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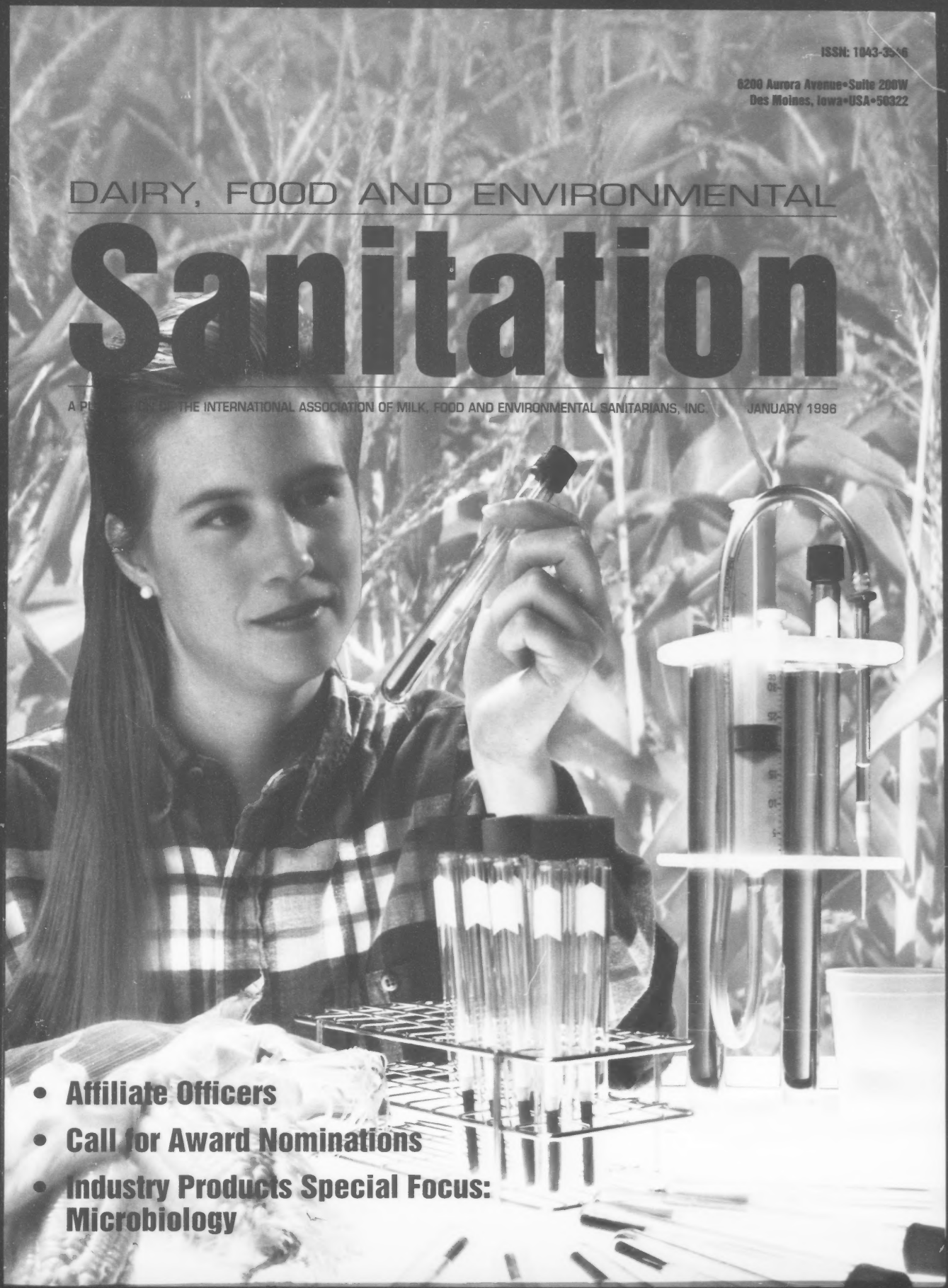
DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. JANUARY 1996



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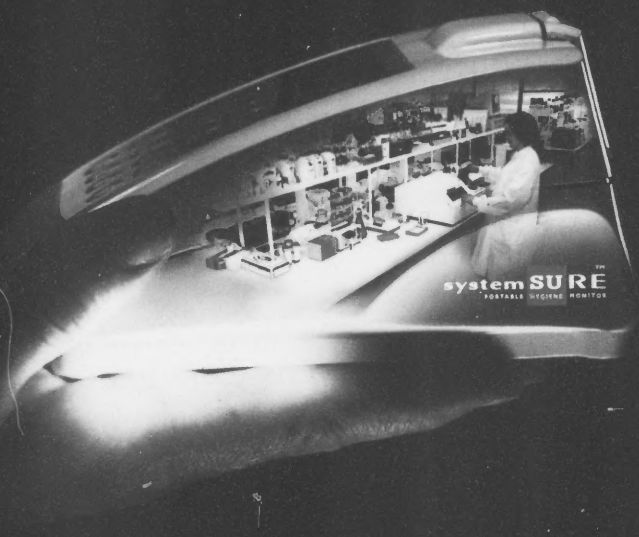

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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

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DEPARTMENTS

EXTRAS

DAIRY, FOOD AND ENVIRONMENTAL

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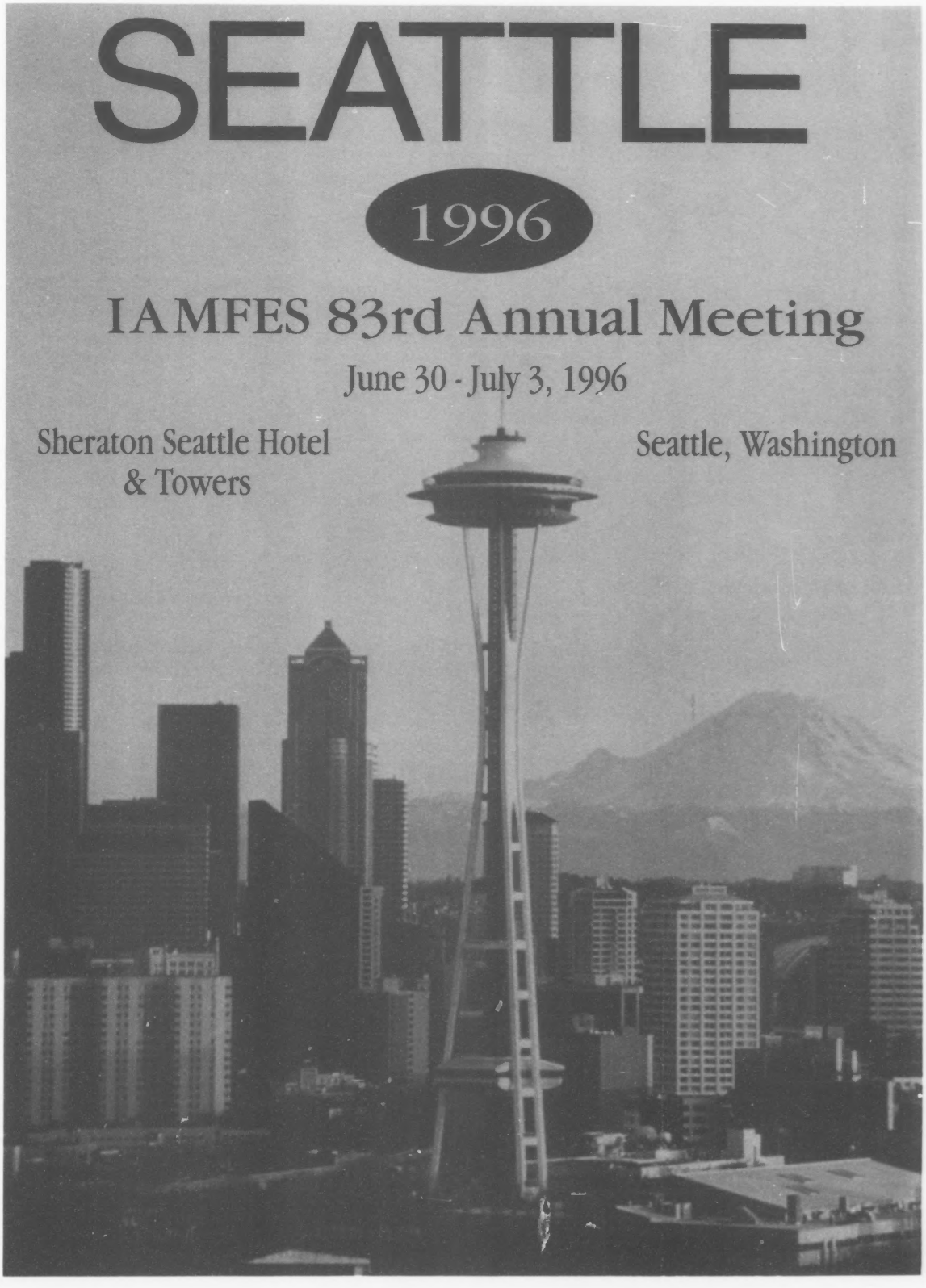
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THOUGHTS

FROM THE PRESIDENT

By F. ANN DRAUGHON,
IAMFES President

"Commitment is a gift we give ourselves"

It really doesn't matter whether we are talking about our family, our job, our association or our community. People who are successful are committed. Strong commitment makes our lives more satisfying. It's good therapy, too. It empowers us, brings out the best in us and actually reduces stress because we enjoy ourselves more. It also makes us more valuable to our company and the people around us. What can be more satisfying than working from the heart and investing ourselves passionately in what we're doing?

I have been thinking about what people expect from a professional association. I think that the time is past when members are happy with a status-quo organization. Members expect better service and quality from their professional organizations than before. In times past, when members wanted more service, the common solution was to hire more people. Spend more money. Associations cannot afford that approach anymore. Instead of throwing more people at problems, associations now throw fewer. We all expect speed in responding to requests, because we've gotten used to fast food, fast transportation, fast computers, FAX, E-mail, and fast everything else. There is really no room any longer for half-hearted effort by employees. The people who are there to do their time and get their checks are goners. We are fortunate to have an IAMFES staff that is really committed to our association. I hope that when you call the IAMFES office, you can feel the energy and the commitment of the ones with whom you talk—because the energy and the commitment is there and getting stronger every day.

A number of outstanding candidates were identified by the American Society of Association Executives for the position of Executive Director of IAMFES and five individuals were interviewed at the November IAMFES Board meeting. The IAMFES Board is delighted to announce that Mr. David Merrifield has accepted the position of Executive Director for IAMFES and his first day in the IAMFES office was December 1, 1995. The Board was very impressed with Mr. Merrifield and unanimous in their decision to hire him as our Executive Director. Mr. Merrifield brings many years of management experience to the IAMFES office. During his tenure with the Iowa Chiropractic Society he developed an award-winning association journal and greatly increased their membership. He will be contacting many of you in the months to come to get the answers to questions and perhaps background and historical context of various IAMFES happenings. Please give him your full support and encouragement so that he can do his very best for IAMFES. I know that you will enjoy talking with him and he will be happy to hear from you.

Have a wonderful new year and be the best you can be!

Notice about your IAMFES Annual Directory

Dear Member of IAMFES,

At IAMFES, serving our members is and has always been our first priority. We recently discovered a couple of significant ways to better accomplish this. Primarily, we have decided to move the publication of our 1997 annual directory to the fall. This decision is based on the poor structure of our current timeline for serving the membership of IAMFES. We have previously published the directory in the spring of each year, which precedes our Annual Meeting in the summer. As most of our members are aware, the IAMFES Executive Board will change, committee chairs and members may change, and many people become new IAMFES members at the Annual Meeting. Moving the distribution of the directory to the fall will enable us to include this new information.

During this transition we will be publishing a mini-directory in the February issue of *Dairy, Food and Environmental Sanitation*. This directory will include most of the information normally given in the full version of the directory with the exclusion of the membership and commercial listings. The mini-directory will be compiled in the center section of the journal. The section itself will be easily removable from the journal for reference until the new full directory is available.

We are confident this change will be an advantage to everyone receiving the directory and the accurate information included in it will be an asset to all of our members.

The second change is not quite as significant but one we hope you will sincerely appreciate. We have decided to polybag our journals beginning with the January 1996 issues. Some of you have received damaged journals in the mail and have expressed your concern about the appearance of them upon receipt. We hope this will eliminate the problem. This will also allow us to include special mailings to our members, which will in turn, save money for the association. This solution is demonstrative of what can happen when we work together.

Sincerely,
Carol Mouchka
Managing Editor

A MESSAGE

From the Home Office

"Starting a new year and facing new challenges"

As I prepare to write this column, my first officially as Managing Editor, I find myself contemplating the sleet falling outside my window that is sure to make my drive home a challenge. Nature has the wonderful power to complicate our daily lives and at the same time provide a beauty few take the time to appreciate. The weather of the last few days for us has been reflective of the last year for me as Acting Editor and now Managing Editor of IAMFES. I came to this position during the blizzard and have faced the often dreary challenges. As with any snowstorm, the intimidation you feel initially is replaced by awe at the beauty of the end result. Our result is a quality publication and a talented team to direct it.

Just as driving on slickened winter roads brings a sense of apprehension, starting a new year and facing new challenges can elicit the same feeling. This new year brings with it a new addition to the IAMFES staff and added assistance for the publications department. The IAMFES Executive Board has announced the addition of Dave Merrifield as Executive Director. Dave comes to IAMFES from the Iowa Chiropractic Society. He has a bachelor's degree in safety and a master's degree in management from the University of Southern California. In 1991 he retired from the United States Army after almost 24 years of service. Dave is originally from Iowa, but his Army career took him to many places throughout the world. He and his wife Lynn have four children; Jennifer (who runs an association as well), Gregory, Christopher and Bethany. Dave is looking forward to working closely with all of us to continue improving the association as a whole.

The assistance for the publications department I referred to previously is the addition of Dr. William LaGrange as voluntary Scientific Editor for *Dairy, Food and Environmental Sanitation*. Bill will officially begin this position in January, though he has had an initial meeting with the IAMFES staff that he will be working most directly with. Bill has long been a strong supporter of IAMFES and *DFES*. He has expressed his confidence to me that we are sure to make a great team.

As I conclude, the sleet here is changing to snow. As I watch the soft, simple-looking flakes I am reminded of the diversity demonstrated in something so apparently similar. Of the millions of snowflakes that will fall, no two will be the same. Though many of our members have strong similarities, no two are exactly alike. Members can be easily categorized by their occupations, ages, interests, etcetera, but I want to know more than what demographic charts can tell us. Demographics are important, but I need the input only the members of IAMFES can give. I want to hear exactly what our members would like to gain from their membership in IAMFES. We would like to develop new features and sections in *DFES* that cater to the needs of our members. To effectively do this we need to know your likes and dislikes.

Bill and I have great expectations for our association with *Dairy, Food and Environmental Sanitation*. We challenge you to let us know your thoughts, ideas, opinions, and concerns. Write, fax or phone us! IAMFES has evolved over the years because of our members and the future is dependent on our ability to adapt to challenges we face together. Make your resolution today to let us hear from you.

Have a safe and happy New Year!

Carol Mouchka
Managing Editor

Dairy, Food and Environmental Sanitation, Vol. 16, No. 1, Pages 14-21

Evaluation of Microbial Hazards of Pork Products in Institutional Foodservice Settings–Part I

Nancy E. Brown, Ph.D., Associate Professor of Hotel, Restaurant, and Institution Management, Iowa State University, Ames, IA
Elsa A. Murano, Ph.D., Associate Professor of Animal Science, Texas A&M University, College Station, TX
Sharon Kotinek Marsh, Ph.D., Research Scientist, Schreiber Foods, Inc., Green Bay, WI

SUMMARY

Processing of breaded pork loin cutlets was followed from receipt of raw boneless Canadian back pork loins through service of the ready-to-eat product in three dining centers serving healthy, young adult clients. The objective was to determine compliance with federal time and temperature guidelines and to detect foodborne pathogens at selected stages of processing. Time and temperature data were collected at each point of primary activity and at the start and end of extended and temporary holding. Meat samples were collected at six points, and swab samples were taken of five surfaces. Three replications were completed for each dining center. Initial contamination of raw pork was below levels usually found in raw meat. *Clostridium perfringens*, *Yersinia enterocolitica*, and viruses were not detected in any samples; however, *Salmonella* spp. and *Staphylococcus* spp. were consistently found. Adequate refrigeration controlled the growth of these organisms. Swab samples of equipment and utensils yielded very low counts, indicating adequate cleaning procedures. Frying and baking of the breaded cutlets were effective in destroying practically all microbial contaminants. Final cooking should not be relied upon as the only means of microbial elimination.

INTRODUCTION

Outbreaks of foodborne illness that result in death bring the issue of food safety to the forefront. Incidents involving *Escherichia coli* O157:H7 in hamburgers sold by Jack in the Box restaurants in western Washington have sparked renewed efforts to avoid contamination of foods.

