & Procedures** – (8 minutes). 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 minutes). 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 minutes). Describes the ether extraction procedure to measure milk fat 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 minutes). 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 minutes). 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, 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 minutes). Describes the Gerber milk fat test procedure for dairy products and compares it to the Babcock test procedure. (CA–1990) (Reviewed 1998)

D1080 **High–Temperature, Short–Time Pasteurizer** – (59 minutes). 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 minutes). 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 tapes). 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, Post milking Teat Dip Protocols, Milk Quality, and Milking Systems. (Nasco–1993)

D1105 **Milk Hauling Training** – (35 minutes). 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 minutes). 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, 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 minutes). Developed by the California Department of Food and Agriculture. It covers pre - and post-inspection meetings 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 lockers and restrooms. Recommended for showing to plant workers and supervisors. (CA–1986)

D1125 **Ohio Bulk Milk Hauling Video** – (15 minutes). 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 minutes). 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 minutes). 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 minutes). 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)

D1180 **10 Points to Dairy Quality** – (10 minutes). 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)

ENVIRONMENTAL

E2012 **Better TEDs for Better Fisheries** – Introduces the usefulness of turtle excluder devices (TEDs) and demonstrates the working nature of the devices. It covers the major sea turtles and the specific TEDs needed for each. It precedes two segments on installation of appropriate TEDs in shrimp trawl nets. (MS Dept. of Marine Resources–2003)

E3010 **The ABC's of Clean – A Handwashing and Cleanliness Program for Early Childhood Programs** – For early childhood program employees. This tape illustrates how proper hand washing 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 minutes). 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 minutes). In–door 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 minutes). 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 minutes). 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** – (3.5 minutes). 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 minutes). Demonstrates the Ceriodaphnia Seven–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 Toxicity Tests (Using Fathead Minnow Larva)** – (15 minutes). A training tape that teaches environmental professionals about the Fathead Minnow Larva 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 minutes). 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 hazardous chemicals in communities. The film outlines 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.

E3080 **Fit to Drink** – (20 minutes). 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 floculation, 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 minutes). 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 minutes). 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; and effects of deforestation, planting of trees and recycling as means of slowing the build-up of greenhouse gases. (Churchill Films–1995)

E3125 **Good Pest Exclusion Practices** – (28 minutes). Most pests you find inside come from outside your food plant. This video covers numerous tactics of keeping pests out of food processing and distribution operations. Tactics include grounds, landscaping and building design; inbound trailer and bulk transportation materials inspection; and key employee actions. Learn how to defend your perimeter with one of the best weapons in the battle against pests – exclusion. (CTI Publications–2004)

E3128 **Integrated Pest Management (IPM)** – (28 minutes). This video develops the IPM concept into a comprehensive 12-point program. To emphasize this concept, computer-animated, digital graphics are used to piece together the IPM puzzle. This dramatic effect assists participants in visualizing and retaining key points of the video. To paint the complete picture, each of the 12 points is discussed providing an IPM overview. (CTI Publications–2004)

E3130 **Kentucky Public Swimming Pool and Bathing Facilities** – (38 minutes). 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)

E3131 **Key Pests of the Food Industry** – (28 minutes). Many types of pests can cause waste and loss of profits. Keeping food processing operations free of pest problems is a challenge. This video will assist food plant employees in the review of basic identification, biology, habits and control options of three key groups of pests frequently associated with food processing operations: birds, insects, and rodents. (CTI Publications–2004)

E3133 **Physical Pest Management Practices** – (28 minutes). Do you feel that you cannot do your job without pesticides? There are solutions. Many of them are what we call physical controls. This video will provide you with some of the things which can help you manipulate the physical environment in a manner that will prevent the growth of the pest population, causing them to leave or die. (CTI Publications–2004)

E3135 **Plastics Recycling Today: A Growing Resource** – (26 minutes). Recycling is a growing segment of our nation's solid waste management program. It 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 minutes). 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 minutes). This videotape explains the danger associated with hazardous chemical handling and discusses the major hazardous waste handling requirements presented in the Resource Conservation and Recovery Act.

E3160 **RCRA–Hazardous Waste** – (19 minutes). 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** 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–1997)

The New Superfund: What It Is and 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 minutes). 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 minutes). 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 minutes). 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 innocent 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 minutes). 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 and hazardous chemical inventory and the toxic chemical release inventory.

E3220 **Tape 5 – Underground Storage Tank Trust Fund & Response Program** – (48 minutes). Another additional 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 minutes). An important new mandate of the new Superfund are the technical provisions for research and development to create more permanent methods in the 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.

E3235 **Regulatory and Good Manufacturing Practices** – (42 minutes). This video comes in two parts. Part one is a professional, 20-minute drama using real actors emphasizing the importance of food safety and GMPs. This dramatization will focus your emotions on the importance of cleanliness. Part two is a comprehensive 22-minute video introducing your employees to basic GMP elements. This training video uses numerous split screens of "good" and "bad" practices, and will help viewers understand GMPs and basic food safety. (CTI Publications–2004)

E3236 **Rodent Control Strategies** – (22 minutes). Pest control is a vital part of food safety, and leading pest-control specialist Dr. Bobby Corrigan shows you how to design and maintain a rodent-control program at food processing establishments. (J.J. Keller–2004)

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

E3245 **Wash Your Hands** – (5 minutes). Hand washing is the single most important means of preventing the spread of infection. This video presents why hand washing is important and the correct way to wash your hands. (LWB company–1995)

E3250 **Waste Not: Reducing Hazardous Waste** – (35 minutes). 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 minutes). 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

F2005 **A Lot on the Line** – (25 minutes). 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 incorporating 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 minutes). 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.–2001)

F2008 **A Recipe for Food Safety Success** – (30 minutes). 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 minutes). 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)

F2010 **Close Encounters of the Bird Kind** – (18 minutes). 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)

F2011 **Available Post Harvest Processing Technologies for Oysters** – (8 minutes). This video explains three currently available post-harvest processing (PHP) technologies for oysters that continue to be developed to provide safer oysters to consumers. The Gulf oyster industry increasingly adopts solutions offered by modern technology in its efforts to continue to promote quality, food safety and extended shelf life of oysters. (MS Dept. of Marine Resources–2003)

F2013 **Control of *Listeria Monocytogenes* in Small Meat and Poultry Establishments** (English and Spanish) – 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 contaminations, in plant sampling, and microbiological testing. (Penn State college of Ag Sciences–2003)

F2014 **Controlling Food Allergens in the Plant** – This training video covers key practices to ensure effective control in food plants and delivers current industry knowledge to help companies enhance in-plant allergen training. Visually communicates allergen-specific Good Manufacturing Practices, from checking raw material to sanitation, to prevent serious, costly problems. (Silliker Laboratories, Inc.–2004)

F2015 **Controlling *Listeria*: A Team Approach** – (16 minutes). In this video, a small food company voluntarily shuts down following the implication of one of its products in a devastating outbreak of *Listeria monocytogenes*. This recall dramatization is followed by actual in-plant footage highlighting 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)

F2016 **Bloodborne Pathogens: What Employees Must Know** – This program provides an overview of the hazards and controls for worker exposure to bloodborne pathogens. Specifically, the program covers the basic requirements of the standard; definitions of key terms (including AIDS, contaminated sharps, and occupational exposure); engineering controls and work practices; housekeeping techniques; Hepatitis B and more. (J.J. Keller–2005)

F2020 **Egg Handling and Safety** – (11 minutes). 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 minutes). 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)

F2030 **"Eggs Games" Foodservice Egg Handling & Safety** – (18 minutes). 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)

F2035 **Fabrication and Curing of Meat and Poultry Products** – (2 tapes – 165 minutes). (See Part 2 Tape F2036 and Part 3 F2037) This is session one of three-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)

F2036 **Emerging Pathogens and Grinding and Cooking Comminuted Beef** – (2 tapes – 165 minutes). (See Part 1 Tape F2035 and Part 2 Tape F2037) This is session two of a three–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, and local authorities, industry, and trade associations in a foodborne outbreak. (AFDO/USDA–1998)

F2037 **Cooking and Cooling of Meat and Poultry Products** – (2 tapes – 176 minutes). (See Part 1 Tape F2035 and Part 2 Tape F2036) This is session three of a three-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)

F2039 **Food for Thought – The GMP Quiz Show** – (16 minutes). 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 – 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 minutes). 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, over-ripening, 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 tapes – 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 and Its Application to the Food Industry (Parts 1 & 2)** – (2 tapes – 16 minutes each). (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 videos)** – (4 tapes – 10 minutes each). (1) "Receiving and 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 Facility 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) "Foodservice 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 videos)** – (4 tapes – 10 minutes each). 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 videos)** – (4 tapes – 10 minutes each). 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)

F2081 **Food Safety Begins on the Farm (DVD)** – From planting to consumption, there are many opportunities to contaminate produce. This is an excellent resource for training fruit and vegetable growers Good Agricultural Practices (GAPs). It includes seven PowerPoint presentations that deal with all aspects of food safety relative to growing, harvesting, and packing fresh fruits and vegetables. (Cornell Good Agricultural Practices Program–2000)

F2090 **Food Safety: An Educational Video for Institutional Food Service Workers** – (10 minutes). 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 Dept 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 minutes). 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 minutes). 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 minutes). 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 minutes). 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–2002)

F2104 **Tape 1 – Basic Microbiology and Foodborne Illness** – (10 minutes). 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 minutes). 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 minutes). 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 minutes). 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.

F2110 **Food Safety is No Mystery** – (34 minutes). 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 foodservice 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) (Reviewed 1998)

F2111 **Controlling *Salmonella*: Stretegies That Work** – (16 minutes). 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 Laboratories–2002)

F2120 **Food Safety: For Goodness Sake Keep Food Safe** – (15 minutes). Teaches food handlers 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 Extention–1990) (Reviewed 1998)

F2121 **Food Safety the HACCP Way** – (11.5 minutes). Introduces managers and line–level staff to HACCP, or the Hazard Analysis Critical Control Point food safety system. The HACCP system is a seven–step process to control food safety, and can be applied to any size and type of food establishment.

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 four topics are: Basic Microbiology, Cross Contamination, Personal Hygiene, and Sanitation. (J.J. Keller & Associates–1999)

F2125 **Tape 1 – Basic Microbiology and Foodborne Illness** – (10 minutes). 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.

F2126 **Tape 2 – Food Safety Zone: Cross Contamination** – (10 minutes). 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** (English and Spanish) – (10 minutes). 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 minutes). 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 the 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.