Of all confirmed foodborne disease outbreaks reported to the Centers for Disease Control from 1983 to 1987, 35% occurred in delicatessens, cafeterias, restaurants, and schools *(3)*. From 1973 to 1987, 7,458 reports of foodborne illness were recorded; etiology was confirmed in 38% of the outbreaks. Bacterial pathogens were responsible for 66% of these confirmed outbreaks *(2)*. More current data have not been published. Foodborne pathogens such as *Listeria monocytogenes*, *Yersinia enterocolitica*, *Campylobacter jejuni*, and *Escherichia coli* O157:H7 are receiving attention as they become recognized as causes of foodborne illness *(12)*.

Avoiding contamination of food and processing foods to destroy existing pathogens are important in all foodservice operations. Opportunities for introducing pathogenic microorganisms into food are numerous. Many conditions, procedures, and practices that might have an adverse effect on the safety and subsequent quality of food are common to all foodservice operations *(6)*. Time and temperature abuses create situations that allow survival and growth of microorganisms.

The objectives of this study were to determine compliance with federal time and temperature guidelines in handling breaded pork cutlet, and to detect foodborne pathogens in the product at selected stages of processing from the raw to the cooked state in an institutional setting.

MATERIALS AND METHODS

Selection Criteria

A foodservice operation was selected that prepared portion cuts from institutional cuts of meat and operated six dining centers. The institution served meals to healthy, young adult clients. Three replications in each of three dining centers were carried out over a 12-month period.

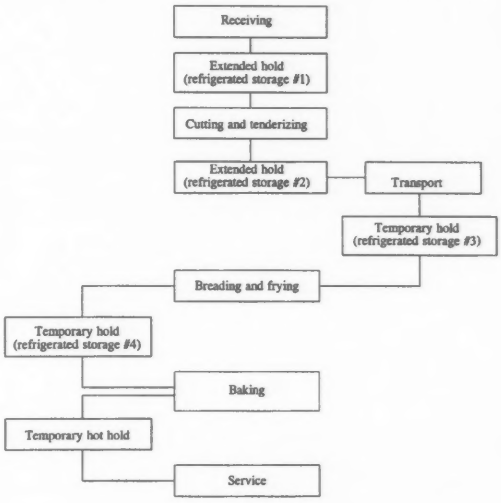
Breaded pork cutlet was selected for study. It was processed in the foodservice operation and there were multiple opportunities for introduction of contaminants. The cutlets were cut on the premises from boneless Canadian back pork loins (IMPS 414); tenderized by machine; dipped in seasoned flour, egg wash, and cracker crumbs; fried until golden brown; and baked at 121.1°C in a convection oven to an internal temperature of 71.1°C (45 to 60 min), according to the recipe. Bacterial pathogens were selected for enumeration or detection based on their likelihood of being present in this product and of causing foodborne illness.

Measurements

Handling of the pork product from receiving through service is shown in Figure 1. At each point of primary activity (such as receiving and cutting/tenderizing) and at the start and end of extended (more than 4 h) and temporary (less than 4 h) holding periods, time and temperature data were recorded. Product and ambient air temperatures were read using either a hand-held microprocessor digital thermometer with penetration probe (Omega, Stamford, CT) or a telethermometer with tubular pointed probe (YSI Co., Yellow Springs, OH). Mean product temperature at each point of primary activity usually was based on temperature readings of three different samples. A small, battery-operated, digital clock was used for monitoring time.

Triplicate samples of meat were taken for microbiological analysis at six points (upon receipt at delivery dock, after tenderizing, after transportation to a dining center, after breading and before frying, immediately before baking, and at the end of service). The samples were handled using sterile surgical gloves, placed into individual sterile bags (Whirl-Pak, Nasco, Fort Atkinson, WI), and sealed. Swab samples were taken of five food-preparation surfaces during use (knives, wooden cutting table, tenderizing machine, sheet pan before cooking, serving pan after service). These samples were collected in triplicate or sextet, depending upon the number of tests being performed, using sterile cotton swabs and sterile aluminum foil templates. Templates were used for the cutting boards and the pans (5 by 5 cm), and for the knives and tenderizer (3 by 3 cm). Each swab was placed in 9 ml of 0.1% (wt/vol) sterile peptone. At the end of breading, triplicate samples of the remaining egg wash were collected and placed in sterile tubes. All samples were placed in an ice transport chest, cooled to approximately 8°C, and taken immediately to the laboratory for microbiological analysis. Meat and swab samples were taken randomly during the sample point and analyzed within an hour after collection. Pork samples used for detection of viruses were frozen at -70°C and analyzed in batches.

Figure 1. Steps in the processing of pork cutlet



Enumeration/Detection of Bacterial Pathogens and Viruses

All meat and swab samples were examined for coliforms, *Escherichia coli*, *Staphylococcus aureus*, and *Salmonella* species. Additional microbiological analyses to determine the presence of *Clostridium perfringens*, *Listeria monocytogenes*, *Yersinia enterocolitica*, and viruses were done on meat samples taken when receiving the raw pork, after breading and before frying, and after serving. Swab samples from the wooden cutting table, knives, and serving pan also were analyzed.

Meat samples (30 g) were aseptically removed from plastic bags and placed into a sterile stomacher bag (Tekmar, Cincinnati, OH), and the sample was homogenized for 2 min in a laboratory blender (Stomacher 400, Tekmar, Cincinnati, OH). Samples were removed for microbiological examination by serially diluting in 0.1% (wt/vol) sterile peptone. Serial dilutions also were made from the swab samples and egg wash.

Total Coliforms and *Escherichia coli* O157. A three-tube most probable number (MPN) series was used. Meat samples were inoculated into lauryl sulfate tryptose (LST) broth

(Difco Laboratories, Detroit, MI). A ColiComplete (BioControl Systems, Inc., Bothwell, WA) disc *(1)* was added to each tube. Total coliforms were confirmed by the presence of a blue color on or surrounding the disc. Tubes showing a milky blue fluorescence under a UV light confirmed the presence of *E. coli*. Positive LST tubes were transferred to brilliant green lactose bile broth (BBL, Cockeysville, MD) and incubated for 48 h at 35°C. Samples that grew and formed gas were streaked onto MacConkey agar plates (Difco). A latex agglutination test (Oxoid, Hampshire, England) was used to test for the presence of the *E. coli* O157 antigen.

Staphylococcus aureus. A three-tube MPN series using trypticase soy broth (BBL) with 10% sodium chloride and 1% pyruvate was performed *(4)*. Growth was transferred to prepoured Baird-Parker agar plates (Difco) containing egg yolk tellurite enrichment (Difco) and incubated at 35°C for 48 h. Characteristic colonies were transferred to brain heart infusion broth (Difco), incubated at 35°C for 24 h, and tested for the presence of coagulase-positive colonies (Staph Latex Kit, Remel, Lenexa, KS).

***Salmonella* spp.** *Salmonella* species were enumerated using a three-tube MPN series with Selenite broth (Difco) *(9)*. Positive tubes were streaked onto xylose lysine deoxycholate plates (Difco) and incubated for 48 h at 35°C. Typical colonies were inoculated into brain heart infusion broth, incubated for 24 h at 35°C, and confirmed by the Salmonella-Tek ELISA test system (Organon Teknika Corp., Durham, NC).

Clostridium perfringens. The *Bacteriological Analytical Manual* method *(10)* for *C. perfringens* enumeration and identification was followed. Typical colonies in perfringens agar (Oxoid) with egg yolk emulsion (Difco) and an overlay of perfringens agar (Oxoid) without egg yolk emulsion (Difco) were transferred to thioglycollate broth (Difco) and cooked meat medium (Difco). Presumptive and confirmatory tests were done according to the *Bacteriological Analytical Manual* method. A reverse passive latex agglutination test (Oxoid) was used to determine the presence of *C. perfringens* enterotoxin.

Listeria monocytogenes. The USDA/FSIS method was used to isolate and identify *L. monocytogenes (15)*. Tubes of modified listeria enrichment broth base UVM formulation (Oxoid) were innoculated and incubated for 24 to 48 h at 30°C. Samples were transferred to Fraser broth (Difco) and incubated for 48 h at 35°C. Modified oxford agar (Oxoid) plates were streaked from the Fraser broth tubes. The plates were incubated for 48 h at 35°C. Typical colonies were transferred to brain heart infusion broth (Difco) and incubated for 24 h at 35°C. The presence of *Listeria* was confirmed by hemolysis on blood agar plates (Difco), oxidase test, tumbling motility, and Listeria-Tek ELISA (Organon Teknika Corp.).

Yersinia enterocolitica. *Y. enterocolitica* detection was by the method of Schiemann and Wauters *(17)*. Confirmation of positive samples included the use of lysine iron agar-arginine slant (Oxoid), Chrisman's urea slant (Difco), and Enterotube II (Roche Diagnostic System, Inc., Montclair, NJ).

Viruses. Four cell cultures were utilized in attempts to isolate viruses from meat samples: a human embryonal rhabdomyosarcoma, CL-136, WI-38; a human diploid lung, CCL-75, MDBK; a bovine kidney, CCL-22; and an African green monkey kidney, MA-104. All of the cell cultures are commercially available and were propagated in 25-cm² plastic cell culture bottles in Eagle's minimum essential medium (EMEM) supplemented with 0.1% lactalbumin hydrolysate, 5% to 10% fetal bovine serum (FBS), and antibiotics. The frozen meat samples were thawed, and 10-g aliquots were ground with sterile mortars and pestles, using sterile sand as an abrasive. Each tissue was titrated in sufficient EMEM to make a 20% suspension. The suspension was clarified by centrifugation, and the supernatant fluid was used to inoculate cell cultures. One milliliter of sample supernate was inoculated onto cell culture monolayers. After 1 h absorption, the inoculum was decanted, and 5.0 ml of maintenance medium (EMEM containing 2.0% FBS) was added. Cell cultures were observed daily for evidence of cytopathic effects (CPE). Cultures showing CPE were frozen, thawed, inoculated onto additional cell cultures, and observed for CPE.

Analysis of Data

Data analysis was carried out using Statistical Analysis System programs (version 5 ed., 1985, Cary, NC). Microbiological data were expressed as the most probable number (MPN) per gram of meat and per cm² for swab surfaces. Differences among dining centers were evaluated using the SAS general linear models analysis of variance.

RESULTS

Potentially hazardous foods should not be held between 5°C and 60°C for more than 4 h *(22)*. These temperatures identify the danger zone where rapid growth of bacteria occurs. Product and ambient air temperatures were evaluated using these guidelines.

Receiving. There were seven deliveries of boneless Canadian back pork loins; complete data were obtained from six. Five of the six shipments were of fresh meat. Elapsed time from docking of the delivery truck to placing boxes of pork loins in refrigerated storage was less than 30 min; differences reflected the number of pallets of meat being delivered and the time needed to verify the order (Table 1). This process did not involve handling the raw meat. Shipment size ranged from 397 kg to 637 kg (X = 515 kg) of boneless pork. Mean internal temperatures of loins at time of refrigeration were well within the recommended product temperature of 5°C or below for storage, and the large amount of meat helped to retain low temperatures. Mean temperatures were significantly different (P = 0.0023) for meat destined for the different dining centers.

Bacterial counts of the raw pork were below 500 organisms per g upon receipt at the loading dock (Table 2).

Table 1. Mean time[a] (± standard error) for each activity and mean temperature[a] (± standard error) of pork by dining center

	Dining center 1		Dining center 2		Dining center 3	
Activity	Mean time (h)	Mean temp (°C)	Mean time (h)	Mean temp (°C)	Mean time (h)	Mean temp (°C)
Receipt to storage	0.23 ± 0.06	2.2 ± 0.24	0.40 ± 0.14	0.1 ± 0.17	0.15[b]	-0.4[b]
Refrigerated storage #1	18.25 ± 1.38	2.6 ± 0.20	16.48 ± 0.76	3.9 ± 2.08	18.12[b]	-2.4[b]
Cutting/tenderizing	2.71 ± 0.14	6.3 ± 0.50	2.85 ± 0.22	6.8 ± 2.82	2.92[b]	-0.9[b]
Refrigerated storage #2	20.97 ± 0.12	2.5 ± 0.55	29.08 ± 14.11	2.4 ± 0.47	49.93 ± 0.99	1.9 ± 1.53
Transportation	1.28 ± 0.20	4.1 ± 0.32	0.63 ± 0.08	3.9 ± 1.42	0.05 ± 0.02	2.6 ± 0.00
Refrigerated storage #3, min	27.04 ± 0.08	2.8 ± 0.15	18.86 ± 3.84	3.5 ± 0.61	1.12 ± 0.97	3.1 ± 0.35
Breading/frying, min	0.15 ± 0.02	27.0 ± 3.95	1.33 ± 0.05	42.0 ± 4.70	0.57 ± 0.19	47.3 ± 2.36
Breading/frying, max	0.74 ± 0.22		1.33 ± 0.05		1.00[b]	
Refrigerated storage #4, min	2.28 ± 0.36	15.0 ± 2.42	2.01 ± 0.14	22.8 ± 2.44	0.71 ± 0.61	29.7 ± 6.09
Refrigerated storage #4, max	3.13 ± 0.66		3.44 ± 0.28		3.66 ± 0.21	
Baking time	0.72 ± 0.23		0.67 ± 0.17		0.70 ± 0.06	
Hot holding	0.96 ± 0.38		1.33 ± 0.32		0.93 ± 0.64	
End service		55.7 ± 9.06		53.7 ± 6.35		55.7 ± 7.11

[a] Mean of three replications in each dining center.

[b] Data are for one replication. Customer counts were low during two replications, frozen meat was used, and handling practices were atypical for these activities.

Table 2. Microbiological data for pork, egg wash, and food-contact surfaces in three dining centers

	Organism and MPN/g			
Item, sample, dining center	Total coliforms	*E. coli*	*S. aureus*[a]	*Salmonella* spp.[a]
Pork[b]				
Receiving				
Dining center 1	455	427	33 (+)	409 (-)
Dining center 2	428	101[c]	15[f](+)	158 (-)
Dining center 3	67[c]	7[d]	21 (+)	10[d](-)
End tenderization				
Dining center 1	154	121	382 (+)	329 (+)
Dining center 2	128	78	36 (+)	93[c](-)
Dining center 3	56[c]	4[d]	151 (+)	nd[e]
End transportation				
Dining center 1	467	10	122 (+)	331 (-)
Dining center 2	606	164	30 (+)	129[c](-)
Dining center 3	37	1[d]	154 (+)	nd
Before frying				
Dining center 1	542	146	133 (+)	293 (-)
Dining center 2	242	88	33 (+)	65[c](-)
Dining center 3	86[c]	29[d]	197 (+)	nd

Continued on next page

Meat for dining center 1 had the highest levels of total coliforms, *E. coli*, and *Salmonella* spp. of the three dining centers. The *Salmonella* spp. bacterial counts were not unexpected because *Salmonella* spp. are found in 3 to 20% of fresh pork *(19)*. Levels of *S. aureus*, a common food-handler contaminant reported to be at levels of 13 to 33% in fresh pork *(19)*, were below 35 organisms per g in all meat at time of delivery. *Listeria monocytogenes* was detected in only 1 sample of raw pork, destined for dining center 3. This represents 1 in 9 samples, or 11%, which approximates the reported incidence of 13% for this pathogen on fresh whole pork *(8)*. No *Listeria* spp. were found in any of the samples for the other dining centers or in samples obtained subsequently from dining center 3.

C. perfringens, *Y. enterocolitica*, and viruses were not detected in any of the samples at any step during processing.

Table 2 continued

Item, sample, dining center	Orgonism ond MPN/g			
	Totol coliforms	*E. coli*	*S. aureus*[a]	*Salmonella*[a] spp.
Before boking				
Dining center 1	nd	nd	21 (-)	nd
Dining center 2	19[d]	nd	16[c] (+)	5[d] (-)
Dining center 3	nd	nd	28 (+)	nd
End service				
Dining center 1	nd	nd	23 (-)	nd
Dining center 2	nd	nd	16 (+)	nd
Dining center 3	nd	nd	21[e] (+)	nd
Egg wosh[f]				
Breoding				
Dining center 1	55	17	58 (+)	28 (-)
Dining center 2	31	2	33 (+)	39 (-)
Dining center 3	14	5[c]	48 (+)	2[d] (+)
Surfoce				
Cutting boord[g]				
Dining center 1	2.5[c]	nd	21[c] (+)	1.9 (-)
Dining center 2	0.40[c]	0.16[c]	0.14[d] (+)	0.16[c] (-)
Dining center 3	0.56[c]	nd	0.88[c] (-)	nd
Knives[h]				
Dining center 1	8[c]	0.9[c]	3[d] (-)	2[c] (-)
Dining center 2	6[d]	3.5[d]	2.1[d] (+)	0.3[c] (-)
Dining center 3	2.3[c]	nd	3.1[c] (+)	nd
Tenderizing mochine[h]				
Dining center 1	1.2[d]	0.4[d]	0.6[e] (-)	1.7[d] (-)
Dining center 2	nd	nd	nd	nd
Dining center 3	0.8[c]	nd	0.7[c] (+)	nd
Pon (before boking)[g]				
Dining center 1	0.16[c]	0.16[c]	6[c] (+)	0.16[c] (-)
Dining center 2	nd	nd	nd	nd
Dining center 3	nd	nd	nd	nd
Serving pon[g]				
Dining center 1	nd	nd	nd	nd
Dining center 2	nd	nd	nd	nd
Dining center 3	nd	nd	nd	nd

[a]Confirmed presence (+) or obsence (-) of specific orgonisms in ot leost one of three replicotions.