F2129 **Food Technology: Irradiation** – (29 minutes). 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. (Chipsbooks–2001)

F2130 **Food Safety: You Make the Difference** – (28 minutes). Through five food workers from differing backgrounds, this engaging and inspirational documentary style video illustrates the four basic food safety concepts: hand washing, preventing cross-

contamination, moving foods quickly through the danger zone, and hot/cold holding. (Seattle–King County Health Dept.–1995)

F2131 **Fruits, Vegetables, and Food Safety: Health and Hygiene on the Farm** (DVD and video) – (15 minutes). This presentation shows ways to prevent contamination of fruits and vegetables while you work. It was filmed in real production fields and packinghouses in the United States. Organisms of concern in fruits and vegetables are discussed, along with proper hygiene practices when handling and harvesting fruits and vegetables. (Cornell University–2004)

F2133 **Food Safety First** (English and Spanish) (DVD and Video) – (50 minutes). Presents causes of foodborne illness in foodservice and ways to prevent foodborne illness. Individual segments include personal hygiene and hand washing, cleaning, and sanitizing, preventing cross contamination, and avoiding time and temperature abuse. Food handling principles are presented through scenarios in a restaurant kitchen. (GloGerm–1998)

F2134 **Food Safety: Fish and Shellfish Safety** – (21 minutes). 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)

F2135 **Get with a Safe Food Attitude** – (40 minutes). 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 women 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 Dept. of Agriculture–1999)

F2136 **GLP Basics: Safety in the Food Micro Lab** – (16 minutes). 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–2001)

F2137 **GMP Basics: Avoiding Microbial Cross–Contamination** – (15 minutes). 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, un–sanitized 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 minutes). 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 minutes). 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)

F2147 **GMP Basics: Process Control Practices** – (16 minutes). 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 activites in the plant have an impact on product safety. (Silliker laboratories–1999)

F2148 **GMP – GSP Employee** – (38 minutes). 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 and Practices in Food Manufacturing (English, Spanish, and Vietnamese)** – (14 minutes). This video focuses on the personal hygiene of food-manufacturing 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)

A 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 (CMPs), 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** – (12 minutes). Provides the definitions necessary to understand the meaning of the CMPs.

F2152 **Tape 2 – Personnel and Personnel Facilities** – (11 minutes). Covers selection

of personnel, delegation of responsibilities, development of plant policies for employees, and operational practices.

F2153 **Tape 3 – Building and Facilities** – (16 minutes). Discusses guidelines for the construction and maintenance of the manufacturing plant and grounds around the plant.

F2154 **Tape 4 – Equipment and Utensils** – (12.5 minutes). Provides guidelines for the construction, installation, and maintenance of processing equipment.

F2155 **Tape 5 – Production and Process Controls** – (20 minutes). Covers establishing a food safety committee, in–house inspections, analysis of raw materials and ingredients, cleaning schedules and procedures, and more.

F2160 **GMP: Sources and Control of Contamination during Processing** – (20 minutes). 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: Five-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 minutes). 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 minutes). Selecting personnel, delegating responsibilities, developing plant policies for employees and visitors, and establishing operational practices.

F2163 **Tape 3 – Building and Facilities** – (17 minutes). Guidelines for the construction and maintenance of the manufacturing facility and grounds around the factory.

F2164 **Tape 4 – Equipment and Utensils** – (13 minutes). Guidelines for construction, installation, and maintenance of processing equipment.

F2165 **Tape 5 – Production/Process Controls** – (22 minutes). 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.

F2169 **HACCP: Training for Employees – USDA Awareness** – (15 minutes). 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 principals; HACCP plan checklist; and an HACCP employee training program. (J.J. Keller & Associates–1999)

F2170 **The Heart of HACCP** – (22 minutes). 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 a critical limits, monitoring systems, and corrective actions that are vital to the success of a HACCP plan. (Silliker Laboratoraies–1994)

F2171 **HACCP: The Way to Food Safety** – (53 minutes). 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)

F2172 **HACCP: Training for Managers** – (17 minutes). Through industry-specific examples and case studies, this video addresses the seven HACCP steps, identifying critical control points, record-keeping 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–2000)

F2173 **Inside HACCP: Principles, Practices and Results (English and Spanish)** – (15 minutes). 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 Laborities–2001)

F2175 **Inspecting for Food Safety – Kentucky's Food Code** – (100 minutes). 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. (Dept. of Public Health Commonweath of Kentucky–1997) (Reviewed 1999)

F2180 **HACCP: Safe Food Handling Techniques** – (22 minutes). 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 Assoc.–1990) (Reviewed 1998)

F2190 **Is What You Order What You Get? Seafood Integrity** – (18 minutes). 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)

F2191 **Microbial Food Safety: Awareness to Action (DVD PowerPoint presentation)** – An overview of GAPs and resources by the United Fresh Fruits and Vegetables Association, a hazard identification self–audit, a sample farm investigative questionnaire, copies of relevant California state information, and US federal regulations. Contains numerous commodity flow charts and photos for more than 30 fruits and vegetables, one dozen PowerPoint presentations containing more than 400 slides, including may in Spanish and two dozen supplemental documents on a variety of food safety topics. (UC Davis–2002)

F2210 **Northern Delight – From Canada to the World** – (13 minutes). 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)

F2220 **Proper Handling of Peracidic Acid** – (15 minutes). Introduces peracidic acid as a chemical sanitizer and features the various precautions needed to use the product safely in the food industry.

F2230 **Purely Coincidental** – (20 minutes). 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)

F2240 **On the Front Line** – (18 minutes). 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 **A Lot on the Line** (English and Spanish) – (30 minutes). 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. (The Food Processors Institute–1993) (Reviewed 1998)

F2260 **100 Degrees of Doom...The Time and Temperature Caper** – (14 minutes). 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: Service, Selection, and Good Safety** – (22 minutes). 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)

F2266 **HACCP: A Basic Understanding** – (32 minutes). 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. (Chipsboosk company–2003)

F2270 **Pest Control in Seafood Processing Plants** – (26 minutes). 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.

F2271 **Preventing Foodborne Illness** – (10 minutes). 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)

F2280 **Principles of Warehouse Sanitation** – (33 minutes). 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)

F2290 **Product Safety and Shelf Life** – (40 minutes). 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 problem 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, Inc.–1987) (Reviewed 1997)

F2310 **Safe Food: You Can Make a Difference** – (25 minutes). 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 hand washing as methods of foodborne illness control is provided. The video provides an orientation to food safety for professional food handlers. (Tacoma–Pierce County Health Dept–1990) (Reviewed 1998)

F2320 **Safe Handwashing** – (15 minutes). Twenty-five percent of all foodborne illnesses are traced to improper hand washing. The problem is not just that hand washing 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 Institue for Technology & Management–1991) (Reviewed 1998)

F2325 **Safe Practices for Sausage Production** – (180 minutes). 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/ofo/hrds/STATE/RETAIL/manual.htm(1999)

F2330 **Sanitation for Seafood Processing Personnel** – (20 minutes). A training video suited for professional food handlers working in any type of food manufacturing plant. The film highlights Good Manufacturing Practices and their role in assuring food safety. The professional food handler is introduced to a variety of sanitation topics including: (1) food handlers 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 minutes). Provides an introduction to basic food safety for professional food handlers. 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 minutes). Becoming food safety savvy is as easy as A–B–C! This video includes a step-by-step journey as 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 & Applied Nutrition–2001)

F2342 **Seafood HACCP Alliance Internet Training Course** – This DVD contains the on-line equivalent material found in the Seafood HACCP Alliance Internet Training Course (http://seafoodhaccp.cornell.edu). This new program is designed to be equivalent to the first two days of the "live" three–day Alliance training courses. There are 12 training modules in the course that cover all of the information on HACCP principles, their application to seafood products, and the FDA regulation. Experience has shown that HACCP implementation can be more effective when a number of key people in the operation have a good understanding of the system and its requirements. (Cornell University–2004)

ServSafe Steps to Food Safety (DVD and Video) (English and Spanish) – 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. (National Restaurant Association Education Foundation–2000)

F2350 – **Step One: Starting Out with Food Safety** – (12 minutes). Defines what foodborne illness is and how it occurs; how foods become unsafe; and what safety practices to follow during the flow of food.

F2350 – **Step Two: Ensuring Proper Personal Hygiene** – (10 minutes). Introduces employees to ways they might contaminate food; personal cleanliness practices that help protect food; and the procedure for thorough hand washing.

F2350 – **Step Three: Purchasing, Receiving and Storage** – (12 minutes). Explains how to choose a supplier; calibrate and use a thermometer properly; accept or reject a delivery; and store food safely.

F2350 – **Step Four: Preparing, Cooking and Serving** – (11 minutes). Identifies proper practices for thawing, cooking, holding, serving, cooling, and reheating food.

F2350 – **Step Five: Cleaning and Sanitizing** – (11 minutes). 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 set up a cleaning program.

F2350 – **Step Six: Take the Food Safety Challenge: Good Practices, Bad Practices – You Make the Call** – (35 minutes). Challenges viewers to identify good and bad practices presented in five short scenarios from different industry segments.

F2370 **Supermarket Sanitation Program – Cleaning and Sanitizing** – (13 minutes). 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 minutes). Contains a full range of basic sanitation information with minimal emphasis on product. Filmed in a supermarket, the video is designated as a basic program for manager training and a program to be used by managers to train employees. (1998) (Reviewed 1998)

F2390 **Take Aim at Sanitation** (English and Spanish) – (8 minutes). Produced by the Foodservice & Packaging Institute in cooperation with the US Food and Drug Administration, this video demonstrates how to properly store and handle foodservice disposables so customers are using safe, clean products. This video demonstrates: the problem of foodborne illness; how foodservice disposables are manufactured for cleanliness; tips for storing foodservice disposables; tips to help your customers in self-serve areas; guidelines for serving meals and maintaining proper sanitation; and tips for cleaning up after meals. Throughout the program a roving microscope "takes aim" at common mistakes made by workers to help audiences identify unsanitary handling and storage practices. (Foodservice & Packaging Institute, Inc.)

F2391 **Understanding Foodborne Pathogens** – (40 minutes). 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 minutes). 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)

F2420 **Your Health in Our Hands, Our Health in Yours** – (8 minutes). For professional food handlers, the tape covers the do's and don'ts of food handling as they relate to personal hygiene, temperature control, safe storage, and proper sanitation. (Jupiter Video Production–1993) (Reviewed 1998)

F2430 **Smart Sanitation: Principles and Practices for Effectively Cleaning Your Food Plant** – (20 minutes). 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 Laborabories–1996)

F2440 **Cleaning and Sanitizing in Vegetable Processing Plants: Do It Well, Do It Safely!** (English and Spanish) – (16 minutes). 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 a processing plant as it is for washing dishes at home. (University of Wisconsin Extension–1996)

F2450 **A Guide to Making Safe Smoked Fish** – (21 minutes). 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–1999)

F2451 **A HACCP-based Plan Ensuring Food Safety in Retail Establishments** (DVD) – (11 minutes). This is an educational DVD that provides a brief summary of HACCP. It explains the purpose and execution of each of the seven principles. Can be used as part of a wide range of HACCP training programs beyond retail establishments. The major emphasis is on proper documentation and validation. (Ohio State University–2004)

F2460 **Safer Processing of Sprouts** – (82 minutes). 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 Service, Food & Drug Branch–2000)

Fast Track 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. (Diversey Lever–1994)

F2500 **Tape 1 – Food Safety Essentials** – (23 minutes). 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 minutes). 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 minutes). 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 minutes). 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 minutes). 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.

OTHER

M4010 **Diet, Nutrition and Cancer** – (20 minutes). 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 minutes). 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 minutes). 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 and Sanitation for Food Processing Employees** – (15 minutes). Illustrates and describes the importance of good personal hygiene and sanitary practices for people working in a food processing plant. (Iowa State University–1993)

M4060 **Psychiatric Aspects of Product Tampering** – (25 minutes). 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 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 minutes). 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 minutes). 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, service size, percentage of daily value, and standard calorie reference/comparison. (Chipsboosk Company–2003)

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DAIRY

- ❒ D1010 The Bulk Milk Hauler: Protocol & Procedures
- ❒ D1020 Causes of Milkfat Test Variations & Depressions
- ❒ D1030 Cold Hard Facts
- ❒ D1040 Ether Extraction Method for Determination of Raw Milk
- ❒ D1031 Dairy Plant
- ❒ D1050 Food Safety: Dairy Details
- ❒ 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 Hauling Training
- ❒ D1110 Milk Plant Sanitation: Chemical Solution
- ❒ D1120 Milk Processing Plant Inspection Procedures
- ❒ D1125 Ohio Bulk Milk Hauling Video
- ❒ D1130 Pasteurizer: Design and Regulation
- ❒ D1140 Pasteurizer: Operation
- ❒ D1150 Processing Fluid Milk
- ❒ D1160 Safe Milk Hauling – You're the Key
- ❒ D1170 3-A Symbol Council
- ❒ D1180 10 Points to Dairy Quality

ENVIRONMENTAL

- ❒ E3010 The ABC's of Clean – A Handwashing and Cleanliness Program for Early Childhood Programs
- ❒ E3020 Acceptable Risks?
- ❒ E3030 Air Pollution: Indoor
- ❒ E3031 Allergy Beware
- ❒ E3040 Asbestos Awareness
- ❒ E3050 Down in the Dumps
- ❒ 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 Toxicity Tests (Using Fathead Minnow Larva)
- ❒ E3075 EPA, This is Super Fund
- ❒ E3080 Fit to Drink
- ❒ E3090 Food-Service Dispoables: Should I Feel Guilty
- ❒ E3110 Garbage: The Movie
- ❒ E3120 Global Warming: Hot Times Ahead
- ❒ E3125 Good Pest Exclusion Practices
- ❒ E3128 Integrated Pest Management (IPM)
- ❒ E3130 Kentucky Public Swimming Pool and Bathing Facilities
- ❒ E3131 Key Pests of the Food Industry
- ❒ E3133 Physical Pest Management Practices
- ❒ E3135 Plastics Recycling Today: A Growing Resource
- ❒ E3140 Putting Aside Pesticides
- ❒ E3150 Radon
- ❒ E3160 RCRA-Hazardous Waste
- ❒ E3161 The Kitchen Uncovered: Orkin Sanitized EMP The New Superfund: What It Is and How It Works
- ❒ E3170 Tape 1 – Changes in the Remedial Process: Clean-up Standards and State Involvement Requirements
- ❒ E3180 Tape 2 – Changes in the Removal Process: Removal and Additional Program Requirements
- ❒ E3190 Tape 3 – Enforcement & Federal Facilities
- ❒ E3210 Tape 4 – Emergency Preparedness & Community Right-to-Know
- ❒ E3220 Tape 5 – Underground Storage Tank Trust Fund & Response Program
- ❒ E3230 Tape 6 – Research & Development/Closing Remarks
- ❒ E3235 Regulatory and Good Manufacturing Practices
- ❒ E3236 Rodent Control Strategies
- ❒ E3240 Sink a Germ
- ❒ E3245 Wash Your Hands
- ❒ E3250 Waste Not: Reducing Hazardous Waste
- ❒ E3251 Would Your Restaurant Kitchen Pass Inspection?

FOOD

- ❒ F2005 A Lot on the Line
- ❒ F2007 The Amazing World of Microorganisms
- ❒ F2008 A Recipe for Food Safety Success
- ❒ F2009 Basic Personnel Practices
- ❒ F2010 Close Encounters of the Bird Kind
- ❒ F2011 Available Post Harvest Processing Technologies for Oysters
- ❒ E2012 Better TEDs for Better Fisheries
- ❒ F2013 Control of *Listeria monocytogenes* in Small Meat and Poultry Establishments
- ❒ F2014 Controlling Food Allergens in the Plant
- ❒ F2015 Controlling *Listeria*: A Team Approach
- ❒ F2016 Bloodborne Pathogens: What Employees Must Know
- ❒ F2020 Egg Handling and Safety
- ❒ F2021 Egg Production
- ❒ F2030 "Egg Games" Foodservice Egg Handling & Safety
- ❒ F2035 Fabrication and Curing of Meat and Poultry Products
- ❒ F2036 Emerging Pathogens and Grinding and Cooking Comminuted Beef
- ❒ F2037 Cooking and Cooling of Meat and Poultry Products
- ❒ F2039 Food for Thought – The GMP Quiz Show
- ❒ F2040 Food Irradiation
- ❒ F2045 Food Microbiological Control
- ❒ F2050 Food Safe-Food Smart – HACCP and 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)
- ❒ F2081 Food Safety Begins on the Farm
- ❒ F2090 Food Safety: An Educational Video for Institutional Food Service Workers
- ❒ F2100 Food Safety for Food Service Series I
  Tape 1 – Food Safety for Food Service: Cross Contamination
- ❒ F2101 Tape 2 – Food Safety for Food Service: HACCP
- ❒ F2102 Tape 3 – Food Safety for Food Service: Personal Hygiene
- ❒ E3180 Tape 2 – Changes in the Removal Process: Removal and Additional Program Requirements
- ❒ F2103 Tape 4 – Food Safety for Food Service: Time and Temperature Controls 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
- ❒ F2110 Food Safety is No Mystery
- ❒ F2111 Controlling *Salmonella*: Strategies That Work
- ❒ F2120 Food Safety: For Goodness Sake Keep Food Safe
  Food Safety Zone Video Series
- ❒ F2125 Tape 1 – Food Safety Zone: Basic Microbiology
- ❒ F2126 Tape 2 – Food Safety Zone: Cross Contamination
- ❒ F2127 Tape 3 – Food Safety Zone: Personal Hygiene
- ❒ F2128 Tape 4 – Food Safety Zone: Sanitation
- ❒ F2129 Food Technology: Irradiation
- ❒ F2130 Food Safety: You Make the Difference
- ❒ F2131 Fruits, Vegetables, and Food Safety: Health and Hygiene on the Farm
- ❒ F2133 Food Safety First
- ❒ F2134 Food Safety: Fish and Shellfish Safety
- ❒ F2135 Get with a Safe Food Attitude
- ❒ 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
- ❒ F2147 GMP Basics: Process Control Practices
- ❒ F2148 GMP – GSP Employee
  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
- ❒ F2150 GMP: Personal Hygiene and Practices in Food Manufacturing
- ❒ F2121 Food Safety the HACCP Way
- ❒ F2160 GMP: Sources and Control of Contamination during Processing GMPs for Food Plant Employees: Five-volume Video Series Based on European Standards and Regulations
- ❒ F2161 Tape 1 – Definitions
- ❒ F2162 Tape 2 – Personnel and Personnel Practices
- ❒ F2163 Tape 3 – Building and Facilities
- ❒ F2164 Tape 4 – Equipment and Utensils
- ❒ F2165 Tape 5 – Production/Process Controls
- ❒ F2169 HACCP: Training for Employees – USDA Awareness
- ❒ F2170 The Heart of HACCP
- ❒ F2171 HACCP: The Way to Food Safety
- ❒ F2172 HACCP: Training for Managers
- ❒ F2173 Inside HACCP: Principles, Practices and Results
- ❒ F2175 Inspecting for Food Safety – Kentucky's Food Code
- ❒ F2180 HACCP: Safe Food Handling Techniques
- ❒ F2190 Is What You Order What You Get? Seafood Integrity
- ❒ F2191 Microbial Food Safety: Awareness to Action
- ❒ F2210 Northern Delight – From Canada to the World
- ❒ F2220 Proper Handling of Peracidic Acid
- ❒ F2230 Purely Coincidental
- ❒ F2240 On the Front Line
- ❒ F2250 A Lot on the Line
- ❒ F2260 100 Degrees of Doom...The Time and Temperature Caper
- ❒ F2265 A Day in the Deli: Service, Selection, and Good Safety
- ❒ F2266 HACCP: A Basic Understanding
- ❒ F2270 Pest Control in Seafood Processing Plants
- ❒ F2271 Preventing Foodborne Illness
- ❒ F2280 Principles of Warehouse Sanitation
- ❒ F2325 Safe Practices for Sausage Production
- ❒ F2330 Sanitation for Seafood Processing Personnel
- ❒ F2342 Seafood HACCP Alliance Internet Training Course
- ❒ F2350 ServSafe Steps to Food Safety
- ❒ F2350–1 Step One: Starting out with Food Safety
- ❒ F2350–2 Step Two: Ensuring Proper Personal Hygiene
- ❒ F2350–3 Step Three: Purchasing, Receiving and Storage
- ❒ F2350–4 Step Four: Preparing, Cooking and Serving
- ❒ F2350–5 Step Five: Cleaning and Sanitizing
- ❒ F2350–6 Step Six: Take the Food Safety Challenge: Good Practices, Bad Practices – You Make the Call
- ❒ F2370 Supermarket Sanitation Program – Cleaning and Sanitizing
- ❒ F2380 Supermarket Sanitation Program: Food Safety
- ❒ F2391 Understanding Foodborne Pathogens
- ❒ F2430 Smart Sanitation: Principles and Practices for Effectively Cleaning Your Food Plant
- ❒ F2440 Cleaning and Sanitizing in Vegetable Processing Plants: Do It Well, Do It Safely!
- ❒ F2290 Product Safety and Shelf Life
- ❒ F2310 Safe Food: You Can Make a Difference
- ❒ F2320 Safe Handwashing
- ❒ F2340 Sanitizing for Safety
- ❒ F2341 Science and Our Food Supply
- ❒ F2342 Seafood HACCP Alliance Internet Training Course
- ❒ F2390 Take Aim at Sanitation
- ❒ F2410 Wide World of Food Service Brushes
- ❒ F2451 A HACCP-based Plan Ensuring Food Safety in Retail Establishments
- ❒ F2420 Your Health in Our Hands, Our Health in Yours
- ❒ F2450 A Guide to Making Safe Smoked Fish
- ❒ F2460 Safer Processing of Sprouts
- ❒ F2500 Tape 1 – Food Safety Essentials
- ❒ F2501 Tape 2 – Receiving and Storage
- ❒ F2502 Tape 3 – Service
  Fast Track Restaurant Video Kit
- ❒ F2503 Tape 4 – Food Production
- ❒ F2504 Tape 5 – Warewashing

OTHER

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

Call for Symposia

IAFP 2006

August 13-16

Calgary, Alberta, Canada

The Program Committee invites International Association for Food Protection Members and other interested individuals to submit a symposium proposal for presentation during IAFP 2006, August 13–16, 2006 in Calgary, Alberta, Canada.

WHAT IS A SYMPOSIUM?

A symposium is an organized, 3 1/2 hour session emphasizing a central theme relating to food safety and usually consists of six 30-minute presentations by each presenter and a 30-minute break. Short symposia with three or four 30-minute presentations are also possible. Innovative approaches such as roundtable question-and-answer sessions or open format concepts will also be considered.

Symposia may include a discussion emphasizing a scientific aspect of a common food safety and quality topic, issues of general interest relating to food safety and microbiological quality, a report of recent developments, an update of state-of-the-art methodologies, or a discussion of basic and applied research in a given area. The material covered should include current work and the newest findings. Symposia will be evaluated by the Program Committee for relevance to current science and to Association Members. Proposals may be prepared by individuals, committees, or professional development groups (PDGs).

SUBMISSION INSTRUCTIONS

To submit a symposium proposal, read all information on this page, pay close attention to the "Symposia Selection Procedure" on the next page, then complete the "Symposium Proposal" on page 660. Follow all instructions for making a submission. Your suggested presenters need not be confirmed at this stage, only identified.

SYMPOSIUM PROPOSAL DEADLINE

Proposals may be sent to the Association office no later than August 5, 2005 or be presented to the Program Committee at its meeting on Sunday, August 14, 2005 in Baltimore, Maryland.