[b]Determined by most proboble number method; minimum detection limit <3.0.

[c]One of three replicotions hod undetectoble counts.

[d]Two of three replicotions hod undetectoble counts.

[e]nd, not detectoble.

[f]Determined by most proboble number method; minimum detection limit <0.3.

[g]Determined by most proboble number method; minimum detection limit <0.12.

[h]Determined by most proboble number method; minimum detection limit <0.2.

Refrigerated Storage #1. The temperature of the central storage unit (refrigerated storage #1 and #2) typically fluctuated between 2.2°C and 6.7°C and reflected normal cycling of the refrigeration system (Table 3). Single temperatures taken directly over the stored meat were usually higher than the temperature recorded electronically.

After refrigerated storage of about 18 h, the mean internal temperature of the pork was slightly higher than at time of delivery (Table 1). The only exception was the shipment of thawed pork to dining center 3. On two occasions during the summer, frozen loins were used. They were removed from the freezer in late afternoon and thawed overnight in the cutting room with the blower turned on. Mean internal temperatures the following morning before refrigeration were 11.3°C and 9°C. These temperatures were within the danger zone; length of holding within that zone was unknown.

Cutting and Tenderizing. During the seven data collection sessions when the product was prepared for six dining centers (1,804 to 2,252 portions), the pork loins were out of refrigerated storage for just under 3 h. At the end of cutting and just prior to tenderizing, mean product temperatures were <5°C. On the two summer days when thawed loins were used, the processing loads were small (147 and 278 portions), and mean time out of refrigeration was 34 min. Product temperatures (12.2°C and 7.1°C), but not air temperatures (16.1°C and 19.8°C), were higher than during other times of year.

Mean ambient air temperatures during tenderizing were similar to those for cutting (18 to 19°C). After the cut pork had been tenderized, the lugs of meat holding from 120 to 250 portions were returned to refrigerated storage. Mean product temperatures had risen just above 5°C (Table 1). Mean product temperatures, 12.6°C and 11.2°C, were higher for the small batches of thawed loins sent to dining center 3; however, processing times were short during the summer when this occurred.

Table 3. Mean temperatures[a] (± standard deviation) of refrigerated storage and processing areas during various stages of processing, by dining center

	Temperatures (°C) Dining center			
Activity	1	2	3	P value
Refrigerated Ambient Air				
Begin storage #1 - continuous	3.9 ± 1.44	3.3 ± 0.00	3.3[b]	NS[c]
Begin storage #1 - one time	5.4 ± 1.95	3.6 ± 2.76	5.2[b]	NS
End storage #1 - continuous	4.2 ± 0.86	3.7 ± 1.27	4.2 ± 1.91	NS
End storage #1 - one time	2.4 ± 0.75	4.3 ± 2.45	0.5 ± 0.71	NS
Begin storage #2 - continuous	4.4 ± 1.10	3.3 ± 1.90	4.4 ± 1.10	NS
Begin storage #2 - one time	2.5 ± 1.48	3.5 ± 1.91	3.9 ± 2.35	NS
End storage #2 - continuous	4.3 ± 1.12	3.7 ± 0.64	3.0 ± 1.44	NS
End storage #2 - one time	3.9 ± 1.71	6.5 ± 2.85	2.6 ± 1.50	NS
Begin storage #3	6.4 ± 0.68	6.1 ± 0.25	7.8[b]	NS
End storage #3	2.2 ± 1.27	5.0 ± 1.88	3.6 ± 1.98	NS
Begin storage #4	6.3 ± 0.99	9.1 ± 1.42	8.0 ± 0.75	0.0517
End storage #4	6.1 ± 0.51	10.1 ± 0.46	5.0 ± 2.42	0.0116
Processing Ambient Air				
Cutting room	19.0 ± 0.69	18.9 ± 1.65	18.7 ± 2.26	NS
Tenderizing room	19.1 ± 0.36	18.9 ± 3.60	18.3 ± 2.12	NS
Kitchen–bread/fry	24.3 ± 0.96	27.2 ± 0.78	23.8 ± 2.35	NS
Kitchen– bake	21.7 ± 1.73	26.3 ±1.27	25.8 ± 2.23	0.0371

[a] Based on single temperature readings taken during three replications in each dining center.

[b]Data are for one replication. Frozen meat was used in two of three replications and handling practices were different.

[c]Not significant.

Bacterial counts after tenderizing did not exceed the initial levels of the delivered raw pork except in the bacterial counts of *S. aureus* (Table 2). The number of *S. aureus* in meat for dining center 1 significantly ($P < 0.05$) increased after tenderization. It is possible that the *S. aureus* present in the meat prior to cutting and tenderizing (3.3×10^1 cells per g) increased to the reported 3.82×10^2 organisms per g because the temperature of the meat (6.3°C) and both the cutting (19.0°C) and tenderizing (19.1°C) rooms were within the temperature danger zone. The time (2.7 h) at these temperatures would have allowed for the increase in *S. aureus*. *S. aureus* counts from the surface of the tenderizer, cutting boards, and knives ranged from 0.6 to 21 cells per cm^2. Because the equipment showed a low amount of contamination by this pathogen, it is also possible that the organism was introduced by a foodhandler. *S. aureus* is commonly found in the throat, hair, feces, and on the skin of 40% of all humans *(20)*. Staphylococcal outbreaks usually result from contamination through handling with unsanitized hands *(5)*.

Refrigerated Storage #2. Mean storage time was about 21 h when pork was transported to the dining center the day after it was cut and tenderized. Mean time was 49 h when delivery was made on the day it was to be cooked and served in the dining center. Mean product temperatures were <5°C just before the pork was removed from the central storage unit (Table 1).

Transportation. Lugs of pork cutlets and other food products were transported in an unrefrigerated truck to two of the three dining centers. Products delivered on the second trip (dining center 1) were held out of refrigeration longer (1 to 1.5 h) than those that were delivered on the first trip of the day to dining center 2 (33 to 42 min). Lugs of meat transported one floor within the same building to dining center 3 were out of refrigerated storage for only 2 to 4 min. Mean product temperatures had risen but were <5°C when the pork was placed under refrigeration at the dining center (Table 1). Mean ambient air temperatures of refrigerated storage areas (6.1 to 7.8°C) reflected the recent opening of these areas to store products that had been delivered (Table 3).

Total coliform counts increased in meat in dining centers 1 (4.67×10^2 cells per g) and 2 (6.06×10^2 cells per g), which might be attributed to the time held out of refrigeration. The increase was not significant ($P > 0.05$) when compared to total coliform counts at the end of tenderization (Table 2).

Refrigerated Storage #3. Length of refrigerated storage in the dining center before breading and frying of the cutlets depended on the timing of delivery relative to the day of service. Mean minimum storage times varied from 1 to 27 h, but mean product temperatures were 3.5°C or less in all dining centers (Table 1).

Breading and Deep Frying. The breading and frying operations were done simultaneously. In dining centers 2 and 3, a storage cart was filled with pans of fried cutlets and then taken to refrigerated storage. In dining center 1, each pan of fried cutlets was carried to a cart stored in

the refrigerator. Temperatures of cutlets in random locations within the storage cart were taken after a cart was filled. Consequently, most fried cutlets in dining center 1 had been under refrigeration at least a short period of time when temperatures were taken, whereas the fried cutlets were held at room temperature in the other dining centers. All temperatures were within the danger zone (Table 1). Mean product temperatures in the dining centers were 27°C or above; differences among dining centers were significant ($P = 0.0015$).

Total coliform, *E. coli*, *S. aureus*, and *Salmonella* spp. bacterial counts in the meat product after breading and prior to frying were not significantly ($P > 0.05$) different from bacterial counts in the meat product during cold storage. The egg wash used in the breading process may have contributed to some of the microbial load of the pork product (Table 2).

Refrigerated Storage #4. The length of refrigerated storage after frying varied by dining center, with mean minimum storage times ranging from about 45 min (dining center 3) to over 2 h (dining center 1). Ambient air temperatures taken shortly before the first pans were removed from refrigerated storage were all 5°C or above (Table 2). Mean temperatures of pork when removed from refrigeration for baking had declined as much as 19°C from initial storage temperatures but were still within the danger zone. Differences in product temperature among dining centers were significant ($P = 0.01240$) and were related to differences in mean product temperatures when first refrigerated (Table 1).

Baking. The designated convection oven setting was 121.1°C; actual temperature settings ranged from 121.1°C to 148.9°C. Baking times for various batches ranged from 22 to 73 min, but mean times (40 to 43 min) were similar for the three dining centers (Table 1).

Bacterial counts at the beginning of oven cooking were low. Detectable counts in dining centers 1, 2, and 3 were predominantly associated with *S. aureus* (Table 2). Results from the surface of the pan, prior to oven cooking, indicate that the pan surface in dining center 1 may have contributed to the *S. aureus* population in the meat product.

Service. In all dining centers, some pans of product were taken directly from the oven to the cafeteria serving line. When the product was held, mean holding time was almost an hour in dining centers 1 and 3 and about 20 min longer in dining center 2. Mean product temperatures at the end of service were slightly below 60°C, the upper limit of the danger zone (Table 1).

S. aureus was the only detectable pathogen found at the end of service with counts of ≤ 23 cells per g. Baking times at 121.1°C or above were adequate (Table 1) and surface swabs from the serving pan did not give detectable bacterial counts. *S. aureus* may have been introduced by workers and their utensils during transfer of product from baking pans to serving pans or during service. Our findings illustrate the resilience of *S. aureus* and show the efficacy of proper storage and cooking temperature in slowing the growth of this organism.

DISCUSSION

The pork obtained by the dining centers in this study was of good microbial quality and had been effectively chilled. The microbial load of the raw pork was at levels below those usually found in raw meat *(18)*, a condition directly linked to good manufacturing practices during slaughter, particularly in the evisceration and subsequent processing into primal cuts *(16)*.

The data indicate cleaning procedures were adequate. Few organisms were detected in swabs taken from pans prior to baking; no organisms were detected on pans at the end of service. Bacterial contamination of food-contact surfaces is a common occurrence, with most studies showing that microorganisms are capable of colonizing glass, polypropylene, and stainless steel *(13, 14, 21)*. Resistance of bacteria to removal with sanitizers is least in stainless steel, which supports our findings of low contaminants on the surfaces made of this material *(11)*.

Frying and baking were effective in destroying microbial contaminants in the product, even though there was evidence of temperature abuse of the cutlets during refrigerated storage before baking, and mean product temperatures were below 60°C at the end of service.

IMPLICATIONS

We have shown that proper storage, transportation, handling, and cooking are essential to maintain the safety of perishable meat products like pork cutlet. Proper cooking was the most crucial step for preventing foodborne illness, because contaminants that were introduced during processing and storage were destroyed at this step. Leaving cooked foods at room temperature was the most important factor (56% of the outbreaks) and inadequate cooking the least important factor (4% of the outbreaks) contributing to outbreaks of foodborne illness from foods prepared in foodservice establishments from 1973 to 1982 *(7)*. It is evident from our results that, even though cooking effectively eliminated most contaminants from the product, overreliance on this last step as the only means of microbial elimination would be a mistake. Failure to follow federal guidelines for time and temperature could result in a hazard to the consumer, especially if the holding temperature following the cooking step is below 60°C.

The hazard analysis critical control point (HACCP) system is a program of monitoring and modifying procedures that is recommended for application to food-preparation operations. The data from this study will be combined with on-site observations to identify critical control points for the processing of pork cutlet, to determine appropriate control measures, and to define criteria to ensure product safety. Additional studies may evaluate each preparation step as a factor contributing to microbial

growth by purposely violating recommended practices. The role of the food handler in introducing contaminants during processing and the effect of industrial sanitizers on the prevalence of microorganisms such as *E. coli* O157:H7 in foods of animal origin during preparation in the kitchen are potential studies of value.

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Evaluation of Microbial Hazards of Pork Products in Institutional Foodservice Settings—Part II

Nancy E. Brawn, Ph.D., Assaciate Prafessar af Hatel, Restaurant, and Institution Management, Iawa State University, Ames, IA
Elsa A. Murana, Ph.D., Assaciate Prafessar of Animal Science, Texas A&M University, College Station, TX
Sharan Katinek Marsh, Ph.D., Research Scientist, Schreiber Foads, Inc., Green Bay, WI

SUMMARY

Evaluation of microbial hazards of four types of pork products (pork chops, pork patties, pork loaf, and pork roast) took place in three separate nursing-home or long-term care facilities. Assessments included detection and enumeration of bacterial pathogens in meat samples at selected control points and swab samples of food-contact surfaces; temperature of pork products at each control point and time involved at each stage of storage or processing; and observation of storage conditions and food-handling practices. No *Clostridium perfringens*, *Listeria monocytogenes*, *Yersinia enterocolitica*, or *Escherichia coli* O157 were detected in any of the meat samples. Total coliforms, *E. coli*, and *Staphylococcus aureus* were present initially in pork samples from all three facilities. At the end of serving, no pathogenic bacteria could be detected, indicating that protocols used in cooking were adequate to destroy most contaminants. Microbial counts on food-contact surfaces such as holding pans were too low to be detected. Product temperatures indicated generally good compliance with federal guidelines.

INTRODUCTION

Avoiding contamination of food and processing foods to destroy existing pathogens are important in all foodservice operations. These measures are especially critical in institutions providing meals to populations that are most susceptible to infections by foodborne pathogens, such as the young, the old, and the immunocompromised *(3)*.

Part I of a two-part study of prevalence of microbial hazards in foodservice facilities was conducted in three kitchens within a single large operation serving healthy young adults *(1)*. The present study examined the prevalence of hazards in pork products in three separate nursing-home or long-term care settings serving elderly and immunocompromised persons.

MATERIALS AND METHODS

Selection Criteria

Three nursing-home or long-term care facilities located in central Iowa and having at least 50 beds were invited to participate in this study. After approvals from the foodservice director and facility administrator were obtained, each facility was visited. Menus were reviewed, and production procedures for each pork product on the menus were identified. Pork products at each institution were selected on the basis of high frequency of appearance on the cycle menu, handling procedures, and availability of people to collect and process samples at the time the item was scheduled for preparation. Two products were selected at each facility; data were collected only once on each product. Products included pork chops, pork patties, pork loaf, and pork roast.

Measurements

The handling of pork varied by type of product and facility. Consequently, the number of pork samples and collection points varied somewhat with each facility. The general pattern was to collect triplicate

Table 1. Microbiological data on six pork products at selected stages of preparation

Facility, product, sample	Organism and MPN/g[a]			
	Total coliforms	*E. coli*	*S. aureus*[b]	*Salmonella*[b]
Facility #1, pork chop				
Thawed chop[c]	6	6	30 (+)	6 (-)
End browning	7	7	23 (+)	6 (-)
End service	nd[d]	nd	nd	nd
Facility #1, pork patty				
Delivery[c]	3	4	36 (+)	nd
End overnight refrigeration[c]	5	5	23 (+)	18 (-)
End browning	10	10	16 (+)	4 (-)
End service	nd	nd	36 (-)	nd
Facility #2, pork loaf				
Thawed ground pork[c]	497	86	40 (+)	497 (-)
End mixing[c]	1,100	373	53 (+)	551 (-)
End overnight refrigeration[c]	527	47	23 (+)	600 (-)
End service (slices)	nd	nd	nd	nd
End service (purée)	nd	nd	nd	nd
Facility #2, roast pork				
Thawed roast[c]	887	887	23 (+)	76 (-)
End overnight refrigeration	nd	nd	nd	nd
End slicing	57	nd	23 (+)	nd
End overnight refrigeration	nd	nd	23 (+)	10 (-)
End service (slices)	nd	nd	nd	nd
End service (purée)	nd	nd	nd	nd
Facility #3, roast pork (precooked)				
Thawed roast	nd	nd	18 (+)	nd
End slicing	nd	nd	20 (+)	nd
End service (slices)	nd	nd	20 (+)	nd
End service (purée)	nd	nd	nd	nd
Facility #3, pork chop				
Thawed chop[c]	nd	nd	nd	nd
Browned chop	nd	nd	nd	nd
End service (chops)	nd	nd	nd	nd
End service (purée)	nd	nd	nd	nd

[a]Determined by most probable number method; minimum detection limit <3.

[b]Confirmed presence (+) or absence (-) of the specific organism.

[c]Uncooked pork.

[d]nd, not detectable.

samples of meat for microbiological analysis upon delivery of fresh product or after thawing of frozen product; after initial processing such as slicing, mixing, or browning; after overnight storage if that step was included; and at the end of service. After the first set of data were collected (in facility #1), samples of cooked ground or puréed pork were collected at the conclusion of service. Handling involved in the grinding or puréeing process justified including the final product in the data-collection schedule.

Triplicate swab samples were taken for microbiological analysis of selected surfaces. These included holding pans, slicer blades, serving utensils, and service pans. Blender or grinder blades used in puréeing or grinding pork were added after data collection began.