The Program Committee will review submitted symposia at the conclusion of IAFP 2005 to decide which symposia will be selected for further development. Organizers will be notified as to the status of their proposal by September 30, 2005. Accepted symposia are required to be finalized and sent to the IAFP office by February 8, 2006. The Program Committee has the final decision whether symposia will be accepted for presentation at IAFP 2006. The organizer will be notified of the final results by March 31, 2006.

PRESENTERS WHO ARE NOT MEMBERS

International Association for Food Protection does not reimburse invited presenters for travel, hotel, or other expenses incurred during the Annual Meeting. However, invited presenters who are not Association members will receive a complimentary registration. Presenters who are Association Members are expected to pay normal registration fees.

ASSOCIATION FOUNDATION SPONSORSHIP

The International Association for Food Protection Foundation has limited funds for travel sponsorship of presenters. After final acceptance of the symposium (March 2006), symposia organizers may make requests in writing to the Program Committee Chairperson. Requests are reviewed on an individual and first-come-first-served basis. The maximum funding grant will be $500 per presenter ($750 if outside North America). Organizers are welcome to seek funding from other sources and the Association will provide recognition for these groups in our program materials. Organizers are asked to inform the Association if they obtain outside funding.

SYMPOSIA SELECTION PROCEDURE:

The primary focus of the symposia selection procedure is to provide a balanced educational program for attendees of the IAFP Annual Meeting. To achieve this goal, symposia may be combined or modified by the Program Committee, as appropriate, to prevent overlap of topics among competing symposia. During this process, the top symposia proposed by groups and individuals will be selected for further development.

Guidelines for tentative acceptance:

1. Proposed symposia must be pertinent to IAFP members and PDGs. Priority will be given to symposia that address one or more of the following program areas:
   - Safety and Microbial Quality of Foods (Dairy, Meat and Poultry, Seafood, Produce, Water)
   - Viruses and Parasites, Retail Food Safety, Epidemiology and Public Health
   - Non-Microbiology Food Safety Issues (food toxicology; allergens; chemical contaminants)
   - General-Applied (advances in sanitation, lab methods, quality assurance, food safety systems)
   - General-Food Protection for the Future (risk analysis; emerging pathogens; biotechnology; predictive models, etc.)
   - Other pertinent food protection topics may be considered if space is available
2. In addition to addressing pertinent program areas, symposia accepted for further development should:
   - Be new, emerging and/or address areas not covered in last 2 years
   - If covered in last 2 years, provide new information that warrant another symposium
3. Symposium submissions must include:
   - Titles that clearly convey the topics to be covered
   - Topics that are unique to prevent overlap of basic information among speakers
   - Names of suggested speakers from a variety of backgrounds, such as industry, regulatory, academic researchers, or consumer perspective (as appropriate)
   - Suggested speakers who are knowledgeable and good communicators
4. Special consideration will be given to symposium submissions that:
   - Are directly applicable or provide viable safety options for food manufacturers, including small to medium size manufacturers
   - Bring an international (outside of North America) focus or viewpoint to the meeting
   - Attract/involve students
   - Attract/involve local affiliate members who would not otherwise attend the annual meeting (e.g., regional specialties like shellfish issues for New Orleans)
   - Would attract members of a new PDG or program area that IAFP is trying to develop or encourage
5. Other considerations for selecting symposia for further development:
   - Proposals must be submitted to the Program Committee by Sunday, August 14, 2005
   - The Program Committee reserves the right to limit the number of sessions devoted to a single program area to provide a balanced program
   - If relevant topics are proposed by more than one submission, the Program Committee will make the final decision to combine or modify symposia as appropriate to avoid overlap of topics among competing symposia
   - Due to space and time limitations, only the top proposals (as modified by the Program Committee) will be selected for further development as either full sessions (consisting typically of six 30-minute presentations or round table discussions) or short sessions (consisting typically of three or four 30-minute presentations or round table discussions)
   - Three sessions will be reserved for symposia sponsored by our partner, International Life Science Institute North America (ILSI, N.A.). The ILSI N.A. symposia address topics that are of general interest to IAFP meeting attendees, focus on emerging food safety issues and technologies, and provide a global perspective
   - Additional sessions may be added at the discretion of the Program Committee to accommodate emerging issues
6. Final decisions on symposia selection will be made at the February 2006 Program Committee Meeting.
   - Accepted symposia are required to be finalized with speakers confirmed and sent to the IAFP office by February 8, 2006. Only fully developed symposia will be considered.

WHO TO CONTACT:

Bev Brannen
International Association for Food Protection
6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655
E-mail: bbrannen@foodprotection.org

Symposium Proposal

IAFP 2006

August 13-16

Calgary, Alberta, Canada

Title: _____

Organizer's Name: _____

Committee or PDG Submitting Proposal: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Topic — Suggested Presenter, Affiliation (Example: 1. HACCP Implementation — John Smith, University of Georgia)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Suggested Convenors: _____

Topic Area:

- ❒ Food Safety/Microbial Quality (list commodities) _____
- ❒ Foodborne Viruses and Parasites
- ❒ Retail Food Safety
- ❒ Epidemiology and Public Health
- ❒ Food Safety (Non-Microbiology Issues)
- ❒ General – Advances in Technology Applications
- ❒ General – Emerging Issues
- ❒ Other _____

Provide a short statement describing the relevance of the symposium to IAFP attendees and how this symposium is unique compared to topics previously presented at IAFP 2005 and IAFP 2004.

Signature of Organizer: _____

Submit by August 5, 2005 to:

IAFP — Symposium Proposal
6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA

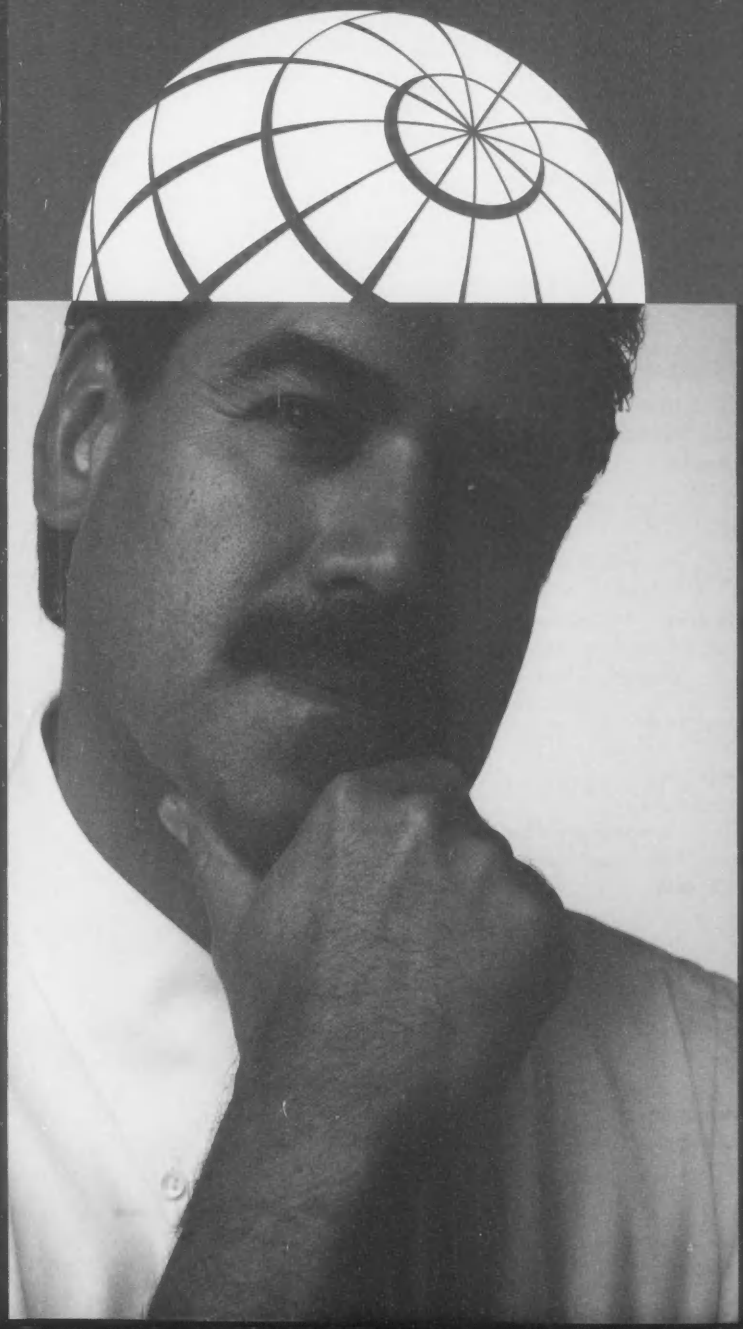
Submit in person on August 14, 2005 to:

Program Committee — IAFP 2006
Baltimore, Maryland

or Contact:

Bev Brannen
International Association for Food Protection
6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655
E-mail: bbrannen@foodprotection.org

Make better **plant operations** and profitability top of mind.



October 26-29, 2005
McCormick Place
Chicago, Illinois USA

It's all here—from receiving and blending through processing and packaging, to material handling and distribution. More than 1,200 suppliers sharing hundreds of innovations at the largest food and beverage processing event. New this year: Super Sessions; technical programs for continuing education credits; and pavilions on product development, distribution and refrigeration and freezing. All geared to better operations, smarter teams, higher profits and happier customers. Use your head. Don't miss the show!

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Food Science Australia
Brisbane

CANADA

Sherif Morcos
Sanitation Pros Inc.
Mississauga, Ontario

Michelle L. Plante
Health Canada, Food Branch
Ottawa, Ontario

Lara Jamilah B. Tiro
Pure Form Concept, Inc.
Richmond, British Columbia

GREECE

Eleni G. Iossifidou
Aristotle University
Thessaloniki

IRELAND

Emily P. Jordan
Department of Agriculture–Ireland
Abbotstown, Castleknock

Paul Leonard
Dublin City University
Dublin

JAPAN

Megumi Akamatsu
Daikin Environmental Laboratory, Ltd.
Tsukuba-Shi, Ibaraki

LEBANON

Nabil N. Rizkallah
GWR Consulting
Jdeidet Elmaten, Maten North

MEXICO

Rosalba Gutierrez Rojo
CIATEJ
Guadalajara, Jalisco

Ema Maldonado-Siman
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Chapingo-Texcoco, Edo de Mexic

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DukSung Women's University
Seoul

Minseon Koo
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Tyson Foods, Inc.
Springdale

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Dennis Smithyman
Tasker Food Solutions
Danbury

Steven M. Zavagli
Tasker Food Solutions
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Washington

FLORIDA

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University of Florida
Gainesville

GEORGIA

Elizabeth Krushinskie
US Poultry and Egg Association
Tucker

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University of Georgia
Griffin

Suvang U. Trivedi
University of Georgia
Griffin

Guodong Zhang
University of Georgia
Griffin

ILLINOIS

Maung S. Myint
University of Illinois at Urbana-Champaign
Urbana

NEW MEMBERS

Libin Zhu
Illinois Institute of Technology
Chicago

INDIANA

Todd A. Armstrong
Elanco Animal Health
Greenfield

IOWA

Angela M. Laury
Iowa State University
Ames

KANSAS

Tom Morey
Kansas Dept. of Environmental Health
Kansas City

MARYLAND

Maryam Taabodi
University of Maryland Eastern Shore
Princess Anne

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BioScale, Inc.
Boston

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Newton Health Department
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Cryovac, Sealed Air Corporation
Duncan

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University of Tennessee
Knoxville

TEXAS

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Virginia Tech
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Virginia Tech
Virginia Beach

WISCONSIN

Dawn N. Preston
University of Wisconsin-Madison
Madison

UPDATES

IFPA Hires David Gombas as Vice President

IFPA has hired David E. Gombas, Ph.D. as new vice president for technical services. David began with IFPA on July 20 in an expanded role that includes directing IFPA's technical, food safety, regulatory, public policy and training programs. He is located at IFPA headquarters in Alexandria, VA.

After an extensive search to find a highly qualified replacement for Jim Gorny, IFPA is thrilled to welcome a veteran food safety specialist who can bolster IFPA's already strong technical, regulatory and food safety programs. David brings to the table extensive association and corporate experience, in addition to strong academic and research credentials.

David spent 10 years with NFPA, now the Food Products Association, overseeing research, quality assurance and food safety programs. He headed the association's National Food Laboratory for five years, leading efforts on food microbiology, processing chemistry, packaging and claims investigations. David directed NFPA's Supplier Audits for Food Excellence (SAFE) program, overseeing all technical, audit quality assurance, auditor training, marketing and P&L. He also worked as a manager of microbiology and food safety at Kraft General Foods, and as a group research scientist at Campbell Soup Company. His most recent position was as a president of Integrity Food and Drug Consulting, which provides product safety, microbiology, good manufacturing practices and regulatory compliance consultation and auditing services.

David earned a B.S. in food science from Rutgers University, a M.S. in food microbiology from M.I.T. and a Ph.D. in food microbiology from the University of Massachusetts. He has published research on a wide-range of technical and food safety topics, including foodborne pathogens, microbiology, HACCP and more.

Dr. Ann Marie McNamara Joins National Advisory Committee on Microbiological Criteria for Foods

Dr. Ann Marie McNamara, vice president of food safety and scientific affairs for Silliker, Inc., was recently appointed by US Agriculture Secretary Mike Johanns to serve on the National Advisory Committee on Microbiological Criteria for Foods (NACMCF).

NACMCF provides scientific advice on public health issues relative to the safety and wholesomeness of the US food supply. In addition, the committee assists in the development of microbiological criteria and reviews, evaluates epidemiological and risk assessment data, and reviews methodologies for assessing microbiological hazards.

A renowned scientist with over 17 years of industry and regulatory experience, Dr. McNamara joined Silliker, Inc. in 2003 after serving as corporate vice president of food safety and technology for the Sara Lee Corporation. From 1992 to 1999, she served as director of microbiology for the Office of Public Health and Science (USDA FSIS). She was influential in several food safety initiatives, and received the Secretary of Agriculture's "Superior Service Award" five times in her seven years at USDA.

"It is a great honor to be chosen to serve on NACMCF with all of the new and highly accomplished appointees," said Dr. McNamara. "I am looking forward to continuing the tremendous work the committee has performed over the past three decades."

Established in 1988, NACMCF serves the US Departments of Agriculture (Food Safety and Inspection Service), Health and Human Services (Food and Drug Administration and Centers for Disease Control and Prevention), Commerce (National Marine Fisheries Service) and Defense. Committee members, 30 scientific experts representing disciplines related to health and food safety issues, serve two-year terms and normally meet two to three times a year.

New Director General for the International Dairy Federation

The International Dairy Federation has announced the appointment of Mr. Christian Robert as its new director general.

Mr. Robert has more than 20 years of experience in the international dairy industry and has held management positions at the highest level. He served 12 years in the senior management team of Nestlé and most recently was managing director, Europe with the Bulmer Group.

Mr. Robert also has extensive experience in trade associations and representative organizations.

He will begin his position on September 1.

Richard S. Braddock Named Chairman at FreshDirect

FreshDirect has announced the appointment of Richard S. Braddock as chairman of the board. Braddock, the former chairman and chief executive officer of Priceline.com, will replace founding shareholder Peter Ackerman who will remain on the Board.

UPDATES

Rick Braddock started his business career at General Foods in 1965, spending ten years in packaged goods marketing. Braddock then spent 19 years at Citibank running Citi's consumer effort worldwide and served as president from 1990–1992. From there he worked in a variety of consumer categories including assignments as CEO of Medco Containment, Acting COO of Lotus, and chairman of True North Communications. He joined Priceline.com as chairman and CEO in 1998, retiring in 2004. Braddock is currently chairman of MidOcean Partners, a private equity firm, and is a director of Kodak, Cadbury Schweppes, Marriott International and Mphasis (India listing).

Whitley to Serve as Executive Chairman for Steritech

CEO and founder of The Steritech Group, Inc., John Whitley, announces that he will step down as CEO, a move scheduled to coincide with the end of the company's fiscal year in June.

Noting the need to structure Steritech to meet the challenges and opportunities that lie ahead, Whitley appointed current food safety division president Mark Jarvis as his successor, citing Jarvis' success in both the food safety and pest prevention divisions over his 12-year tenure with Steritech. Whitley will remain on Steritech's board of directors and serve as chairman for the group.

Mark joined the company in 1993 as an account executive for the pest prevention division in the Atlanta area, quickly moving into a management role as branch manager of the company's Atlanta operation. The following year, he made the branch the company's most successful, earning Steritech's coveted "Branch of the Year" title. In 1996, he moved to California to help establish operations on the West Coast, serving as Pacific regional vice president. With the company's push into the food safety arena in the late '90s, Jarvis became a key player in the development of Steritech's food safety programs. In 2001, he moved into a newly created position as president and chief operating officer of the food safety division.

Rich Ennis, current vice president of operations for the food safety division, will be promoted to the position of president and chief operating officer of the food safety division. Ennis has served in his current position for just under two years. In that brief time, he has brought about significant improvements in operational efficiency and been instrumental in developing a career path for employees of the food safety division.

Cirelli Foods Appoints New Sales Consultant and District Sales Manager

Cirelli Foods has recently appointed Dan Lee as sales consultant and Steven Cifrino as district sales manager.

As a sales consultant at Cirelli Foods, Dan Lee will be part of the outside sales force catering to independent restaurants, schools, nursing homes and similar clients throughout the New England area. Lee has more than 15 years of sales experience and previously held the position of sales representative for US Foodservice for five years. Prior to that, he was a salesman for Ipswich Shellfish for nine years.

Steven Cifrino, the new district sales manager, will oversee outside sales at Cirelli Foods in catering to restaurants, schools, nursing homes and numerous other New England-based clients. Prior to joining Cirelli Foods, Cifrino spent 10 years as a district sales manager and an additional seven years as territory manager at US Foodservice. In 1998, he was awarded MRA Salesman of the Year. Cifrino has an extensive background in the food service industry.

Novazone Inc. Appoints Philip G. Connolly as Chief Financial Officer

Novazone has announced the appointment of Philip G. Connolly as chief financial officer. Mr. Connolly will oversee the company's financial management and accounting activities, and will report to Paul White, president and chief executive officer.

Mr. Connolly brings a wealth of knowledge and talent to Novazone, which stems from over 20 years of finance and operations experience in fast growth companies. During his career, he held numerous senior level management positions and played key roles in business strategy, financial management and process development.

Previously, Mr. Connolly provided executive level consulting services for managed service and software companies, such as DCI Technology Holdings and Arkivio, Inc., where he was responsible for all aspects of finance and operations. Prior to consulting, he was chief financial officer and chief operating officer for Sanrise Inc., a managed storage solutions software company. In addition, Mr. Connolly held senior level positions at Republic Financial Corp., Triton Container International Ltd., and Cronos Containers Inc. Earlier, Mr. Connolly served as an infantry officer in the United States Army.

Mr. Connolly holds a bachelor's degree in engineering from the United States Military Academy, West Point, NY.

International Association for Food Protection® NEWS

United States Government Accountability Office Report to the Chairman, Subcommittee on Environment and Hazardous Materials, Committee on Energy and Commerce, House of Representatives

We identified (1) the estimated extent of perchlorate nationwide; (2) what actions the federal government, state governments, and responsible parties have taken to clean up or eliminate the source of perchlorate found; and (3) what studies of the potential health risks from perchlorate have been conducted and, where presented, the author's conclusions or findings on the health effects of perchlorate.

To provide an estimate of the extent of perchlorate in the United States, we compiled and analyzed data on perchlorate detections from the Environmental Protection Agency (EPA), the Department of Defense (DOD), the US Geological Survey, and state agencies. For each site, our review shows the highest perchlorate concentration reported for all media sampled as of January 2005, although officials may have sampled the site more than once, in varying locations and media, and found differing levels of perchlorate. We also interviewed officials from EPA headquarters and regional offices, DOD, and selected state agencies to determine the accuracy and completeness of our compiled list of perchlorate detections.

To identify what actions the government and private sector have taken to address perchlorate and the extent to which responsible parties have taken action to clean up and eliminate the source of perchlorate, we reviewed federal and state laws, regulations, and policies on water quality and environmental cleanup and interviewed EPA and state agency officials on their roles, responsibilities, and authorities to monitor and respond to instances of perchlorate found. We interviewed officials from EPA headquarters and each of its 10 regions. We also interviewed officials from state environmental agencies in California, Oregon, Texas, and Utah. We selected these states because they (1) had higher estimated numbers of sites where perchlorate was found and higher perchlorate concentration levels and/or (2) had taken steps to investigate and respond to perchlorate.

During interviews with state agency officials, we discussed whether parties responsible for perchlorate had taken action to clean up and whether federal or local governments required that they stop activities causing the release of perchlorate. Finally, we reviewed and analyzed data from federal and state agencies to determine the status and extent of cleanup efforts.

To identify studies of the potential health risks from perchlorate, we conducted a literature search for studies of perchlorate health risks published since 1998. We also interviewed DOD and EPA officials to obtain a list of the studies they considered important in assessing perchlorate health risks. We examined the references for each study so that we could include any other key studies that we had not obtained through the literature search and DOD and EPA interviews. We identified 125 studies of perchlorate and the thyroid but did not review 35 of these studies because they were not directly related to the effects of perchlorate on the thyroid. Our review of 90 studies included the title; the author and publication information; the sponsor or recipient; a description of the study subjects; the type of research design and controls; and, where presented, the author's conclusions or findings about the adverse effects of perchlorate on health.

We conducted our work from June 2004 to March 2005 in accordance with generally accepted government auditing standards, including an assessment of data reliability and internal controls. Complete document available at http://www.gao.gov/cgi-bin/getrpt?GAO-05-462.

"Is It Done Yet?" Only Your Food Thermometer Knows for Sure

Kids popping into the kitchen or dashing by a barbecue grill ask impatiently, "Is it done yet?" The answer to this hungry question is the basis of a national campaign to encourage the use of food thermometers when preparing meat, poultry and egg dishes, to prevent foodborne illness. The campaign, which is being led by USDA's Food Safety and Inspection Service (FSIS) is themed, "Is It Done Yet? You Can't Tell by Looking. Use a Food Thermometer to be Sure!"

Studies have shown that using a food thermometer is the only way to tell if harmful bacteria have been

destroyed. For instance, even if they look fully cooked, one in four hamburgers may not be adequately cooked. Despite this disparity, only 6 percent of home cooks use a food thermometer for hamburgers and only 10 percent use a food thermometer for chicken breasts according to the latest data from the Food Safety Survey, which was conducted by FSIS and the Food and Drug Administration.