The temperature of the product was recorded each time a sample of meat was collected. A hand-held microprocessor digital thermometer with penetration probe (Omega, Stamford, CT) was used. The time involved in each primary step in handling, holding, or storage also was recorded. The procedures followed those described for Part I of the study *(1)*. Observations of storage conditions and food-handling practices were recorded.

Enumeration/Detection of Bacterial Pathogens

Standard methods were used to collect and analyze meat and swab samples for the presence of total coliforms, *Escherichia coli* (including O157), *Staphylococcus aureus*, and *Salmonella* spp. as described in Part I of the study *(1)*. Meat samples also were analyzed for presence of *Clostridium perfringens*, *Listeria monocytogenes*, and *Yersinia enterocolitica*. These were the same organisms included in Part I of the study; detection of viruses was dropped from Part II. Details of these procedures were described earlier *(1)*.

Analysis of Data

Data from each product are reported separately. Microbiological data are expressed as the most probable number (MPN) per gram of meat and per cm^2 for surface swabs. Minimum detection limit was <3 organisms per g of meat. Minimum detection limit of organisms on food contact surfaces varied depending on size of surface area swabbed.

RESULTS AND DISCUSSION

Pork chops served in facilities #1 and #3 were received frozen, thawed under refrigeration, browned, and then cooked in the oven. The pork patties in facility #1 were received fresh, refrigerated, then browned and cooked with sauce, and served. The pork loaf in facility #2 originated as frozen ground pork that was thawed under refrigeration, mixed with ingredients and shaped, refrigerated overnight, cooked, and cut into servings. The pork roast in this same facility was purchased frozen, thawed under refrigeration, cooked in a steam-jacketed kettle in water, refrigerated overnight, sliced, refrigerated overnight, and then heated and served. In facility #3, the roasts were purchased precooked. They were thawed under refrigeration and then at room temperature or under running water, sliced, and heated before service.

Microbial Hazards in Meat

No *C. perfringens*, *L. monocytogenes*, *Y. enterocolitica*, or *E. coli* O157 was detected in any of the meat samples. The level of contaminants found on each of the six products evaluated is shown in Table 1.

Products in facility #2 showed the highest number of total coliforms on the uncooked product, indicating possible fecal contamination. Numbers reached almost 900 organisms per g in the thawed pork roast, which was in its original plastic wrap. Handling of meat also increased the number of organisms. For example, mixing the pork loaf caused a doubling of coliforms from about 500 to 1,100 organisms per g. Immediate cooking and refrigeration of the roast and immediate refrigeration of the uncooked pork loaf caused a sharp decrease in numbers. Pork products received by the other two facilities showed very low coliform counts, pointing to the fact that the microbial quality of meat can vary greatly, depending on where it is obtained.

Pork was obtained from three different suppliers. Frozen pork in facilities #1 and #3 was obtained from the same source. Facility #2 obtained frozen pork from a second supplier. Fresh pork for facility #1 was obtained from a third source. How the pork products were handled prior to delivery at the facilities was not known. Proper refrigeration can be an effective means to inhibit growth of the majority of contaminants.

The number of *S. aureus* contaminants in pork products was similar in all facilities. With one exception, counts ranged from 18 to 40 organisms per g upon receipt or after thawing under refrigeration. This initial level did not decrease substantially until after the products were cooked and served. This indicates both the ease with which this pathogen is introduced into meat products and the difficulty in removing it.

Samples suspected of containing salmonellae were confirmed negative for this pathogen. It is possible that these isolates, presumptive positives for *Salmonella* spp., were actually other organisms belonging to the family *Enterobacteriacea*, such as *Enterobacter* spp., *Citrobacter* spp., etc., some of which are not foodborne pathogens.

Swab Samples of Food Contact Surfaces

The number of contaminants on food contact surfaces was too low to be detected, indicating cleaning procedures were adequate. Low counts had been found earlier in a large institution *(1)*.

Time/Temperature Relationships

As shown in Table 2, most temperatures were maintained at <5°C or >60°C, the temperatures proposed as federal standards *(4)*. The most unsettling finding was that the cooked pork roasts in facility #2 had not reached 5°C or below after 20 hours under refrigeration. Improper cooling of food was the most common factor (43.7% of occurrences) contributing to outbreaks of foodborne

Table 2. Time and temperature data on six pork products at end of selected stages of preparation

Facility, product, pracedure	Time (hours)	Temperature (°C)[a]
Focility #1, pork chop		
Starage in freezer[b]	97.8	
Thawing under refrigeratian[b]	20.4	2.6
Browning	1.6	62.0
Halding in convectian aven, 93.3°C	0.2 - 0.4	
Cooking in convection oven, 176.7°C	1.5 - 2.0	
Service	0.8 - 1.4	65.8
Focility #1, pork potty		
Receiving[b]		3.4
Starage under refrigeratian[b]	18.9	2.6
Brawning	0.4	65.0
Holding at room temp	0.1 - 0.4	
Caaking in aven, 176.7°C	1.3 - 1.8	
Service	1.5	63.9
Focility #2, pork loof		
Thawing under refrigerotion[b]	71.8	3.0
Mixing[b]	0.4	7.6
Storoge under refrigeration[b]	24.8	3.3
Molding looves[b]	0.1/pon	
Caaking in convection oven, 148.9°/135°C	1.5 - 2.0	
Halding in oven, 121.1°C	0.1 - 1.8	
Service (slices)	0.5 - 1.0	91.2
Service (purée)	0.5 - 1.1	62.7
Facility #2, roast park		
Storoge in freezer[b]	146.5	
Thawing under refrigeration[b]	45.2	0.4
Caaking in steom-jocketed kettle	3.4	
Caaking in convection oven, 176.7 °C	3.5 - 4.0	
Starage under refrigeratian	20.0 - 20.4	5.5
Slicing meat	0.6	5.8
Grinding meat	0.9	7.8
Starage under refrigeratian	26.6	4.3
Heating in canventian oven, 176.7°C	0.9 - 2.1	
Puréeing	0.2	
Heating purée in steamer	1.5	
Service (slices)	0.2 - 0.7	85.5
Service (purée)	0.9	71.5
Facility #3, roost pork (precooked)		
Thawing under refrigeratian	41.6 - 42.9	
Thawing at raam temperature	1.5	-4.4
Slicing meat	0.3	1.4
Grinding/puréeing meat	0.3	
Heating in conventional aven, 204.4°C	2.5 slices; 1.2 purée	
Service (slices)	1.0	70.8
Service (purée)	2.1	55.9
Facility #3, pork chap		
Storoge in freezer[b]	66.1	
Browning	0.8	50.9
Caaking in conventionol oven, 232.2°C	1.6 chop; 0.7 purée	
Grinding/puréeing meot	0.2	
Halding/service (chops)	1.5	55.9
Halding/service (purée)	3.2	51.2

[a] Product temperotures were recarded anly when meat samples were collected.

[b] Uncaaked pork.

illness during 1961-1982 *(2)*. It is possible the roasts were within the danger zone for much longer than 4 hours, although it cannot be said with certainty because temperature was not monitored throughout. The slight rise in temperature during the short period needed to slice or grind the pork did not add appreciably to temperature abuse. In facility #3, thawing under refrigeration was either eliminated (as for the pork chops) or inadequate for further processing (as for the precooked pork roasts). Browning was insufficient to bring frozen chops to 60°C but they were cooked further in the oven. The time within the danger zone was short and was part of continuous processing of the product. Continued thawing at room temperature or under cold running water was required before slicing of roasts could take place. Although temperatures were below 5°C even after slicing, allowing additional time for thawing roasts under refrigeration would remove the need to thaw at room temperature or the added effort to thaw under running water.

Product temperatures at the end of service were at least 60°C in facilities #1 and #2. Only the sliced pork met temperature compliance in facility #3. Extended hot holding of 2 to 3 hours on the steam table of the puréed product and the low temperature at end of service raise questions about handling of puréed product in facility #3. Steam tables are not designed to bring products up to temperature, only to maintain temperature. Improper hot holding was identified as a contributory factor in 13.3% of outbreaks of foodborne illness during 1961-1982 *(2)*.

When compared to a similar study in a large institution *(1)*, one critical control point, transportation, was not applicable in the nursing-home or long-term care facilities. With the exception of facility #2, more continuous processing of pork products was observed in these facilities than in the large institution. The small number of servings prepared when compared to a large institution contributed to this scheduling difference. Continuous processing of meat reduces the opportunity for temperature abuse and is the preferred procedure to follow. Holding of cooked pork before and during service for periods of one or more hours was not unusual in either type of operation. When product temperature is maintained at 60°C or higher, food safety is not a problem, but aesthetic aspects of the product can be adversely affected.

Conditions and Food Handling Practices

Conditions for storing meat varied among the three facilities. Freezer storage seemed to be adequate in all three facilities; overcrowding was not observed. However, refrigerated storage in facilities #1 and #2 was at a premium, and air circulation around food would be restricted by the quantities of food held under refrigeration. When a large quantity of hot food, such as cooked pork roasts in facility #2, is stored in a crowded refrigerator, the ability of the machinery to reduce food temperatures to a safe level within 4 hours is questionable. Mean ambient air temperature of the refrigerated storage unit in facility #2 was higher (4.5°C) at end of a storage period than in facility #1 (2.5°C) or #3 (1.8°C). Once the pork was removed from storage, further processing was done in ambient air temperatures of 23.3°C, 20.0°C, and 22.4°C in facilities #1, #2, and #3, respectively.

Thawing of food in two facilities was done completely under refrigeration. The meat remained in its original packaging and was not touched during the thawing process. In facility #3, initial thawing of precooked pork roast was done under refrigeration, but sufficient time was not available between delivery and use for the process to be completed. Final thawing was done at room temperature (two roasts for approximately 1.5 hours) or under cold running water (one roast for approximately 0.75 hour). Thawing was done in the original packaging and was followed immediately by slicing and heating.

Employees at all three facilities seemed to be cognizant of the importance of maintaining a clean kitchen. Work surfaces were wiped regularly with a cleaning cloth; however, thorough washing was observed infrequently. This cleaning may have been done at the end of the work shift when researchers were not present. Sanitizing of equipment surfaces before use was observed only in facility #2.

Thermometers were used in all facilities to check product temperatures. Handling of the thermometers after use raised some food safety concerns. Thermometers were left on the counter and reused later, were rinsed off in running water, or were wiped with a cloth that had been used to clean other surfaces. Thorough washing was not observed. One cook in facility #1 sanitized the thermometer in boiling water.

The most common practices for handling meat were to use gloved hands or to use utensils. Handwashing in the kitchen was observed infrequently.

SUMMARY

Foodborne pathogens present in pork entering an institutional foodservice operation, as well as pathogens added as the product is handled on the premises, can contribute to the incidence of foodborne illness. Critical control points for pork products in the three nursing home or long-term care facilities included freezer or refrigerator storage, thawing, handling (such as mixing or slicing), cooking, hot holding, and serving. Total coliforms, *E. coli*, and *S. aureus* were present initially in pork samples from all three facilities, with the products from facility #2 having the highest level of contamination. At the end of serving, no pathogenic bacteria could be detected in the pork products or on surfaces such as holding pans from any of the facilities.

Effective protocols included maintaining pork temperature under refrigeration at 5°C or less, thawing pork in its original wrapping under refrigeration, handling meat with

clean utensils or gloved hands, and cooking to internal temperatures of at least 60°C and maintaining that temperature during hot holding and service. Additional precautions could be taken. Continuous processing of pork rather than extending preparation over several days, rapid cooling of large quantities of pork, reducing the length of time pork is held hot during service, checking product temperature during service, and using sanitizers in the cleaning of food contact surfaces are procedures that would enhance food safety. Although this was a small sample of institutions and of pork products, the results probably are typical of what one would find in other similar establishments where a conscientious effort is made to serve safe food.

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Dairy, Food and Environmental Sanitation, Vol. 16, No. 1, Pages 28-31

Canada's Food Inspection System—Do We Need Federal, Provincial and Municipal Food Inspectorates?

Mark Mitchell[1] and Rena Hubers[2]
Ontario Ministry of Agriculture, Food and Rural Affairs,
[1]Agricultural and Food Laboratory Services Branch,
[2]Policy and Program Coordination Branch, Guelph, Ontario, Canada

SUMMARY

Canada's food inspection system is respected worldwide for producing safe, high quality foods and in this regard it may be considered a success. However, the system operates in a very complex jurisdictional web involving the federal, provincial and municipal levels of government and their regulatory branches. Such a system has resulted in duplications and gaps in inspection activities, adverse reactions from industry, consumer confusion, poor intergovernmental collaboration and increasing expenses. This report provides a brief overview of the current food inspection system in Canada and recommends that significant changes be considered. The work of a joint steering committee (Federal/Provincial/Agri-Food Inspection Committee and the Federal/Provincial/Territorial Food Safety Committee), which was recently formed, is highlighted and their proposal that a "Canadian Food Inspection System" be developed is strongly recommended. Such a system will benefit all parties involved through streamlined inspection delivery; enhanced market performance and competitiveness; reduced barriers to trade and regulatory pressures on the industry; facilitation of the food standards harmonization process; a food inspection system with the capacity to be flexible, responsive and timely; accessibility to consumers; and increased intergovernmental collaborations.

INTRODUCTION

Canada's food supply is internationally recognized as being safe, wholesome, and of high quality. A major reason for this reputation is the success of our food inspection system. Food inspection systems refer to all activities relating to food safety and economic fraud prevention, such as education, observation, enquiry, laboratory testing, and enforcement of the law.

Essentially, the agricultural sector was declared a shared legislative jurisdiction in the Canadian Constitution of 1867 *(2)*. Since then, food inspection has evolved into a very complex system involving federal, provincial, and municipal levels of government with responsibilities divided between Agriculture, Fisheries, Health, Environment, Natural Resources, and other regulatory organizations *(5, 6)*. Although inspections are conducted at the farm, processing plants, border entries, and retail outlets by different levels under their respective jurisdictions and statutes, no common federal-provincial safety standards for inspection exist. As a consequence there are duplications and gaps in inspection activities, poor intergovernmental communication, layering of costs and unfavorable reactions from the industry and consumers.

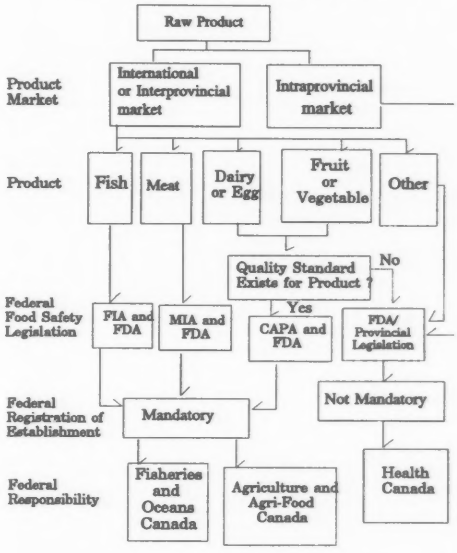
In response to industry pressure, increasing consumer safety concerns, shrinking budgets, international trade agreements, developments in biotechnology, and the changing demographics, dietary needs and ethnic makeup of Canada, governments are now placing a priority on reviewing the current inspection programs with a view to increasing efficiency in system design and delivery. In this con-

text, a joint steering committee consisting of the Federal/Provincial/Agri-Food Inspection Committee (FPAFIC) and the Federal/Provincial/Territorial Food Safety Committee (FPTFSC) was formed in 1993 to develop a "Canadian Food Inspection System" which would be based on the scientific assessment of risks to health and safety, responsive consumer information, the efficient use of resources, a commonality of approaches to issues, complementary and/or universal legislation and regulations, and the rationalization of services *(5, 6)*.

To answer the question of whether Canada requires federal, provincial and municipal food inspectorates, it is necessary to first understand the current system. Although many details are quite complex and beyond the general scope of this report, a general outline will be presented.

Figure 1.

The Canadian Food Safety System



The Role of the Federal Government

Essentially, the regulation of food products crossing provincial boundaries (interprovincial trade) as well as all exports and imports of foods fall under federal jurisdiction. The federal government has legislation under the Departments of Health, Agriculture and Agri-Food, Fisheries and Oceans, and Revenue Canada-Customs that relates to food inspections *(1, 3, 6)*. The food inspection activities of these four departments are covered in five federal food legislation acts:

1. Food and Drugs Act (FDA), Health Canada (HC)
2. Consumer Packaging and Labelling Act (Food Portion), Agriculture and Agri-Food Canada (AAFC)
3. Fish Inspection Act (FIA), Fisheries and Oceans Canada (DFO)
4. Meat Inspection Act (MIA), (AAFC)
5. Canada Agricultural Products Act (CAPA), (AAFC)

HC has absolute primacy for all health, safety, nutritional, and fraud prevention aspects of foods imported or offered for sale in Canada by virtue of the Food and Drugs Act and Regulations. They must protect the health and safety of all Canadians. To meet these requirements, HC recruits the assistance of various federal and provincial departments. Enforcement of this act is provided for in criminal law. The major governing principles of the Food and Drugs Act include:

- Prohibiting the sale of foods that contain poisonous or harmful substances, are unfit for human consumption, are adulterated or were manufactured or stored under unsanitary conditions.
- Providing for inspection of sanitary conditions in manufacturing or processing plants.
- Regulating drugs and chemicals for use in food-producing animals.
- Approving additives and ingredients for use in specific foods and determining allowable levels.
- Providing composition standards for some food products.
- Providing for labelling of contents of food packages.

In addition to setting food safety standards, HC is required to audit the inspection programs of the federal government to ensure that inspections are conducted in accordance with their standards. Currently there are 3,900 federally registered food-processing plants in Canada *(3)*.

AAFC and DFO share the food safety responsibilities with HC, and further regulate the marketability (e.g., quality, grade, safety) of foods traded interprovincially, internationally or imported. Under the Meat Inspection Act, Fish Inspection Act and the Canada Agricultural Products Act, all meat, fish, dairy, egg, fruit, vegetable, maple and honey products produced by federally registered plants must be inspected and graded by a federal inspector. AAFC also has overall responsibility for the fraud and labelling provisions of the Food and Drugs Act at other than the retail level.

AAFC is responsible for the labelling standards (e.g., nomenclature, net quantities, bilingualism) of all prepackaged foods imported or sold in Canada under the Consumer Packaging and Labelling Act. It is also responsible for the fraud and labelling provisions of the Food and Drugs Act at the retail or consumer level. Revenue Canada-Customs plays a significant role by notifying federal departments of shipments and enforcing import regulations at ports of entry.

In some cases, commodities do not have standards for quality and composition listed in any of the federal acts (e.g., chocolate, baby cereal and fruit drinks) under AAFC or DFO and are not inspected by these departments. Such commodities are inspected by HC under the Food and Drugs Act. See Figure 1 for an overview of the federal and provincial governments' food inspection system *(3)*.

The Role of the Provincial Government

Each province has jurisdiction over products produced and sold within that province (intraprovincial trade). Therefore, food processing establishments that sell only within one province are only required to obtain provincial registration. Currently there are 4,500 provincially registered establishments in Canada *(3)*. In the past, the provinces have had a specific interest in the food service and retail sectors, as well as meat and dairy production and processing.

What the provinces do in the area of food inspection varies greatly from province to province *(3, 5, 6)*. However, most provinces have adopted federal standards by reference in their statutes and regulations, and in many cases, both federal and provincial inspectors may be cross-appointed to carry out each others' responsibilities if necessary *(6)*. For example, in Quebec food inspection is the responsibility of one agency (Ministry of Agriculture, Fisheries and Food) which will soon be legislating under one food act. This Ministry's power of inspection and confiscation has been extended to every product physically within the province regardless of origin. In British Columbia, the province contracts federal services for all inspections and references standards by legislation. Manitoba, Saskatchewan and the Maritimes have split food inspection duties between the federal and provincial governments. Due to the variability and complexity of the different legislations found in each province, this report will focus further on Ontario as an example.

Ontario provides inspection services, to varying degrees, for farm production and processing of livestock, eggs, dairy products, tobacco, maple syrup, edible oils, margarine, fruit and vegetables to ensure safety and quality. Food inspection legislation in Ontario primarily involves the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA); however, the Ontario Ministry of Health (OMH), and the Ontario Ministry of Natural Resources (OMNR) also have a role. In total, nine acts are covered by these ministries which specifically relate to food inspection *(4, 7)*. These include:

1. Farm Products Sales and Grades Act, (OMAFRA)
2. Milk Act, (OMAFRA)
3. Meat Inspection Act, (Ontario) (OMAFRA)
4. Livestock and Livestock Products Act, (OMAFRA)
5. Dead Animal Disposal Act, (OMAFRA)
6. Oleomargarine Act, (OMAFRA)
7. Edible Oil Products Act, (OMAFRA)
8. Health Protection and Promotion Act, (OMH)
9. Fish Inspection Act, (Ontario), (OMNR)

The main purpose of the Farm Products Sales and Grades Act is to ensure the quality, safety and grading of a wide range of Ontario products such as animals, animal products, fruit, fruit products, vegetables, vegetable products, grain, honey, maple syrup, seeds, tobacco, wood, and Christmas trees. This act provides for inspection of farm products, licensing of farm product dealers and operators of controlled-atmosphere storage plants, establishment of grades and standards, (generally the province has adopted federal grades and standards under the Canada Agricultural Products Act where they exist), and control of packaging, buying, selling, advertising, handling, shipping, and transportation of farm products to ensure maximum quality.

The Milk Act assures the quality, safety and grading of cows' and goats' milk as well as milk products such as cheese, cream, butter and ice cream through regulations, inspection, licensing and testing of products. As with the Farm Products Sales and Grades Act the province has adopted reference grades and standards set out under the federal Canada Agricultural Products Act. Inspectors monitor milk production at all stages, from the farm to the processing plant, inspecting all equipment and vehicles used to produce, process and market milk. The act also requires the licensing of all plant operators and distributors, as well as the certification of bulk tank and plant milk graders. Testing of raw milk for the presence of inhibitors, excess water, bacteria, and somatic cells to ensure that standards are met is also an integral function of the act.

The Meat Inspection Act (Ontario) applies only to meat intended for human consumption. It ensures the humane slaughter of animals and that meat and meat products are safe and of high quality by requiring inspection and licensing of slaughtering premises. Regulations provide for both post and ante mortem inspection of animals and carcasses by a licensed inspector; monitoring of plant sanitation programs and waste disposal; testing for antibiotic, drug and pesticide residues; condemnation of diseased animals; and control of processing and shipping.

The Livestock and Livestock Products Act applies to cattle, eggs and processed eggs. The act provides for the licensing of livestock dealers and dealers in livestock products such as sales barns, country dealers, sales agents and slaughtering plants. Inspectors' powers include the seizure and detention of livestock and livestock products which violate the act and regulations. Currently, AAFC provides both the egg-and-meat grading services under this act, and the Farm Products Sales and Grades Act respectively, both of which have adopted federal grade standards.

The protection of community health is ensured by the Dead Animal Disposal Act. This act prohibits the use of dead animals for human consumption and assures that the owners of dead animals (cattle, horses, sheep, goats and swine) dispose of them by proper burial or release to a licensed deadstock dealer. It also licenses dead-animal brokers and operators of receiving and rendering plants, and controls record keeping, identification, and labelling of meat obtained from dead animals.

The Oleomargarine Act and the Edible Oil Products Act provide for inspections and licensing to manufacture these products by setting quality standards, and coloring and labelling requirements. They prohibit the display or labelling of these products in any manner which may confuse them with dairy products. Inspectors may seize any products that do not comply with the legislation and the product may be subject to laboratory analysis. The current status of the Oleo-

margarine Act legislation is under review and the act is currently not enforced *(7)*.

The Health Protection and Promotion Act: Food Premises Regulation protects community health by ensuring the sanitary handling of food and maintenance of food premises through inspection of food service facilities such as restaurants, caterers, institutes, hospitals, and the food retail industry including grocery stores, farmers markets, butcher shops and bakeries. Under this act, the Ontario Ministry of Health's Public Health Branch sets policy and regulations but does not conduct the actual inspections. This function is performed by the local board of health at the municipal government level which is funded 75% by the Ontario Ministry of Health to assure that regulations are met. In some provinces, the municipal governments are not involved in regulation enforcement.

The Fish Inspection Act (Ontario) currently has no regulation standards specified for aquaculture. Therefore, fish intended for human consumption are subject to the safety standards listed in the Food and Drugs Act. Production standards are voluntary but are currently being developed by industry. Some monitoring of freshwater fish is done in conjunction with the Ministry of the Environment, such as testing for environmental contaminants (e.g., mercury).

The Role of the Municipal Government

Municipal governments enact and enforce by-laws that regulate zoning, building codes, environmental and other issues that affect the food inspection industry. They also enforce provincial regulations related to food establishments and have inspection resources of which the majority are related to food service and retail sectors *(6)*. By-laws are enacted by local planning boards and health units or boards of health, and may exceed the minimal inspection requirements set by the provincial governments if special local needs are identified.

The Key Issues

In a country as vast and diverse as Canada, the elimination of national or sub-national food inspection programs would not be advisable. However, to assure an effective food inspectorate, significant changes to the food inspection activities of all levels of government must be imposed. Such changes should include:

- Critical review of all program and product standards to develop more uniform procedures and practices in delivery of inspection programs (e.g., grading, composition and laboratory testing).
- Ensuring cost and benefit effectiveness of inspection programs by using scientifically validated risk assessment studies.
- Enhanced access to international markets by Canadian food producers.
- Decreased regulatory pressures on industry.
- Development, elimination of gaps, and harmonization of national standards which have a common legislative base and reflect international developments.
- Elimination of inspection overlaps such as those that occur when both federal and provincial inspectors inspect provincially licensed plants (e.g., HC and OMAFRA) and federal inspectors from different agencies inspecting federally licensed plants (HC and AAFC).
- Improved intergovernmental collaboration.
- Reduction of government role in enforcing quality standards which only have private benefit, and a continuing role in public education, economic fraud prevention, and the enforcement of health and safety standards.
- Increasing the role of industry to ensure product quality and safety by incorporating Hazard Analysis Critical Control Point (HACCP) systems which can be easily audited by government inspectors.

To streamline and integrate inspection programs and legislation, a shared vision must be adopted by the federal, provincial and municipal levels of government by building trust, partnerships, fairness, and on-going consultations. At the same time, such a system must be very flexible in its implementation. Agency liability must be defined, and given the financial constraints on all governments, it is imperative that the load is distributed equitably and still ensures public health and safety. Also, the changing roles of government and industry will require a period of adjustment.

Such an implementation system is currently being addressed by the joint FPAFIC and the FPTFSC and its recommendations for the development of a "Canadian Food Inspection System" *(5,6)*. This committee is currently working on the harmonization of fluid milk standards for the development of a National Dairy Code.

The development of a National Food Inspectorate in Canada offers many significant improvements to the current system. These include: the creation of a common legislative base utilizing nationally recognized standards; the creation of a single agency for the delivery of inspection services in both the federal and provincial inspectorates; the development of an inspection system based on risk assessment rather than the traditional after-the-fact inspection methods; the changing role of the government in food inspections placing less emphasis on quality, (unless conducted on a cost recovery basis); and the continuing emphasis on public education, economic fraud prevention, health and safety issues *(5,6)*. The development of such a system will meet the needs of the future and continue to ensure the safety and high quality of Canadian food products.

References

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3. Federal Management of the Food Safety System. 1994. Report of the Auditor General of Canada.
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5. Joint FPAIC/FPTFS Steering Committee. A Blueprint for the Canadian Food Inspection System. 1994. A Report to the Meeting of the Federal/Provincial Ministers of Agriculture Winnipeg, Manitoba, July 4-6.
6. Office of Food Inspection Systems. July 1995.The Federal Food Inspection System–Organizational Options. Discussion Paper.
7. Ontario Ministry of Agriculture, Food and Rural Affairs. Ontario Margarine Color/Composition Requirements Revised. News Release: December 21, 1994.

Dairy, Food and Environmental Sanitation, Vol. 16, No. 1, Pages 32-33

Reprinted from the Mississippi Morbidity Report, Vol. 14, No. 3

Foodborne Outbreak

The following report is an example of an outbreak investigation conducted by the MSDH for the purpose of interrupting transmission and preventing further cases.–Ed.

INTRODUCTION

At 11:45 A.M., Sunday, March 5th, 1995, an official of the Mississippi State Department of Health received a call from an E.R. physician at Hospital A, in central Mississippi, who reported having seen three patients with gastrointestinal symptoms suggesting a possible foodborne outbreak. All had eaten at a local restaurant on Friday evening, March 3rd, 1995. Also, on March 5th, the E.R. at Hospital B reported two additional cases with similar symptoms, one of whom was admitted. Both had eaten at the same restaurant on Friday night.

Table 1. Food Specific Attack Rates (%).

	Eoten			Not Eaten		
Menu Item	Ill	Not Ill	% Ill	Ill	Not Ill	% Ill
cot fish†	42	21	66.7	0	5	0.0
coleslow†	41	13	75.9	0	12	0.0
french fries	39	28	58.2	1	1	50.0
onion rings	6	1	85.7	29	21	58.0
hushpuppies	36	14	72.0	2	9	18.2
dill pickles	23	8	74.2	18	16	52.9
tartar souce	16	5	76.2	20	17	54.1
pickled onions	23	7	76.7	15	16	48.4
turnip greens	20	7	74.1	18	15	54.5
corn breod	37	22	62.7	1	2	33.3

† $p < 0.01$

Background:

The restaurant is a popular one which has a limited menu and specializes in fried catfish. Food is served by waiters (not buffet style).

Investigation:

Case Finding: On March 5th and 6th, original cases from the two E.R.'s were interviewed, as were their dining companions. A local newspaper carried an article (not at MSDH request) regarding the outbreak. Over the next several days interviews were conducted of all persons who called the health department reporting having eaten at the suspect place, or whose names were given to MSDH by those who called in. Most were ill or knew someone in their party who was ill.

Environmental Investigation: A local MSDH environmentalist visited the restaurant on Sunday afternoon and obtained specimens of the coleslaw and other foods. The coleslaw was left over from Saturday night (the 4th). None was left from Friday night.

On Monday the 6th, an official inspection was accomplished. The MSDH inspectors met with the restaurant officials who were questioned regarding all food service workers and food preparation practices. Two employees who made the coleslaw were questioned about preparation practices and current or recent illnesses. One employee that made the slaw on the nights in question was observed making a new batch during the inspection.

On Friday the 10th, another inspector visited the restaurant to perform a Hazard Analysis Critical Control Points (HACCP) environmental evaluation.

Laboratory investigation: Stool specimens from five patients were obtained for culture at local hospitals. Coleslaw was obtained for culture by the local environmentalist on March 5th. This sample was taken from the batch left over from the previous night (Saturday). None was available from March 3rd (Friday).

RESULTS:

Case Finding: Seventy-two (72) persons were interviewed regarding foods eaten and signs and symptoms

of illness. The case definition for illness included persons with either vomiting, diarrhea, or both, and who had eaten at the restaurant on March 3rd or March 4th, 1995. The attack rate among all persons who ate there and who could be interviewed was 60%. The food most associated with illness was coleslaw, with an attack rate of 76% (41/54). Everyone who was ill had eaten coleslaw. When looking at only those who ate fish, coleslaw was still associated with illness (all those who ate fish but did not eat coleslaw remained well).

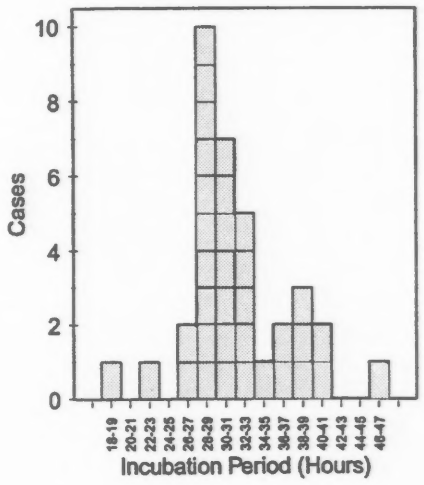
The average incubation period for the 31 persons who could recall the time they ate and the time of onset of illness was 34 hours, with a range of 19 to 46.5 hours. The symptoms among the cases included nausea (98%), diarrhea (84%), vomiting (79%), cramps (77%), chills (66%), headache (59%), and subjective fever (53%). No one reported having bloody stools. Average duration of illness was 37 hours with a range of 6 to 72. One person was still hospitalized at the time of the investigation and her duration of illness is unknown. A total of seven persons sought medical attention and two were hospitalized.

Environmental Investigation: A company representative stated that the restaurant served approximately 780 persons on Friday night. Only one of the employees was reported to have been ill, and she was a hostess who handled no food. However, one person who prepares coleslaw did report that her grandson, whom she helps take care of, had been ill with a gastroenteritis.

The environmental inspection conducted on Monday, March 6th, revealed several deficiencies. The inspector observed coleslaw being prepared and was told that the leftover coleslaw from the night before is saved and used first the next day, not mixed in with the new batch. It is prepared with commercially made mayonnaise in a large tub, and mixed by the preparer who uses her ungloved hands.

Laboratory Investigation: All five of the stool cultures grew only normal flora. Culture of the coleslaw and the raw cabbage grew > 10^5 mixed gram negative and gram positive bacteria. Culture of the cooked catfish sample had no growth.

Figure 1. Distribution of Incubation Period.



Summary:

An outbreak of gastrointestinal illness occurred among persons who had eaten at a restaurant in central Mississippi on March 3rd or 4th. Eating coleslaw was epidemiologically associated with becoming ill. The attack rate among persons questioned who ate coleslaw was 76%. The cultures of the coleslaw grew no bacterial pathogens but did grow mixed gram negative and gram positive bacteria, suggestive of contamination. The method of preparing the coleslaw was not optimal for prevention of contamination.

Conclusions:

Based on epidemiologic investigation and analysis, the food item responsible for the outbreak was coleslaw. The fact that no pathogenic bacteria were isolated from stool specimens or from the incriminated coleslaw indicated the pathogen was probably viral. The average incubation period and duration of symptoms is consistent with Norwalk group viruses, which are thought to be quite common causes of nonbacterial foodborne outbreaks.