"FSIS hopes the 'Is It Done Yet?' campaign hits home and reminds everyone to use a food thermometer to cook to safe internal temperatures," said FSIS acting administrator Dr. Barbara Masters. "By using a food thermometer to check whether meat, poultry or egg dishes are done you also prevent overcooking and guesswork. Food cooked to a safe internal temperature is juicy and flavorful. If you use a food thermometer, then you'll know the answer to: 'Is It Done Yet?' We encourage people to get a food thermometer and become a role model in their neighborhood."

Tips for Using a Food Thermometer: Insert the food thermometer into the thickest part of the food, making sure it doesn't touch bone, fat or gristle. Cook food until the thermometer shows an internal temperature of 160°F for hamburger, pork and egg dishes; 145°F for steaks and roasts; 170°F for chicken breasts and 180°F for whole poultry. Clean your food thermometer with hot, soapy water before and after each use.

FSIS has created a Web site to provide consumers with recommended internal temperatures and instructions on how to use a food thermometer: www.IsItDoneYet.gov. FSIS is partnering with various organizations, agencies and local groups to help spread this important food safety message.

For food safety information in English and Spanish, call the USDA Meat and Poultry Hotline at 1.888.MPHotline (1.888.674.6854) or TTY: 1.800.256.7072. The year-round toll-free hotline can be called Monday through Friday from 10 a.m. to 4 p.m. EST. An extensive selection of timely food safety messages also is available at the same number 24 hours a day.

Consumers may also pose food safety questions by logging on to FSIS' online automated response system called "Ask Karen," which is available on the FSIS Web site at http://www.fsis.usda.gov. E-mail inquiries can be directed to MPHotline.fsis@usda.gov.

Tagging Pathogens with Synthetic DNA 'Barcodes'

A supermarket checkout computer can identify thousands of different items by scanning the tiny barcode printed on the package. New technology developed at Cornell University could make it just as easy to identify genes, pathogens, illegal drugs and other chemicals of interest by tagging them with color-coded probes made out of synthetic tree-shaped DNA.

A research group headed by Dan Luo, Cornell assistant professor of biological engineering, has created "nanobarcodes" that fluoresce under ultraviolet light in a combination of colors that can be read by a computer scanner or observed with a fluorescent light microscope.

Other methods of identifying biological molecules that are available or being developed mostly involve expensive equipment, Luo said. "We wanted something that could be done with inexpensive, readily available equipment," he said. Several years ago, researchers created probes consisting of nanoscale bars of metal actually etched with conventional bar codes. Since then, most molecular tagging devices have been referred to as "barcodes," even though there are no bars involved.

The researchers have tested their system using samples containing various combinations of *E. coli*, anthrax and tularemia bacteria and ebola and SARS viruses, and have found the color codes could clearly distinguish several different pathogens simultaneously.

The research is described in a paper, "DNA fluorescence nanobarcodes for multiplexed pathogen detections," by Luo, Yougen Li, a former Cornell graduate student now at California Institute of Technology, and Yen Thi Hong Cu, a current graduate student, was published in the July 2005 issue of the journal *Nature Biotechnology* and available in the online version of the journal.

The idea is one of several applications the researchers have found for what they call "dendimer-like DNA," consisting of many short Y-shaped strands of DNA linked together in a tree-like structure. The DNA that carries the genetic code in living cells consists of two complementary strands that attach to one another along their length. But Luo's research purposely and completely ignores the DNA's genetic coding properties. He uses DNA, he said, as a "generic instead of a genetic material."

By synthesizing three short strands of DNA, each of which is complementary to one of the others along half its length, the researchers can create a Y-shaped structure.

Combining several of these structures creates a web with many branching ends. "While DNA is flexible, the short strands used here

are quite rigid," Luo said. "A long piece of spaghetti is floppy, but a short bit of it is quite stiff." An antibody or some other molecule that will bind to the molecule to be detected is attached to one of the loose ends of the DNA. To other ends are attached molecules of fluorescent dye in a predetermined pattern. For example, one probe might contain four molecules of green dye and one of red. Another might have three molecules of green and two of red, and so on.

If a mixture of several probes is added to a solution containing, for example, *E. coli* bacterial DNA, only probes with a particular color code will be programmed to bind to that DNA. The results can be seen under a fluorescent light microscope using colored filters that pass only one color at a time. A signal in which the ratio of intensity of green light is four times that of red light, for example, identifies a "4G1R" probe. The researchers say that up to 1,000 different codes can be created using only three fluorescent dyes.

To amplify the signals, the researchers attached many DNA probes to the surface of polystyrene microbeads 5.5 microns (millionths of a meter) in diameter. The results can be read in several ways. One is in a flow cytometer, in which samples move rapidly past a window where a computer reads the color codes of individual beads. Another is by dot blotting, in which the sample is spread on a sheet of absorbent paper and made visible to the naked eye. Or the color can be observed directly through a fluorescent light microscope, which is useful in situations where the geographic distribution of the target molecules is important, Luo said. For convenience, a computer can convert the subtle differences in light intensity between, say 4G1R and 3G1R, into "pseudo colors," perhaps making one appear as orange and the other as pink, to make the difference clear to a human eye.

The researchers point out that the nanobarcode detection system does not require complex preparation of a sample and can be applied to living cells. The technology could be used in genomic research, clinical diagnosis, drug testing, environmental monitoring and monitoring for biological terrorism, they suggest. Further details on "tree-shaped" DNA appear in a paper in *Nature Materials* (Vol. 3, Pg. 38–42, 2004).

Models Predict Poultry Pathogen Behavior

Computer models that more accurately predict the growth of food pathogens are being developed by the Agricultural Research Service (ARS) and are available online.

These models make better predictions about food safety because they gauge how pathogens are affected by competition from other food microbes. ARS food technologist Thomas P. Oscar, at the ARS Poultry Food Safety Research Laboratory in Princess Anne, MD, models the growth and survival of *Salmonella* and *Campylobacter* on chicken. The lab, based at the University of Maryland Eastern Shore campus, is affiliated with the ARS Eastern Regional Research Center (ERRC) in Wyndmoor, PA.

Oscar's research is part of a growing field, known as predictive microbiology, that estimates the behavior of foodborne pathogens in response to environmental conditions encountered in food production and processing operations.

Previously, models were often developed by studying pathogens in broth with no other microbes present. Researchers thought this would allow them to accurately predict pathogen behavior in food. But this is not always the case because these models don't consider the role competing microorganisms have in real-life scenarios.

ARS researchers will produce more realistic models using a system to rate the performance of current models. Oscar recently developed an "acceptable prediction zone" method for evaluating existing models. The method establishes criteria for verifying and validating models, classifying them to show which are best, and then pinpointing changes to improve the models.

According to Oscar, most current broth models predict much higher pathogen numbers than would be present in real food with microbial competition. Posting poultry pathogen models, as well as other food safety models, on the ERRC's Pathogen Modeling Program Web site (www.arserrc.gov/mfs/pathogen.htm) should accelerate the use of models by food industries and other professionals in the field of predictive microbiology.

Read more about this research in the June issue of *Agricultural Research* magazine, available online at: http://www.ars.usda.gov/is/AR/archive/jun05/poultry0605.htm.

Handwashing – We Don't Always Do the Right Thing

In 2002, the Food Safety Information Council (FSIC) released the results of two surveys on handwashing. A quantitative survey, conducted by Newspoll, tested people's knowledge of effective handwashing techniques and a qualitative study examined how well this knowledge was put into practice.

Over the past two years, both the FSIC and Food Standards Aust-

ralia New Zealand (FSANZ) have received many requests for information about the results of these surveys. The FSIC has now developed a paper giving information about the two studies and their results.

The Newspoll survey of 1,250 respondents showed that the vast majority of people knew that it was safe, before handling food, to wash their hands using soap and water and drying thoroughly. However, quite a large minority also thought it was safe to prepare food after just rinsing their hands under water or without using soap.

The qualitative study observed the actual behavior of 200 men and women in the public toilets at a suburban shopping centre. The study showed that only 20% of females and 7% of males observed used the correct procedure of washing their hands for at least 10 seconds, rubbing soap all over their hands, rinsing and drying for 10 seconds with a clean towel or 20 seconds with a hand dryer. 8% of females and 29% of males failed to wash their hands at all after going to the toilet. Both studies showed that the worst knowledge and practice came from males of all age groups.

These studies showed that although there has been a considerable increase in the recognition of the need to wash hands correctly since a national survey in Australia in 1997, there is clearly an ongoing need for consumer education to translate the knowledge of what should be done to keep food safe into actual safe handling practices. Correct handwashing should be a major element of that education.

For more information, read the paper on the Food Safety Information Council Web site, www.foodsafety.asn.au or contact Tania Bradley, project coordinator, the Food Safety Information Council at info@foodsafety.asn.au or phone 0407.626.688.

The *Listeria* That Won't Die

Meat processors already know that dangerous *Listeria monocytogenes* bacteria can withstand some major assaults. They sanitize the food processing environment and heat their products to kill the bacteria on cooked and ready-to-eat meats, but a few of the bacteria are merely injured or starved and live to cause trouble another day.

They can do quite a bit of damage even after several months in a starved state, according to new research results. Ramakrishna Nannapaneni, a food science research associate for the University of Arkansas, has been exploring the issue for the Food Safety Consortium with a research team led by professor Mike Johnson. "There has been a tremendous effort to find out virulence differences within *Listeria monocytogenes* for risk assessment needs," Nannapaneni said, pointing to the bacterium's damaged cells. "The next logical question is how long they remain virulent. That's been the focus of our work."

The situation is relevant for food processing facilities in which *Listeria monocytogenes* cells are depleted of their nutrients but recover sufficiently to become a threat. Good cleaning practices are necessary in food processing environments, but Nannapaneni noted that inadequate chemical sanitizing can leave some bacteria alive and virulent.

The Arkansas experiments tested *Listeria monocytogenes* cells that had been starved for 196 days and those that had not been starved. The healthy cells were strong enough to kill 90 percent of a target mouse cell population within two hours of release. The starved and injured cells, after more than six months of languishing, still had enough strength to kill 60 percent of their target cell population within six hours, then 90 percent of the target after eight hours. "Most of the phenomenon is that the starved ones take a little longer to wake up," Nannapaneni said. "Once they wake up, they have the strength to go forward."

The food processing industry has 99 percent of the cases under control, Nannapaneni said, and is aiming at the rest. "They are very serious about this organism," he continued. "They are taking powerful measures for preventing cross-contamination or eliminating it." Even with a limited amount of cross-contamination, the virulence of the surviving bacteria makes them targets for elimination.

This project used mouse hybridoma cells to demonstrate the power of starved *Listeria monocytogenes*. The next step is to test the bacteria on human cell models to discover if they are equally susceptible and how quickly they can be infected. Then it's time to determine what controls are necessary to kill the starved pathogens.

It's already known, from Food Safety Consortium research conducted by Aubrey Mendonca of the Iowa State University food science faculty, that starved *Listeria monocytogenes* cells show increasing resistance to stresses such as irradiation. "It's important to understand how these starved cells are waking up and how to suppress them," Nannapaneni said. "The long-term starved cells become smaller and coccoid (spherical shaped), but they still remain viable and virulent."

INDUSTRY PRODUCTS

Fluid Imaging Technologies, Inc.