Recommendations:

The highlights of the recommendations made to the restaurant are summarized as follows:

1. An emphasis should be made on good hand washing practices.
2. Make coleslaw in smaller batches, and store in 2" deep pans to ensure proper cooling, and less warming of batches during preparation.
3. Use elbow length gloves, or use long handled utensils for mixing of the coleslaw.
4. All raw food, especially fruits and vegetables should be thoroughly washed and cleaned of filth and spoilage prior to use in preparation of recipes.
5. Protect food from cross-contamination while in storage-prep and holding by storing off of the floor, and do not store ready-to-eat food under raw food.
6. All potentially hazardous foods need to be held at ≤45 degrees F except during necessary periods of preparation.

Prepared by Mary Currier, M.D., M.P.H., Office of Community Health Services; MSDH.

Dairy, Food and Environmental Sanitation, Vol. 16, No. 1, Pages 34-36

Dairy, Food and Environmental Sanitation Instructions for Authors

NATURE OF THE MAGAZINE

Dairy, Food and Environmental Sanitation (DFES) is a monthly publication of the International Association of Milk, Food and Environmental Sanitarians, Inc. (IAMFES). It is targeted for persons working in industry, regulatory agencies or teaching in milk, food and environmental protection.

The major emphases include:

- practical articles in milk, food and environmental protection;
- new product information;
- news from activities and individuals in the field;
- news of IAMFES affiliate groups and their members;
- 3-A Dairy and Egg Sanitary Standards, amendments and lists of symbol holders;
- excerpts of articles and information from other publications of interest to the readership.

Anyone with questions about the suitability of material for publication should contact the editor.

SUBMITTING ARTICLES AND OTHER MATERIALS

All manuscripts including, "Letters to the Editor" should be submitted in triplicate (original and two copies), in flat form (*not folded*), and by First Class mail to Managing Editor, DFES, c/o IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, U.S.A.

When possible, authors are encouraged to submit a fourth copy of their manuscript on computer disk. Manuscripts submitted on disk should be saved as an ASCI file.

All reading matter dealing with affairs of IAMFES or with news and events of interest to members of IAMFES is published in DFES, and should be mailed to the above address. Correspondence dealing with advertising should also be sent to the address given above.

Correspondence regarding subscriptions or membership in IAMFES should be sent to Julie Cattanach, Membership Coordinator, (address above).

PUBLICATION OF MANUSCRIPTS

Manuscripts are accepted for publication only after they are reviewed by two members of the editorial board. Occasionally, when the subject of the paper is outside of the specialties of members of the Editorial Board, other specialists may be asked to review manuscripts. After review, a manuscript will be returned to the author by the editor for revision in accordance with reviewers' suggestions. Three clean copies of the revised paper, plus the original paper in flat form, are to be returned to the editor as soon as possible. Authors can hasten publication of their papers by submitting well-written manuscripts conforming to the journal's style and by revising and returning manuscripts promptly. If, after review of a manuscript is completed, an author chooses to withdraw rather than revise the paper, the editor should be notified promptly. If an author does not respond in *four months* after a reviewed paper is returned, the paper will be considered as withdrawn. With authors' cooperation, articles are usually published within three to six months after they are received and may appear sooner.

When a manuscript is received, it is numbered, and the author is notified by postal card that the manuscript has been received. The manuscript number will be given on the postal card and should be used on all future correspondence and revised manuscripts to identify and help locate manuscript files. Authors will also be notified when a manuscript has been accepted for publication. Page proofs will be sent to authors for final approval with a 48 hour return required.

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Readers of DFES include persons working in industry, regulatory agencies or teaching in milk, food and environmental protection. DFES serves this readership by publishing a variety of papers of interest and usefulness to these people. The following types of articles and information are acceptable for publication in DFES.

General interest

DFES regularly publishes nontechnical articles as a service to those readers who are not involved in the technical aspects of milk, food and environmental protection. These articles include such topics as the organization and application of milk or food control programs or quality control programs, ways of solving a particular problem in the field, organization and application of an educational program, management skills, use of visual aids and similar subjects. Often talks and presentations given at meetings of affiliate groups and other gatherings can be modified sufficiently to make them appropriate for publication. Authors planning to prepare general interest/nontechnical articles are invited to correspond with the managing editor if they have questions about the suitability of their material.

Book reviews

Authors and publishers of books in the fields covered by DFES are invited to submit their books to the managing editor. Books will then be reviewed by a specialist in the field covered by the book, and the review will be published in an issue of DFES.

Preparation of Articles

The managing editor assumes that the senior author has received proper clearance from his/her organization and from co-authors for publication of the manuscript.

All manuscripts should be typed double-spaced on 8-1/2 by 11 inch white bond paper. Onion skin or similar thin paper should not be used. *Lines on each page should be numbered to facilitate review of the manuscripts.* Use of paper with pre-numbered lines is satisfactory. *Manuscripts submitted on paper without numbered lines will be returned to authors for retyping prior to being sent out to review.* Margins on all sides should be at least one-inch wide and pages of the original manuscript should not be stapled together.

A manuscript should be read critically by someone other than the author before it is submitted. If English is not the author's first language, the manuscript should be reviewed by a colleague of the author who is fluent in written English to ensure that correct English is used throughout the paper. *The managing editor and editorial staff will not rewrite papers when the English is inadequate.*

Authors are encouraged to consult previously published issues of DFES to obtain a clear understanding of the style of papers published.

Brand names and manufacturers of research samples (i.e., specific products tested as in surveys, etc.) *should not* be used. It is the policy of DFES to not publish this information. Instead, refer to types of products or identify by letters or numbers.

Revised manuscripts that do not require a second review should be typed on plain white bond paper *without* numbered lines or box outlines, etc. Finished manuscripts are typeset by scanning into a computer program. A clean copy facilitates the scanning process.

In order to decrease turnaround time authors may send a copy of their manuscript on computer disk as noted earlier in these instructions.

ORGANIZATION OF ARTICLES

The title of the manuscript should appear at the top of the first page. It should be as brief as possible and contain no abbreviations.

The title should be indicative of the subject of the manuscript.

Authors should avoid expressions such as "Effects of," "Influence of," "Studies on," etc.

Names of each author (including first name and middle initial), and the name and address of the institution(s) where the work was done should appear on the title page. Footnotes can be used to give the current addresses of authors who are no longer at the institution(s) where the work was done. An *asterisk* should be placed after the name of the author to whom correspondence about the paper and proofs should be sent. The telephone and facsimile numbers of this author should be given at the bottom of the page. No text of the manuscript should appear on the title page.

The Abstract should appear on a separate piece of paper directly following the title page, and should not exceed 200 words. It should summarize the contents of the manuscript, and be meaningful without having to read remaining pages. The Abstract should *not* contain references, diagrams, tables or unusual abbreviations.

The references should be arranged in alphabetical order, by last name of first author and numbered consecutively. Only the first author's name and initial should be inverted. *Cite each reference in the text by number.* All references given in the list must be cited in the text. List references according to the style of the following examples.

Paper in journal

Alberman, G. G. and E. H. Marth. 1974. Experimental production of aflatoxin in citrus juice and peel. J. Milk Food Technol. 37:308-313.

Paper in book

Marth, E. H. 1974. Fermentations. pp. 771-882. *In* B. H. Webb, A. H. Johnson and J. A. Alford. (eds.). Fundamentals of dairy chemistry. 2nd ed. AVI Publishing Co., Westport, CT.

Book by author(s)

Minor, T. E. and E. H. Marth. 1976. Staphylococci and their significance in foods. Elsevier Scientific Publishing Co., Amsterdam.

Book by editor(s)

Vanderzant, C. and D. F. Splittstoesser. (eds.). 1992. Compendium of methods for the microbiological examination of foods. 3rd ed. American Public Health Association, Washington, DC.

Patent

Hussong, R. V., E. H. Marth and D. G. Vakaleris. 1964. Manufacture of cottage cheese. U.S. Pat. 3,117,870. Jan. 14.

Publication with no identifiable author or editor

Anonymous. 1977. Thermally processed low-acid foods in hermetically sealed containers. Code of Federal Regulations No. 21, U.S. Government Printing Office, Washington, DC.

References citing "personal communication" or "unpublished data" are discouraged, although it is recognized that sometimes it is unavoidable. An author may be asked to provide evidence of such references.

References consisting of papers that are "accepted for publication" or "in press" are acceptable, but the author may be asked to provide copies of such papers if needed to evaluate the manuscript in question.

References should follow the text, tables should follow references, and figures should follow tables in manuscript organization. Placement of each should be indicated in the text.

ILLUSTRATIONS, PHOTOGRAPHS, FIGURES

Submission of photographs, graphics or drawings to illustrate the article will help the article. The nature of DFES allows liberal use of such illustrations, and interesting photographs and drawings often increase the number of persons who are attracted to and read the article.

Photographs. Photographs which are submitted should have sharp images with good contrast. A scale marker to indicate magnification should be on each photomicrograph. Color photographs should not be submitted for use inside of DFES, because they will be published in black and white, with a loss of detail. Photographs can be printed in color, but the additional cost of doing so must be borne by the author. Authors wishing to publish color photographs should contact the editor for cost estimates.

The editor also encourages the submission of photographs to be used on the cover of DFES. Photographs considered for the cover should be submitted in the form of a negative or slide, and should be four-color.

Line drawings. All line drawings (graphs, charts, diagrams, etc.) should be submitted as black and white glossy or matte finish photographs, which do not require any additional art work. *No part of a graph or drawing should be typewritten.* Use a lettering set or other suitable device for all labeling. If graphs are computer generated, printed copies of the graphs must be produced by a good quality laser printer, with sufficiently dark printing or appropriate size letters and numerals. Graphs produced by dot matrix printers or with very thick lines and lettering *are not* acceptable. Figures are commonly reduced to a 1 column width (85 mm) of printing. If the original figure can be reproduced to the size of a one-column width, further reduction will not be necessary, otherwise lettering should be of sufficient size to allow for reduction. If symbols are used, they must be identified on the figure and not in the legend. Data that are presented in figures should not be repeated in Tables. A well-prepared figure should be understandable without reference to the text of the paper.

Labeling of figures. All figures should be labeled lightly on back, using a soft pencil or a typed adhesive label. Labeling should include:

- figure number,
- last name of author(s),
- title of manuscript,
- the manuscript number (on revised copies),
- identification of the top of the figure.

COMMON ABBREVIATIONS

Frequently used acceptable abbreviations may be used (i.e., using *wt* for the word *weight*, or *s* for the word *second*). For further details on abbreviations see the current edition of the *CBE Style Manual.* Note that a period is used with some but not all abbreviations.

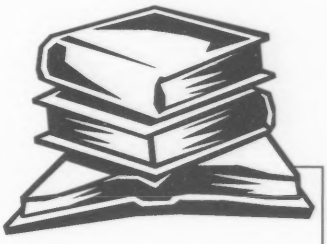
For a complete listing of expressions to avoid in scientific writing, see pages 93-98 in O'Connor, M. and F. P. Woodford. 1976. *Writing Scientific Papers in English*. Elsevier, Amsterdam. Also, *How to Write a Scientific Paper*, by Day, Robert A., 3rd ed. 1988. Oryx Press, Phoenix, AZ.

Authors may also contact the scientific editor if they are not sure about acceptable abbreviations.

Dairy, Food and Environmental Sanitation, Vol. 16, No. 1, Page 37

Book reviewed by: Christine Bruhn, University of California Davis, Davis, California

Book Review



"Safety of Irradiated Foods"
(2nd edition)

J. F. Diehl
Marcel Dekker
270 Madison Ave., New York, NY 10016

The *Safety of Irradiated Foods* is comprehensive, scientifically complete, and quite readable. It can serve as the authoritative text for the research scientist and professional interested in any aspect of this technology.

Irradiated foods are currently being sold in almost 30 countries nationwide and marketing in the United States is expanding. This text will be a valuable reference for questions on how the irradiation process works, effectiveness of irradiation treatment, safety and nutritional value of irradiated foods, and the environmental impact of the process. The consumer attitudes chapter includes an overview of consumer organization's response to irradiation, summarizes the history and philosophy of consumer advocacy groups, and provides a list and response to common misstatements about irradiated foods and environmental safety.

Diehl's descriptions are clear, his explanations logical, and the text even more comprehensive than the 1990 edition. The book chapters include Introduction: How It All Began, Radiation Sources and Process Control, Chemical Effects of Ionizing Radiation, Biological Effects of Ionizing Radiation, Identification of Irradiated Foods, Radiological and Toxicological Safety of Irradiated Foods, Microbiological Safety of Irradiated Foods, Nutritional Adequacy of Irradiated Foods, Evaluation of the Wholesomeness of Irradiated Foods by Expert Groups and International Agencies, Potential and Current Applications of Food Irradiation, Government Regulations of Irradiated Foods, Consumer Attitudes, and Outlook.

People who have the first edition of this book, may wonder if their library should be updated with Edition Two. The answer is definitely YES. The chapter, "Identification of Irradiated Foods" is an addition not found in the 1990 edition. The text and references from the other chapters are significantly expanded. For example, the number of references on radiological and toxicological safety increased from 122 to 200 and nutritional adequacy references increased from 32 to 139. The consumer attitudes chapter is up-to-date for publication time. The marketing of irradiated foods in the United States is expanding and no text can capture the most recent activity.

The *Safety of Irradiated Foods* is strongly recommended as a reference for university food and nutrition departments, industry, regulatory agencies, and personal libraries.

Read any good books lately?

If you have recently read or heard about an interesting and informative book relative to food science or safety, and would like to recommend it for review, please contact: Editor, *Dairy, Food and Environmental Sanitation*, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2863; telephone (515) 276-3344 or (800) 369-6337; fax (515) 276-8655.

FederalRegister

Pathogen Reduction: Hazard Analysis and Critical Control Point (HACCP) Systems—Issue Papers

Agency: Food Safety and Inspection Service, USDA.

Action: Proposed rule, issue papers.

Summary: On September 13-15, 1995 and September 27-29, 1995, the U.S. Department of Agriculture held issue-focused public meetings on the Food Safety and Inspection Service's (FSIS) proposed rule, "Pathogen Reduction, Hazard Analysis and Critical Control Point (HACCP) Systems." At the meetings, FSIS made available issue papers on agenda topics. Those issue papers are published in the notice.

Dates: The comment period for the proposed rule, "Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems" (60 FR 6674, February 3, 1995), which reopened August 11, 1995 (60 FR 41029, August 11, 1995), will close, as announced in the Federal Register (80 FR 45380, August 31, 1995), on October 30, 1995.

Addresses: Send an original and two copies of written comments to: FSIS Docket Clerk, DOCKET 93-016P, Docket Room 4352, South Agriculture Building, Food Safety and Inspection Service, U. S. Department of Agriculture, Washington, DC 20250.

For Further Information Contact: Dr. Paula Cohen, Director, Regulations Development, Policy Evaluation and Planning Staff, FSIS, USDA, Room 3812, South Agriculture Building, Washing, DC 20250, (202) 720-7164.

Lowfat and Skim Milk Products, Lowfat and Nonfat Yogurt Products, Lowfat Cottage Cheese: Proposed Revocation of Standards of Identity; Food Labeling, Nutrient Content Claims for Fat, Fatty Acids and Cholesterol Content of Food

Agency: Food and Drug Administration, HHS.

Action: Proposed rule.

Summary: The Food and Drug Administration (FDA) is proposing to remove the standards of identity for sweetened condensed skimmed milk, lowfat milk, skim (nonfat) milk, acidified lowfat milk, acidified skim (nonfat) milk; cultured lowfat milk; cultured skim (nonfat) milk; sour half-and-half, acidified sour half-and-half, lowfat yogurt, nonfat yogurt, and lowfat cottage cheese, based in part, on petitions filed jointly by the Milk Industry Foundation (MIF) and the Center for Science in the Public Interest (CSPI). FDA also is proposing to remove the standards of identity for evaporated skimmed milk and lowfat dry milk based on a petition filed by the American Dairy Products Institute (ADPI). Removal of these food standards of identity would permit the products covered by these regulations to be manufactured and labeled in accordance with the general definition and standard of identity (the general standard) in the regulations for foods named by use of a nutrient content claim and a standardized term. These products would then be named in a manner that is consistent with the agency's definitions of the terms "lowfat" and "nonfat" established in response to the Nutrition Labeling and Education Act of 1990 (the 1990 amendments). This action will provide for consistency in the nomenclature and labeling of these nutritionally modified milk products and other foods bearing "lowfat" and "nonfat" claims and will promote honesty and fair dealing in the interest of consumers.

The agency also is proposing to amend the nutrient content claims regulations for fat, fatty acids, and cholesterol content to provide for "skim" as a synonym for "nonfat" when used in labeling milk products.

Dates: Comments by January 23, 1996. FDA proposes that any final rule that may issue based on this proposal, unless stated by a filing of proper objections, become effective January 1, 1998. Compliance may begin on the date of publication of the final rule in the Federal Register.

Addresses: Submit written comments to the Dockets Management Branch (HFA-305); Food and Drug Administration, rm. 1-23, 12420 Parklawn Dr., Rockville, MD 20857.