Process Instrumentation Firm Unveils High-speed Particle Imaging and Analysis System

Process instrumentation firm Fluid Imaging Technologies has unveiled the FlowCAM® Benchtop II, a new particle analysis system that takes high-resolution, digital images of individual fluid-borne particles, measures particle size, length, width, shape, fluorescence and other parameters, and also records the data in an interactive scattergram for instant display and analysis. Featuring the company's patented high-speed imaging technology and state-of-the-art digital firewire camera, the breakthrough FlowCAM Benchtop II is the only particle analysis instrumentation that captures detailed digital images of every particle sampled while also providing an advanced array of traditional particle analysis tools, according to the company.

Boasting a proprietary image management system with a new, enhanced version of the company's pattern recognition software, the compact FlowCAM Benchtop II automatically collects and stores each particle image in a digital library. During analysis, the sophisticated technology permits the integration of the images with the corresponding data for instant cross reference and visual documentation of each particle.

Ideal for process engineers, laboratory managers, water/wastewater engineers, plant managers, environmental compliance officers and others, the versatile FlowCAM Benchtop II analyzes organic and inorganic fluid-borne particles such as fibers, petrochemicals, microorganisms, cosmetic microcapsules, laser and copier toner, food ingredients and others where verifying the true size, shape and number of particles is paramount. The FlowCAM Benchtop II operates with discrete samples and/or in situ, permitting continuous monitoring with real-time analysis from a remote location.

Fluid Imaging Technologies, Inc.
Edgecomb, ME
207.882.1100
www.fluidimaging.com

BioControl Develops Eight Hour DNA Test for *E. coli* O157:H7

BioControl Systems, Inc., is pleased to announce the development of a revolutionary new solution for pathogen detection. The Assurance GDS™ (Genetic Detection System) combines the latest advancements in molecular technology and food microbiology to provide faster results with the increased accuracy required to meet today's food and environmental testing challenges.

A key advantage of the Assurance GDS system is its turnaround time. Assurance GDS for *E. coli* O157:H7 has been designed to provide results in a single, 8-hour shift. "With the prevalence of test and hold, particularly in the beef industry, faster results have becme necessity," states Geoff Bright, microbiology product manager. "The financial test results can be significant, particularly with a perishable product."

In addition to faster results, Assurance GDS also offers greater accuracy in the form of multiple layers of specificity. "Another key advantage that Assurance GDS has over other pathogen detection systems is that its design includes three levels of specificity," according to Bright. These include Immunomagnetic separation (IMS), highly specific primers, and a patented Probe system which ensures the highest degree of accuracy. "The multiple levels of specificity have enabled us to overcome matrix interference and cross reactivity; issues that are common to other genetic-based systems. The benefit to customers being consistently accurate results," says Bright.

Completing the system is the Assurance GDS Rotor-Gene, an innovative multi-channel rotary cycler for the amplification and detection of the

target. The Assurance GDS Rotor-Gene can read multiple, distinct targets thereby eliminating the need for melt curves, which can be difficult and time consuming to interpret.

E. coli O157:H7 and Shiga Toxin(s) (STXI and STX2) are the first assays to be developed on the Assurance GDS platform. AOAC Official Method approval is expected soon for both assays. Additional assays for *Salmonella*, *Listeria* and *L. monocytogenes* are currently in development.

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

Torrey Pines Scientific, Inc.

New, Fully Programmable Chilling/Heating Incubators from Torrey Pines Scientific

Torrey Pines Scientific, Inc. announces two new programmable, chilling/heating, bench top incubators. The models IN35 and IN45 are Peltier-based units with no compressors or CFCs and a temperature range from 4.0°C to 70.0°C with control to 0.1°C (even at room temperature). They have interior capacity of 27.5 liters and 55 liters, respectively.

Both models have fully programmable controls that are capable of storing 3 routines in memory. Each routine is capable of 10 steps and each program step is a temperature, time, and ramp function (if required). Each program can be made to repeat from 1 to 99 times automatically.

Programs are stored in CMOS for instant recall and use at any time. Units have an RS232 interface for data collection, and 99-day timer readable to 1 second.

These programmable incubators are ideal for use in pharmaceutical, biotech, biochemistry, clinical, general chemistry, and other laboratories.

Typical applications include protein crystal growth, culture growth, enzyme reactions and deactivations, incubating marine cultures, ligations, hybridizations, storing oocytes and DNA libraries, BODs, and much more.

All applications may be done above, below, or at room temperature!

These units are UL, CSA, and CE listed and are available in 100, 115, and 230 VAC, 50/60 Hz models.

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

Nilfish-Advance America's New Industrial Vacuum Ergonomically Redesigned to Make General Cleaning Easier

Industrial vacuum cleaner manufacturer Nilfisk-Advance America introduces its newly designed CFM 118. The new CFM 118 provides workers with handy conveniences that make cleaning less strenuous. The combined power, small footprint, and efficiency of the CFM 118 also helps manufacturers clean tight spaces more quickly and thoroughly.

New additions to the CFM 118 include a wheeled 6.6-gallon collection container with handles for easy emptying, and optional container fitted with a paper-bag filter for safe recovery and quick disposal of debris. These add-ons complement existing CFM 118 features such as an external filter shaker handle to keep the main filter free of clogging and maintain maximum performance, and a self-cooling bypass motor to protect the motor from burnout.

As with all Nilfisk-Advance America industrial vacuums, the CFM 118 collects and retains dust and debris within its high-efficiency filtration system through a series of progressively finer filters including an optional HEPA exhaust filter that capture increasingly smaller particles as they move through the vacuum. The unit can be custom designed with a multi-stage filtration system that is proven to trap 99.995% of particles down to and including 0.18 microns, ensuring that collected materials are retained within the vacuum.

Nilfisk-Advance America
610.269.2100
Malvern, PA
www.n-aa.com

Impregnated Silicon Wipe Offers Controlled Lubrication for Controlled Environments and Aseptic Processing from Micronova Manufacturing Inc.

Micronova Manufacturing Inc. introduces the SilSat pre-saturated silicon wipes. The SilSat wipes address the challenge of using lubri-

cant in a controlled environment – by offering high-grade silicon on a pre-saturated wipe.

The pre-saturated lubricating wipe is a simple alternative to silicon and lubricating spray cans and bottles. Each polyester wipe is lightly impregnated with silicon — enough to service gears and rollers on fill lines — without the likely transfer of silicon into product or other critical surfaces. The wipe also presents the ideal medium for mold release applications in medical device and manufacturing applications.

The SilSat wipes come in a re-sealable 8-pack pouch and are double bagged for easy transfer into the processing area.

SilSat wipes are available gamma irradiated at 45 kgy.

Micronova manufactures a full range of cleanroom mops, sponges and wipers, detergents and cleaners, cleanroom tape and hand soaps.

Micronova Manufacturing Inc.
310.784.6990
Torrance, CA
Thunsucker@micronova-mfq.com

Waterproof Non-glass Conductivity, TDS and Salinity from IQ Scientific Instruments

The IQ350 is a waterproof, hand-held, non-glass Conductivity, TDS and Salinity meter. This rugged meter system is NEMA4x (IP 67) rated, showcases an extra large LCD display with LED backlight, and has the ability to measure accurately conductivity, TDS, salinity and temperature. Features include automatic or manual temperature compensation, automatic

IQ Scientific Instruments, Inc.

conductivity cell constant recognition with auto ranging, and up to five-point calibration (one point per range). Complete with a solid-state four cell conductivity electrode, this easy-to-use ultra-rugged meter system is engineered to withstand harsh use in the most difficult of applications.

IQ Scientific Instruments, Inc.
Carlsbad, CA
760.930.6501
www.phmeters.com

PBI-Dansenor America, Inc.'s Quality of Metallized Film is Quickly Validated by Water Vapor and Oxygen Transmission Rate Testers

Metallized film, with its highly regarded moisture and oxygen barrier properties and relatively low cost economy, can be quickly and easily tested on LYSSY Moisture Vapor Transmission and Oxygen Permeation testers available from PBI-Dansensor to validate barrier performance properties prior to material use at both point of receipt of the material and when material is taken from storage to ensure that barrier properties have not become compromised by oxidation or moisture.

Since metallized film material kept in storage is subjected to a range of temperature and humidity conditions that can warp the film and result in a weakening of the barrier properties and physical aesthetics, it is important that metallized film rolls be tested prior to its use.

When used as a component of a fast-to-market packaging development strategy, the LYSSY tester provides speed, ease-of-use and accuracy for measuring permeability.

Quick-yielding LYSSY test results present packaging engineers and metallized film formulators with early and frequent moisture vapor transmission and oxygen transmission rates they can use to test and evaluate barrier protection performance.

The self-contained LYSSY tester provides continuous scanning within a controlled, enclosed temperature/humidity environment that is less sensitive to ambient temperature, humidity or physical space limitations than other test methods.

PBI-Dansensor America, Inc.
201.251.6490
Glen Rock, NJ
www.pbi-dansensor.com

Germicidal Activity of American Air Scrubbers by Texas Tech University

Texas Tech University's Department of Biological Sciences evaluated American Air Scrubbers' equipment for germicidal effectiveness in

laboratory studies. The equipment tested was a special research machine that contained UV-C gennicidal lamps and photo catalytic reactors. It has long been established that irradiation from UV-C lamps kills bacteria by direct exposure. A machine was developed to test the hypothesis that *E. coli* exposed to an air stream treated with UV-C light and photo catalytic reactors would be killed at a faster rate than would *E. coli* exposed to an air stream not treated with photo catalytic reactors. *E. coli* in both test and control conditions were maintained in the dark.

The special test machine developed for Texas Tech exposed an air stream to photo catalytic reactors irradiated with UV-C light; then the air stream moved through a light-blocking filter into a dark (no light present) chamber. This stream of treated air was on the experimental side of the machine. The control side had a stream of air similar in volume and flow to that on the experimental side. The control side contained no photo catalytic reactors.

Cultures of *E. coli* were established on Petri dish plates with agar media. *E. coli* colonies on the agar plates were too numerous to count (TNTC) at the beginning of the test.

Eighteen plates with *E. coli* TNTC were exposed, in groups of three, to the treated airflow in the dark chamber for 10, 20, 30, 40, 50, and 60 minutes and then removed to count surviving colonies of *E. coli*.

This study, and one other similar study, indicated that air exposed to UV-C light and photo catalytic reactors was able to kill growing *E. coli* cells maintained in the dark and protected from UV-C irradiation. Colony counts of *E. coli* were initially TNTC, but declined to near zero after 60-minute exposure.

Similarly, American Air Scrubbers' technology treats air flowing through the ducts of residential and commercial heating and air conditioning equipment and kills bacteria residing in, or passing through the ducts.

American Air Scrubbers, Inc.
877.846.4247
Lubbock, TX
www.americanairscrubbers.com

Prevent Corrosion in Your Water Jacketed Incubator from Sheldon Manufacturing

Sheldon Manufacturing has included a new feature for 2005 for their Water Jacketed Incubators.

The addition of a Dis-Similar Metal Anode in the water jacket, allows the use of good quality tap water without worrying about corrosion.

Sheldon Manufacturing Inc.

No need to use expensive distilled water to fill the Sheldon Mfg. CO_2 water jacketed incubator!

This innovative feature eliminates the hassle and expense of distilled water and allows the safe use of tap water in the stainless steel chamber.

In additon, there is an accessory kit available to allow users of existing ShelLab incubators to install the protection of the Anti-Corrosion Anode.

Sheldon Manufacturing Inc.
800.322.4897
Cornelius, OR
www.shellab.com

COMING EVENTS

SEPTEMBER

- **7, HACCP: A Management Summary,** GFTC, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **11–14, 4th International Whey Conference,** Chicago, IL. For more information, contact James Page at 630.530.8700 or go to www.IWC-2005.org.
- **13–15, HTST Pasteurization,** Randolph Associates, Inc., Nashville, TN. For more information, call 205.595.6455; E-mail: us@randolphconsulting.com.
- **13–15, Practical HACCP for Food Processors,** Las Vegas, NV. For more information, call Silliker at 708.957.7878 or go to www.silliker.com.
- **13–16, Food Safety/Sanitation & HACCP Workshop,** Chicago, IL. For more information, call AIB at 785.537.4750 or go to www.aibonline.org.
- **15–16, Fundamentals of Auditing,** Atlanta, GA. For more information, contact Jeanette Hugé at 800.477.0778 ext. 113; E-mail: jhuge@asifood.com.
- **19–20, Certified HACCP Auditor,** GFTC, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **20, Georgia Association for Food Protection Annual Fall Meeting,** Georgia Tech Food Processing Auditorium, Atlanta, GA. For more information, contact Louis Hughes at 912.267.3623; E-mail: lhughes@kpseafood.com.
- **20–22, Kansas Environmental Health Association Annual Fall Meeting,** Hyatt Regency, Wichita, KS. For more information, contact Cyndra Kastens at 316.383.7951; E-mail: ckastens@sedgwick.gov.
- **20–22, New York State Association for Food Protection Annual Meeting,** Holiday Inn, Liverpool, NY. For more information, contact Janene Lucia at 607.255.2892; E-mail: jgg3@cornell.edu.
- **20–22, Washington Association for Food Protection Annual Conference,** Campbells Resort on Lake Chelan, Chelan, WA. For more information, contact Bill Brewer at 206.363.5411; E-mail: billbrewer1@juno.com.
- **21–22, Wisconsin Association for Food Protection Joint Education Conference,** Stoney Creek Inn, Mosinee, WI. For more information, contact Randy Daggs at 608.837.2087; E-mail: rdaggs@juno.com.
- **23–27, The 7th International Exhibition on Food & Drink Industry,** International Exhibition & Convention Center, Hachiminh City, Vietnam. For more information, contact Nguyen Ba Vinh at 84.90340.6383; E-mail: vinhba@hn.vnn.vn.
- **27–29, Microbiological Concerns in Food Plant Sanitation and Hygiene,** Chicago, IL. For more information, call Silliker at 708.957.7878 or go to www.silliker.com.
- **27–29, Wyoming Environmental Health Association Annual Educational Conference,** Buffalo Bill Village Resort, Cody, WY. For more information, contact Roy Kroeger at 307.633.4090; E-mail: roykehs@laramiecounty.com.
- **28–29, Sixth Annual Illinois Food Safety Symposium,** Holiday Inn City Centre, Peoria, IL. For more information, call the Illinois Dept. of Public Health at 217.785.2439 or E-mail Jayne Nosari at jnosari@idph.state.il.us.

OCTOBER

- **3–7, Dairy Technology Workshop,** Randolph Associates, Inc., Newport, KY. For more information, call 205.595.6455; E-mail: us@randolphconsulting.com.
- **4–7, Better Process Control School,** University of Nebraska, Lincoln, NE. For more information, call 402.472.9751; E-mail: tkoeppe2@unl.edu.
- **11–12, Better Process Control School,** University of Nebraska, Lincoln, NE. For more information, call 402.472.9751; E-mail: tkoeppe2@unl.edu.
- **11–12, IAFP European Symposium on Food Safety "Recontamination Issues in the Food Industry,"** to be held in Prague, The Czech Republic. For more information, check www.foodprotection.org under "Meetings and Education."
- **11–13, FoodScan,** Laughlin, NV. For more information, call 952.974.9892; E-mail: info@fossnorthamerica.com.
- **11–13, HTST Pasteurization and Controls Seminar,** LaQuinta Inns & Suites, San Antonio, TX. For more information, call 210.628.1596; E-mail: mvk1030@aol.com.
- **11–13, North Dakota Environmental Health Association Annual Meeting,** Holiday Inn, Fargo, ND. For more information, contact Deb Larson at 701.328.1291; E-mail: djlarson@state.nd.us.
- **12–13, Association of Illinois Milk, Food and Environmental Sanitarians Annual Fall Meeting,** Stoney Creek Inn, Peoria, IL. For more information, contact Frank Brown at 217.785.2439; E-mail: fbrown@idph.state.il.us.
- **15–19, Current Concepts in Foodborne Pathogens and Rapid and Automated Methods in Food Microbiology Symposium,** University of Wisconsin-River Falls, WI. For more information, contact Doreen Cegielski at 715.425.3704; E-mail: foodmicro@uwrf.edu.
- **18–20, Applied Extrusion Workshop,** University of Nebraska, Lincoln, NE. For more information, call 402.472.9751; E-mail: tkoeppe2@unl.edu.
- **19, Metropolitan Association for Food Protection Fall Meeting,** Rutgers University, New Brunswick, NJ. For more information, contact Carol Schwar at 908.689.6693; E-mail: cschwar@entermail.net.
- **20–21, HACCP/ISO 9000,** Las Vegas, NV. For more information, contact Jeanette Hugé at 800.477.0778 ext. 113; E-mail: jhuge@asifood.com.
- **25, Iowa Association for Food Protection Annual Fall Meeting,** Western Starlite Motel, Ames, IA. For more information, contact Phyllis Borer at 712.754.2511 ext. 33; E-mail: borerp@ampi.com.

COMING EVENTS

- **26–27, Certififed Equipment Design Seminar,** Atlanta, GA. For more information, contact AIB at 785. 537.4750; E-mail: info@aibonline.org.
- **31–1, Food Plant Sanitation,** GFTC, Guelph, Ontario, Canada. Contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.

NOVEMBER

- **1–4, Food Safety/Sanitation & HACCP Workshop,** Toronto, Ontario, Canada. For more information, call AIB at 785.537.4750 or go to www.aibonline.org.
- **1–4, ProcessScan,** Eden Prairie, MN. For more information, call 952. 974.9892; E-mail: info@fossnorthamerica.com.
- **9–11, Dairy Practices Council 2005 Annual Conference,** Radisson Lackawanna Station Hotel, Scranton, PA. For more information, call 732. 203.1947; E-mail: dairypc@dairypc.org.
- **11–12, Mexico Association for Food Protection Annual Meeting,** Guadalajara, Jal., Mexico. For more information, contact Alejandro Castillo at 979.845.3565; E-mail: a-castillo@tamu.edu.
- **16, Ontario Food Protection Association Annual Fall Meeting,** Mississauga, Ontario. For more information, contact Gail Evans at 519. 463.5674; E-mail: seed@golden.net.
- **25, HACCP: A Management Summary,** GFTC, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.

DECEMBER

- **13–14, Infratec 1255/1265,** Eden Prairie, MN. For more information, call 952.974.9892; E-mail: info@foss-northamerica.com.

IT'S A FACT

You Can Nominate the Next IAFP Secretary

See page 641 of this issue for additional information.

IAFP UPCOMING MEETINGS

AUGUST 13-16, 2006
Calgary, Alberta, Canada

JULY 8-11, 2007
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AUGUST 3-6, 2008
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Research Notes

Review

ERRATUM

In the article "Bacteriophage Ormoel of Escherichia Bacillus" by Shim, *Journal of Food Protection*, 68(5):1102–1111, the journal cited for reference 9 (Barrow and Soothill) in the list of References is incorrect. The journal for this reference should be *Trends Microbiol.*

* Author address to author for correspondence.

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

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

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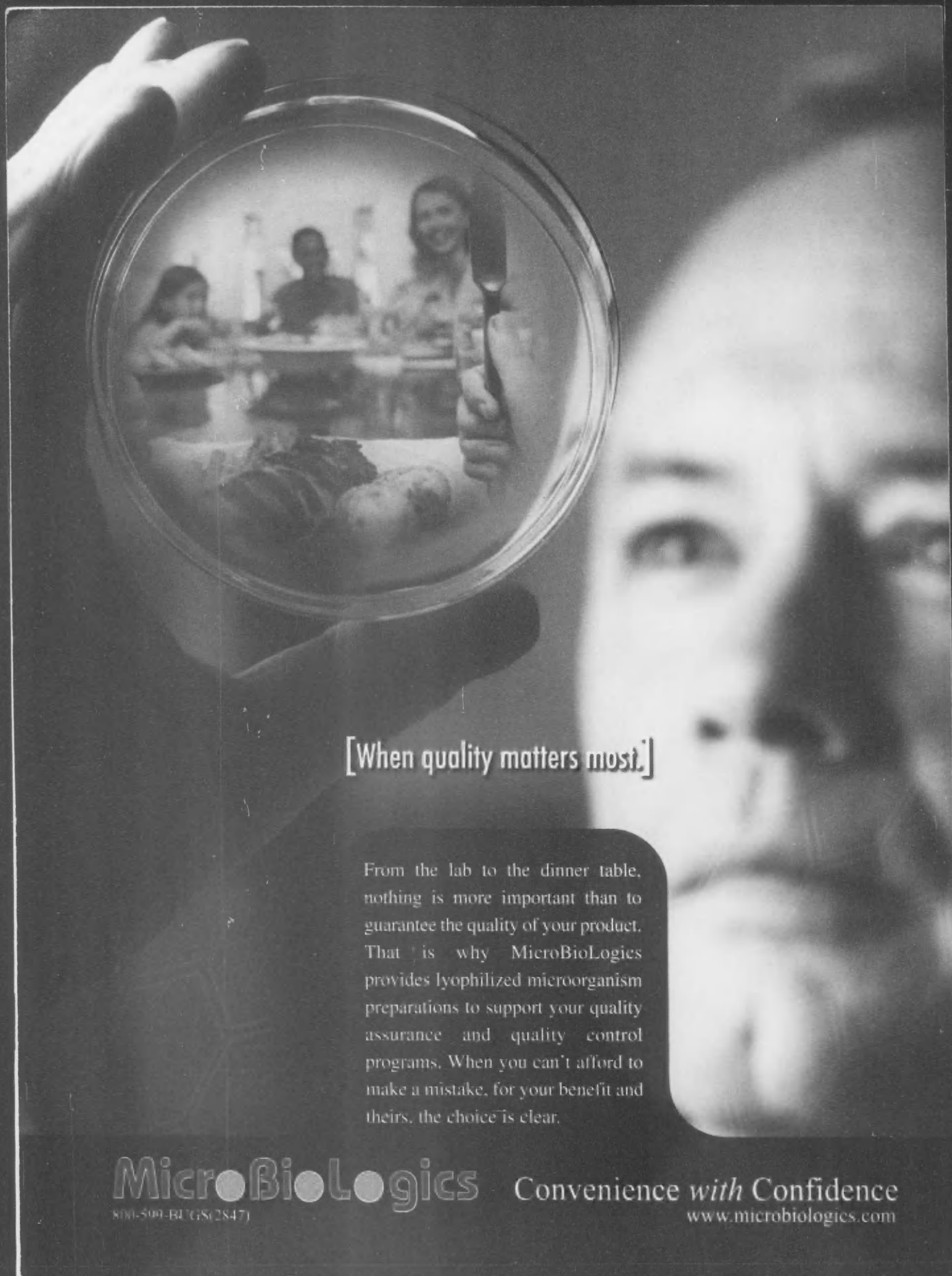
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