For Further Information Contact: Nannie H. Rainey, Center for Food Safety and Applied Nutrition (HFS-158), Food and Drug Administration, 200 C St. SW., Washington, DC 20204, 202-205-5099.

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Attn: Tammi Barrett-Coomer
P. O. Box 457
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(317)383-6168

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UpDates

USDA Scientist and IAMFES Member Named 1995 Outstanding Research Scientist

Donald W. Thayer, a research chemist with the U.S. Department of Agriculture, has been named an "Outstanding Research Scientist of the Year" by USDA's Agricultural Research Service for his work in using irradiation to control foodborne pathogens on poultry and red meat.

Thayer was one of three ARS researchers nationwide to receive the honor. He leads the Food Safety Research unit at the agency's Eastern Regional Research Center in Greenbelt, Maryland. Thayer and other ARS scientists were recognized in an award's ceremony Nov. 29th at the agency's headquarters at Beltsville, MD. Each scientist received a plaque, cash award and research funding.

"Dr. Thayer's research showed the safety and efficacy of using irradiation to kill food pathogens in poultry and red meat, a critical factor in the USDA and Food and Drug Administration approval of this technique," said Floyd P. Horn, ARS administrator.

Horn noted that Thayer heads two of USDA's most important food safety research programs–food irradiation and developing advanced technologies to detect drug residues in meat and poultry.

Thayer discovered that *E. coli* O157:H7 could be controlled by radiation prior to the major outbreak of this bacterium in the northwestern United States. He also has effectively used irradiation against other foodborne pathogens including *Bacillus cereus*, *Listeria monocytogenes*, *Salmonella* and *Staphylococcus aureus* on meat and poultry.

John P. Cherry, director of the Philadelphia research center, said that because of Thayer's work, irradiated poultry is now available in grocery stores in Miami and Chicago and is being supplied to hospitals and nursing homes by a large food service chain.

Cherry also noted that NASA and South African military forces are using shelf-stable, irradiated meats and the U.S. Army plans to petition FDA for approval to use them.

"More than 7,000 tons of food are irradiated each year in the United States," Cherry said. "This is primarily a result of Dr. Thayer's dedicated research."

Thayer received undergraduate and master's degrees from Kansas State University and a Ph.D. in microbiology and radiation biology from Colorado State University.

Recognized worldwide as an expert on poultry and red meat irradiation, Thayer has published extensively and has given scientific presentations on his research throughout the world. His many honors include being elected a Fellow of the American Academy of Microbiology and receiving the 1992 Colonel Rohland A. Isker Award from the Research and Development Associates for Military Food and Packaging Systems. Thayer is also a member of the International Association of Milk, Food and Environmental Sanitarians.

Leibhan Leads Technical Services at Tri-Clover

Tri-Clover Inc. has announced the appointment of Michael Leibhan as manager of technical services, providing distributors and customers with specification, application and maintenance assistance for the company's process equipment and systems.

Since joining Tri-Clover in 1975, Leibhan has been involved in product and application engineering for Tri-Clover's full lines of pumps, valves, blenders and systems for process industries. He most recently served as the company's technical services representative.

The company also announced that Douglas Cochran, an employee at Tri-Clover since 1979, has joined the sales and technical services department as a service technician. Cochran has an extensive CNC and computer background and is a member of the United States Air Force Reserve.

Gloria I. Swick, M.S.A., R.S. Accepts Position with Marion County Health Department

Gloria I. Swick, M.S.A., R.S., formerly with the Columbus Health Department in Columbus, Ohio, has accepted the position of Director of Environmental Health with the Marion County Health Department in Marion, Ohio. Gloria graduated from The Ohio State University with a B.S. in Agriculture having a triple major in Animal Science, Agricultural Education, and Biology. She earned her Master of Science in Administration with a concentration in Health Services Administration from Central Michigan University.

Gloria is currently serving as President of the Ohio Association of Milk, Food and Environmental Sanitarians,

where she has been a Board Member for seven years and the Ohio Delegate to the Affiliate Council for five years. Gloria is also the Chairperson of the Food Sanitation Committee of IAMFES and an active member of the Ohio Environmental Health Association.

Elsag Bailey Process Automation N.V. to Acquire the Hartmann & Braun Group of Companies from Mannesmann AG

Elsag Bailey Process Automation N.V. (NYSE:EBY), a unit of Finmeccanica S.p.A., announced today that it has entered into a definitive agreement to acquire the Hartmann & Braun group of companies from Mannesmann AG. The transaction, valued at approximately DM 1,000 million, is expected to be completed by year-end 1995, subject to the approval of the Mannesmann Supervisory Board and relevant regulatory authorities.

Officials from the two companies hailed the transaction as a strategic partnership in which two leading names in process automation will join forces to achieve a position of market leadership. Mannesmann had sought a partner which could ensure the continued competitive position and customer confidence enjoyed by Hartmann & Braun. Elsag Bailey, in turn, sought expansion of its technological and geographic presence in Europe and elsewhere.

Hartmann & Braun, based in Frankfurt, Germany, is a producer of systems and instrumentation for the automation of energy production and other industrial processes in Germany and Europe. The company is also a leader in gas analysis technologies.

Elsag Bailey Process Automation N.V., incorporated in the Netherlands, is a producer of distributed control systems, instrumentation products, and professional services for the process industries. The firm's technologies are sold worldwide for the automation of varied processes in the electric power, chemical and pharmaceutical, oil and gas, pulp and paper, and other industries.

Sharrann Simmons Promoted to European Marketing Manager, for FMC Corporation's Food Ingredient Division

Sharrann Simmons has been promoted to European Marketing Manager for FMC Corporation's Food Ingredients Division (FID), one of the world's leading producers of chemicals and machinery. She was formerly Commercial Development Manager for FID.

In this newly established position, Ms. Simmons will provide overall marketing direction for the European region and stimulate business development activities through market segment focus. This includes strengthening the sales support system, overseeing new product launches and instigating new marketing awareness and penetration campaigns.

FMC Corporation, headquartered in Chicago, is one of the leading producers of chemicals and machinery for industry, government and agriculture. The company operates 95 manufacturing and mine facilities in 18 countries. The company divides its businesses into five major segments: Industrial Chemicals, Performance Chemicals, Precious Chemicals, Defense Systems and Machinery and Equipment.

Elgin Dairy Foods Names Clinton Office Manager

Elgin Dairy Foods, Inc., the Chicago-based manufacturer of dairy and non-dairy mixes, toppings and proprietary food products, has named Renee Clinton to the post of Office Manager. Clinton, who joined Elgin in 1988 as a clerk, has held a number of increasingly more responsible administrative positions with the company leading up to her appointment.

Elgin manufactures a wide range of soft serve, shake and ice cream mixes, dairy and non-dairy whipped toppings, sour cream and creamers. It also produces proprietary mixes and ingredient formulations used by the foodservice and food processing industries.

Roth Young, Wisconsin, Announces Restructuring

Tom Brenneman, new owner and President of Roth Young Executive Search of Milwaukee, announced today a new vertically integrated organization designed to more effectively serve the food and hospitality industries. Roth Young executives with both staffing expertise and industry background have been assigned to each of our four divisional levels: Food Ingredients and Technology, Food Manufacturing, Food Sales & Marketing, and Food Service & Hospitality. Bill Durling, Vice President/Technologies, will provide staffing solutions for technologically based firms with product development and technical issues pertaining to the further processing of food ingredients. Brenneman will handle management staffing needs in food manufacturing–where ingredients become finished packaged food products. Bob Alstrin, Vice President/Food Sales & Marketing, is handling staffing for executives involved in the sales and marketing of these food products. Finally, another executive to be named later, will handle the consumption area–where restaurants, hotels and resorts market these products for away from home consumption.

William LaGrange Named as Scientific Editor for *Dairy, Food and Environmental Sanitation*

Please join us in welcoming a new Scientific Editor for *Dairy, Food and Environmental Sanitation*. William LaGrange, Ph.D., has accepted a four year appointment to the editorial staff of the journal. Dr. LaGrange replaces Dr. Henry Atherton, Professor Emeritus at the University of Vermont who retired two years ago from the position with *Dairy, Food and Environmental Sanitation*. Dr. John Bruhn of the University of California-Davis has been fulfilling the duties of Scientific Editor while a search for the best replacement was conducted by the Journal Management Committee and Executive Board of IAMFES.

Bill has spent most of his professional career in outreach and extension activities at Iowa State University in Ames, Iowa. His focus has been on the improvement of safety and quality in foods through application research and the development of various educational conferences for the Iowa food industry. He has established himself as a leader within the academic communities and with the food processing industry in the United States.

Bill's history with this association began in 1957 when he became a member of IAMFES. He has witnessed the evolution of *Dairy, Food and Environmental Sanitation* through the years and is knowledgeable in the goals and ideas of IAMFES members. He will be an asset to members and the staff who work on the journal itself. We look forward to working with Dr. William LaGrange as he assumes the responsibility of Scientific Editor.

Awards Nominations

The International Association of Milk, Food and Environmental Sanitarians is proud of its members and their contributions. As a member, you are entitled to nominate deserving colleagues for the IAMFES Awards.

Nomination forms need to be completed and back to the Des Moines office by March 15, 1996.

1. Previous award winners are not eligible for the same award. Check pages 46 and 47 in this issue for a complete listing of past award winners.
2. Current Executive Board members are not eligible for nomination.
3. Candidates must be current IAMFES members in order to be nominated.

Presentation of these awards will be made during the Annual Awards Banquet on July 3.

NOMINATION FORMS MAY BE OBTAINED FROM:

David M. Merrifield
IAMFES, Awards
Suite 200W
6200 Aurora Avenue
Des Moines, IA 50322-2863

(Be sure to tell us for which award(s) you will be making a nomination. Each award nomination form is different.) Questions? Call 800-369-6337, 8-4:30 Central time weekdays, or FAX 515-276-8655.

- **Sanitarian Award — $1000 Award and Plaque**
  Recognizes an individual for outstanding service to the profession of the Sanitarian.
- **Educator Award — $1000 Award and Plaque**
  Presented to an educator in recognition of outstanding service in academic contributions to the profession of the Sanitarian.
- **Harold Barnum Industry Award — $1000 Award and Plaque**
  Recognizes an individual for outstanding service to the public, IAMFES and the profession of the Sanitarian.
- **Citation Award — Plaque**
  Recognizes an individual for many years of devotion to the ideals and objectives of the association.
- **Honorary Life Membership Award — Plaque and Lifetime Membership with IAMFES**
  For an individual's devotion to the high ideals and principles of IAMFES.
- **Black Pearl Award — Black Pearl, Encased in Glass**
  Recognizes a company for its outstanding achievement in corporate excellence in food safety and quality.

IAMFES

1996

Nominate a deserving colleague or company for one or more of these prestigious IAMFES Awards

Past Awardees

EDUCATOR-INDUSTRY AWARD

1973-Walter A. Krienke
1974-Richard P. March
1975-K. G. Weckel
1976-Burdet H. Heinemann
1977-Elmer H. Marth
1978-James B. Smathers
1979-Joseph Edmondson
1980-James R. Welch
1981-Francis F. Busta

In 1982 this award was split into the Educator Award and the Harold Barnum Award (for industry).

EDUCATOR AWARD

1982-Floyd Bodyfelt
1983-John Bruhn
1984-R. Burt Maxcy
1985-Lloyd B. Bullerman
1986-Robert T. Marshall
1987-David K. Bandler
1988-Edmund A. Zottola
1989-Vernal Packard
1990-Michael Stiles
1991-William E. Sandine
1992-William S. LaGrange
1993-Irving J. Pflug
1994-Kenneth R. Swartzel
1995-Robert B. Gravani

HAROLD BARNUM AWARD

1982-Howard Ferreira
1983-C. Dee Clingman
1984-Omer Majerus
1985-William L. Arledge
1986-Hugh C. Munns
1987-J. H. Silliker
1988-Kenneth Kirby
1989-Lowell Allen
1990-Roy Ginn
1991-Thomas C. Everson
1992-Ronald Case
1993-David D. Fry
1994-R. Bruce Tompkin
1995-Damien A. Gabis

CITATION AWARD

1951-J. H. Shrader and
William B. Palmer
(posthumously)
1952-C. A. Abele
1953-Clarence Weber
1954-C. K. Johns
1955-R. G. Ross
1956-K. G. Weckel
1957-Fred C. Baselt
1958-Milton R. Fisher
1959-John D. Faulkner
1960-Luther A. Black
1961-Harold S. Adams
1962-Franklin W. Barber
1963-Merle P. Baker
1964-W. K. Moseley
1965-H. L. Thomasson
1966-J. C. Olson, Jr.
1967-William V. Hickey
1968-A. Kelley Saunders
1969-Karl K. Jones
1970-Ivan E. Parkin
1971-L. Wayne Brown
1972-Ben Luce
1973-Samuel O. Noles
1974-John C. Schilling
1975-A. R. Brazis
1976-James Meany
1977-None Given
1978-Raymond A. Belknap
1979-Harold E. Thompson, Jr.
1980-Don Raffel
1981-Henry V. Atherton
1982-None Given
1983-William B. Hasting
1984-Elmer H. Marth
1985-Ralston B. Read, Jr.
1986-Cecil E. White
1987-None Given
1988-Carl Vanderzant
1989-Clem Honer
1990-None Given
1991-Frank Bryan
1992-Ewen C. D. Todd
1993-Robert C. Tiffin
1994-Sidney E. Barnard
1995-Charles W. Felix

SANITARIAN AWARD

1952-Paul Corash
1953-E. F. Meyers
1954-Kelley G. Vester
1955-B. G. Tennent
1956-John H. Fritz
1957-Harold J. Barnum
1958-Karl A. Mohr
1959-William Kempa
1960-James C. Barringer
1961-Martin C. Donovan
1962-Larry Gordon
1963-R. L. Cooper
1964-None Given
1965-Harold R. Irvin
1966-Paris B. Boles
1967-Roger L. Stephens
1968-Roy T. Olson
1969-W. R. McLean
1970-None Given
1971-Shelby Johnson
1972-Ambrose P. Bell
1973-None Given
1974-Clarence K. Luchterhand
1975-Samuel C. Rich
1976-M. W. Jefferson
1977-Harold Bengsch
1978-Orlowe Osten
1979-Bailus Walker, Jr.
1980-John A. Baghott
1981-Paul Pace
1982-Edwin L. Ruppert
1983-None Given
1984-Harold Wainess
1985-Harry Haverland
1986-Jay Boosinger
1987-Erwin P. Gadd
1988-Kirmon Smith
1989-Robert Gales
1990-Leon Townsend
1991-James I. Kennedy
1992-Dick B. Whitehead
1993-Lawrence Roth
1994-Charles Price
1995-Everett E. Johnson

HONORARY LIFE MEMBERSHIP AWARD

1957-J. H. Shrader
1958-H. Clifford Goslee
1959-William H. Price
1960-None Given
1961-Sarah Vance Dugan
1962-None Given
1963-C. K. Johns and Harold Macy
1964-C. B. and A. L. Shogren
1965-Fred Basselt and Ivan Parkin
1966-M. R. Fisher
1967-C. A. Abele and L. A. Black
1968-M. P. Baker and W. C. Frazier
1969-John Faulkner
1970-Harold J. Barnum
1971-Wiliam V. Hickey
1972-C. W. Dromgold and
E. Wallenfeldt

& Past Presidents

1973-Fred E. Uetz
1974-H. L. Thomasson and
K. G. Weckel
1975-A. E. Parker
1976-A. Bender Luce
1977-Harold Heiskell
1978-Karl K. Jones
1979-Joseph C. Olson, Jr.
1980-Alvin E. Tesdal and
Laurence G. Harmon
1981-Robert M. Parker
1982-None Given
1983-Orlowe Osten
1984-Paul Elliker
1985-Patrick J. Dolan,
Franklin W. Barber and
Clarence K. Luchterhand
1986-John G. Collier
1987-Elmer Marth and
James Jezeski
1988-Kenneth Whaley and
Paul J. Pace
1989-Earl Wright
Vernon Cupps
1990-Joseph E. Edmondson
1991-Leon Townsend
Dick B. Whitehead
1992-A. Richard Brazis
Harry Haverland
1993-None Given
1994-Ken Kirby
1995-Lloyd B. Bullerman
Robert T. Marshall

BLACK PEARL AWARD

1994-HEB Company
San Antonio, TX
1995-Albertson's Inc.
Boise, ID

SHOGREN AWARD

1972-Iowa Affiliate
1973-Kentucky Affiliate
1974-Washington Affiliate
1975-Illinois Affiliate
1976-Wisconsin Affiliate
1977-Minnesota Affiliate
1978-None Given
1979-New York Affiliate
1980-Pennsylvania Affiliate
1981-Missouri Affiliate
1982-South Dakota Affiliate
1983-Washington Affiliate
1984-None Given
1985-Pennsylvania Affiliate
1986-None Given
1987-New York Affiliate
1988-Wisconsin Affiliate
1989-Georgia Affiliate
1990-Texas Affiliate
1991-Georgia Affiliate
1992-Georgia Affiliate
1993-New York Affiliate
1994-Illinois Affiliate
1995-Wisconsin Affiliate

MEMBERSHIP ACHIEVEMENT AWARD

1986-Iowa Affiliate
1987-Florida Affiliate
1988-Florida Affiliate
1989-California Affiliate
1990-California Affiliate
1991-Illinois Affiliate
1992-California Affiliate
Illinois Affiliate
1993-California Affiliate
1994-California Affiliate
1995-Texas Affiliate

PAST PRESIDENTS

1912-C. J. Steffen
1913-C. J. Steffen
1914-C. J. Steffen
1915-A. N. Henderson
1916-Claude F. Bessio
1917-Wm. H. Price
1918-Alfred W. Lombard
1919-James O. Kelly
1920-Ernest Kelly
1921-C. L. Roadhouse
1922-H. E. Bowman
1923-Geo. E. Bolling
1924-J. B. Hollingsworth
1925-T. J. Strauch
1926-G. C. Supplee
1927-W. A. Shoults
1928-Ira V. Hiscook
1929-H. R. Estes
1930-R. E. Irwin
1931-A. R. B. Richmond
1932-W. B. Palmer
1933-H. N. Parker
1934-P. F. Krueger
1935-C. K. Johns
1936-G. W. Grim
1937-J. C. Hardenbergh
1938-A. R. Tolland
1939-V. M. Ehlers
1940-P. D. Brooks
1941-L. C. Frank
1942-F. W. Fabian
1943-C. A. Abele
1944-C. A. Abele
1945-R. R. Palmer
1946-R. R. Palmer
1947-R. G. Ross
1948-W. D. Tiedeman
1949-A. W. Fuchs
1950-M. R. Fisher
1951-K. G. Weckel
1952-H. L. Thomasson
1953-H. J. Barnum
1954-John D. Faulkner
1955-I. E. Parkin
1956-Harold S. Adams
1957-Paul Corash
1958-Harold Robinson
1959-Franklin Barber
1960-W. V. Hickey
1961-John Sheuring
1962-Charles E. Walton
1963-Ray Belknap
1964-John H. Fritz
1965-W. C. Lawton
1966-Fred E. Uetz
1967-P. R. Elliker
1968-A. N. Myhr
1969-Samuel O. Noles
1970-Milton E. Held
1971-Dick B. Whitehead
1972-Orlowe M. Osten
1973-Walter F. Wilson
1974-Earl O. Wright
1975-P. J. Skulborstad
1976-H. E. Thompson, Jr.
1977-H. V. Atherton
1978-David D. Fry
1979-Howard Hutchings
1980-Bill Kempa
1981-William Arledge
1982-Harry Haverland
1983-Robert Marshall
1984-A. Richard Brazis
1985-Archie Holliday
1986-Sidney E. Barnard
1987-Roy Ginn
1988-Leon Townsend
1989-Robert Gravani
1990-Ron Case
1991-Bob Sanders
1992-Damien A. Gabis
1993-Michael P. Doyle
1994-Harold Bengsch
1995-C. Dee Clingman

California Poly State University Wins Top Honors at 74th Annual Collegiate Dairy Products Evaluation Contest

The California Poly State University team took the All Products title at the 74th Annual Collegiate Dairy Products Evaluation Contest, sponsored in part by the DFISA Foundation and held at McCormick Place, Chicago, IL, in conjunction with MegaShow, November 6, 1995. Louisiana State came in a close second, with South Dakota State following directly behind, finishing third in the division.

Fourteen teams participated in this year's contest in which students were required to evaluate the quality of butter, cheddar cheese, milk, vanilla ice cream, cottage cheese, and strawberry swiss-style yogurt. The contest may be compared to professional wine tasting, in that students sample entries and rate the quality against a remembered role model. It takes a trained palate to distinguish subtle differences in taste, aroma, appearance, body and texture. Students' opinions of samples are compared to those of an expert panel of industry judges.

In addition to the DFISA Foundation, the annual contest is actively supported by the American Dairy Science Association, and the United States Department of Agriculture (USDA). The DFISA Foundation provided a $1,500 travel stipend to teams of three from each participating university. Awards and other support came from the American Butter Institute, Dairy Recognition and Education Foundation, International Ice Cream Association, Milk Industry Foundation and the National Cheese Institute. Judging was supervised by USDA.

The DFISA Foundation has established a $2,000 Seas Scholarship which was awarded to Cal Poly, for placing first in All Products. The Seas Scholarship is given in memory of Shirley W. Seas, who was Professor of Dairy Science at South Dakota State University. Seas was actively involved in the dairy manufacturing teaching program and management of the SDSU dairy plant.

Individual honors in the All Products division went to Devin Woodill, Cal Poly State, first place; Rhoda Lawson, Mississippi State, second place; and Lidyawati Widjaja representing Oregon State, third place.

For more information about the contest and results, contact Tom Gilmore, DFISA Technical Director, 703-761-2600.

FDA Approves Food Additive Petition for Radiation of Poultry Feed

In the September 28, 1995 *Federal Register*, the FDA announced that the Agency is amending the food additive regulations to provide for the safe use of gamma radiation from cobalt-60 in an absorbed dose range of 2 kiloGrays (kGy) (0.2 Megarads) (Mrad) to 25 kGy (2.5 Mrad), in poultry feed products. This action is in response to a food additive petition filed by Nordion International, Inc., Kanata, Ontario, Canada.

The use of irradiation was evaluated based on its ability to render poultry feeds and poultry feed ingredients *Salmonella* negative. *Salmonella* is known to cause animal disease. The effect of subclinical cases of *Salmonella* on animal production is difficult to quantitate. There are, however, substantial circumstantial data suggesting a potential link between the organisms in feed and organisms causing human and animal salmonellosis. For this reason in 1990, FDA announced a goal of *Salmonella* negative for animal feed and feed ingredients. FDA has defined *Salmonella* negative as 10 samples from a continuous production lot testing negative for *Salmonella* using the culture procedure described in the 7th edition of FDA's *Bacteriological Analytical Manual*.

Data submitted by the sponsor indicate that an irradiation dose of 1.0 kGy effectively reduces the *Salmonella* count by 1 log cycle (one decimal reduction). To ensure that irradiation achieves the intended purpose, all portions of the feed must receive at least the minimum absorbed dose. The minimum absorbed dose should be based on initial *Salmonella* concentration using the relationship that 1 kGy reduces *Salmonella* concentration by 1 log cycle. Based on the statistical power of the sampling plan, the minimum dose should be no less than 2 kGy in order to ensure that the *Salmonella* negative definition is met.

Data submitted by the sponsor indicate that an irradiation does have a minimal effect on the content of some nutrients such as water soluble vitamins and some amino acids. Feeds treated by irradiation should be formulated to account for such nutritional loss.

FDA has evaluated the data in the petition and other relevant material. The Agency concluded that irradiation of poultry feeds and poultry feed ingredients is safe when the feed is formulated to allow for nutritional loss, and that the regulations should be amended by adding new section (Title 21, Part 579.40.)

This amendment will allow the marketing of irradiation equipment by manufacturers, such as Nordion, for use by the poultry feed industry. Irradiation of poultry feed products is to be performed in a facility licensed by the U.S. Nuclear Regulatory Commission. Irradiators are to be operated in conformance to the requirements of the U.S. Department of Energy (10 CFR 51). The sponsor has indicated that there are currently at least twenty contract irradiation facilities in the U.S. capable of irradiating poultry feed products.

Additional information on this food additive approval is available in the Federal Register announcement or by contacting Dr. Sharon A. Benz, Center for Veterinary Medicine (HFV-226), Food and Drug Administration, 7500 Standish Place, Rockville, MD 20855, 301-594-1724.

Compliance Control Center Opens Foodsafety Internet Site

The Compliance Control Center, a premier Internet site covering foodsafety, HACCP, and the FDA Food Code, is open to those interested in the prevention of foodborne illness and risk reduction. The site offers specific information on cross-contamination and employee hygiene, as well as access to a broad body of foodsafety material and prevention strategies. In addition, the site offers links to the FDA's Foodborne Illness Educational Information Center and access to a variety of on-line publications, journals, and articles covering foodsafety. The Compliance Control Center is available at no charge through any on-line computer service provider (Compuserve, Prodigy, America-On-Line, etc.) at http://users.aol.com/com control/comply.htm or for access assistance contact Buck Brown, Director of Information, at 1-800-810-4000.

Seafood Allergies Summary Available

Allergies to seafood are among the most common food allergies in the United States.

The Institute of Food Technologists (IFT), a nonprofit scientific society of food scientists, recently released a Scientific Status Summary, *Seafood Allergy and Allergens: A Review*. This report discusses the different symptoms, treatments and the definitions of seafood allergies. The summary also touches upon the various testing methods physicians use to determine if a person has a seafood allergy.

For questions about seafood or to receive the summary contact Leigh Ann Disser, IFT media relations specialist, at 312-782-8424.

A Study by Reason Foundation Questions FDA Packing Regulations in Relation to Recycling

Food packaging regulations aimed at preventing contaminants from entering our food may discourage the use of recycled materials, according to the study **The FDA vs. Recycling: Has Food Packaging Law Gone Too Far?**, released recently by the Los Angeles-based Reason Foundation.

The Food and Drug Administration (FDA) operates under the assumption that all substances diffuse over time; i.e. everything that makes up your Coca-Cola bottle will *eventually* become part of your Coke, and vice versa. Therefore, it regulates the components of food packaging as *indirect* food additives, as opposed to *direct* food additives, like NutraSweet.

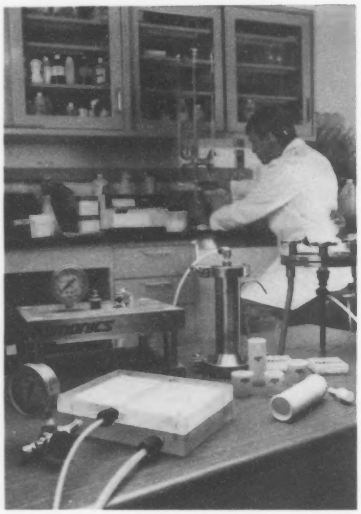
The study examines the implications of the FDA's "conservative risk assessment methods" which assume the worst-case scenario, regardless of whether any migration of contaminants between the packaging and the food has been detected. As a result, growth in recycled food packaging has been depressed, with little or no benefit. According to the study, even the FDA itself notes that indirect additives migrate to food in such "minuscule amounts" that they're "of extremely low or no toxicological concern in terms of food safety."

Volokh also charges that Prop. 65, California's labeling law, which is even more conservative than the FDA in its risk assessment, can scare consumers away from packaging with recycle content because the packaging contains "harmless, minute amounts of contaminants."

The FDA vs. Recycling: Has Food Packaging Law Gone Too Far? is the first study in a series to be released by the Reason Foundation on the regulatory barriers inhibiting the use of recycled materials. Related studies include *Solid Waste Recycling Costs: Issues and Answers, Garbage by the Pound: On the Streets, and Mandates or Incentives?: Comparing Packaging Regulations with User Fees for Trash Collection*. Copies of each study may be obtained by calling the Reason Foundation at 310-391-2245.

The Reason Foundation is a national public-policy research organization with a practical, market-based approach and an outside-Washington perspective. Founded in 1978 and based in Los Angeles, Calif., the Reason Foundation has earned a reputation for sound economic research and a how-to approach that benefits policy makers and elected officials who require practical solutions.

Industry**Products**



Osmonics Inc.

Microbiology Lab Solves Tomorrow's Filtration Problems Today

Osmonics, a major manufacturer of ultrapure water systems, filtration and separation products, uses an in-house, state-of-the-art microbiology lab to stay on the leading edge of technology.

This innovative lab provides a clean room environment fully equipped for microbial testing. Challenge testing using bacteria as the challenge particulate is performed to characterize the retention and sterilizing capabilities of membrane filters which include pleated membrane cartridge filters, ultrafiltration and reverse osmosis membrane elements as well as Osmonics' unique ceramic filters and silver membranes. In addition, routine microbial analysis is performed to further develop systems and techniques to minimize microbial problems such as bacterial fouling and system contamination. To test for Giardia, Cryptosporidium, the lab utilizes fluorescence microscopy. The lab is also used for pyrogen analysis to improve membranes and systems used in critical applications such as pharmaceutical Water For Injection (WFI).

The microbiology lab strengthens Osmonics' technical leadership in a number of industries which have concerns involving microbiological purity. Therefore, the pharmaceutical, medical, food, beverage and electronics industries all benefit from the tests conducted in this lab. The microbiology lab helps Osmonics provide its customers with products of unsurpassed performance and reliability backed by strong technical assistance and service.

Osmonics Inc., Minnetonka, MN

Readers Service No. 368

Neogen Releases Eight-Hour *E. coli* Test

Neogen Corporation has announced it is releasing a revolutionary new test system to detect the presence of *E. coli* O157:H7 in just eight hours. This is the fastest test in the industry allowing same-day results in one-third the standard time.

Micro-Screen•8 was developed as part of a research contract with the USDA/FSIS. This is the only test system for *E. coli* O157:H7 that can accurately and reliably detect the bacteria after an eight-hour incubation in MS•8 Media. Conventional methods can take two to three days, while other "rapid" tests take at least 24 hours to screen for the pathogen.

As with Neogen's current Micro-Screen test kit for *E. coli* O157:H7, the test only takes 15 minutes. However, the new test incorporates a special media broth that allows results after an eight-hour incubation. The user then simply places four drops of the media into the port of the test stick, and reads the results.

"Micro-Screen•8 will give our customers a quicker one-step test to use when expediency is an issue," said Ed Bradley, vice president of sales and marketing for the Neogen meat and poultry division. "We are continually looking at ways of improving our products. This test is a major break-through, and we're happy to get a test on the market that will address the all-important time issue."

The fact that Micro-Screen•8 is easy to use and requires less than a $500 investment in equipment and training, makes it easy to incorporate this product into any pathogen screening program.

Neogen Corporation, Lansing, MI

Reader Service No. 369

New 24 Hour Enterococci Test

IDEXX Laboratories announces a 24 hour enterococci test, called Enterolert™. Like Colilert®, the coliform and *E. coli* test, Enterolert is based on IDEXX's Defined Substrate Technology® (DST™).

To perform the test, add reagent to sample, incubate 24 hours in a P/A vessel or Quanti-Tray™, and look for fluorescence. Enterolert consistently detects down to one enterococcus in a 100

ml sample, Quanti-Tray yields counts from 1 to 200 without a dilution.

Unlike traditional methods, Enterolert is able to suppress heterotrophs without sodium azide. This minimizes heterotrophic interference without compromising lab personnel safety.

IDEXX Laboratories, Inc., Westbrook, ME

Reader Service No. 370

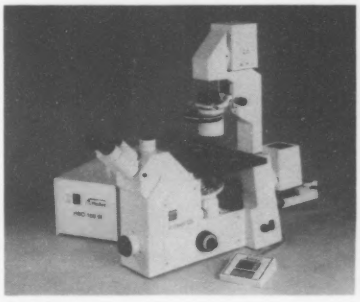
New systemSURE™ Portable Hygiene Monitor for Food and Beverage Manufacturing

Celsis, Inc., formerly Integrated Biosolutions, has introduced the new systemSURE, a highly sensitive, portable hygiene monitor which can detect and document very low levels of microbial contamination in food and beverage manufacturing. Designed to meet the requirements for fast information, systemSURE provides immediate, on-the-spot assessment of the cleanliness of production processes throughout the plant. Since there are no delays waiting for laboratory results, the risk of contamination in production can be substantially minimized. Using the latest ATP technology, this new system offers greater sensitivity and improved reproducibility. systemSURE is easy to use, and produces results in less than one minute. It weighs less than 0.7kg and can be held in one hand.

systemSURE can be easily incorporated into Hazard Analysis Critical Control Point (HACCP) programs. Unrivaled data management capacity helps ensure that all results are available for hygiene audits by regulatory authorities. The instrument can store up to 1200 results, and data can be downloaded to an optional PC data base. This data base provides a secure record of several year's results and enables trend analysis.

Celsis, Inc., Monmouth Junction, NJ

Reader Service No. 371



Carl Zeiss, Inc.

New Fluorescence Microscopy Variable Light Control Eliminates Need for Neutral Density Filters & Extends Bulb Life

Carl Zeiss, Inc., Microscope Division, has introduced the **AttoArc**™ Variable Intensity Light Control for HBO 100 mercury lamps used in Zeiss fluorescence microscopes. Using **AttoArc**, scientists for the first time can control the intensity of 100 watt fluorescence illumination systems.

The **AttoArc** unit, which replaces the conventional power supply, attaches easily to existing Zeiss HBO sockets (post-1987 models with the ignition device in the socket). It provides instant, continuously variable electronic control of the lamp intensity from 100% down to 15% using the compact touchpad controller.

The use of the **AttoArc** Light Control eliminates the need for neutral density filters, a major advance in fluorescence microscopy convenience. Epi-fluorescence tags subject to photobleaching will last longer under the less intense light possible with the **AttoArc** Light Control.

Another important benefit of using the **AttoArc** Light Control is the increase in the mercury lamp bulb life. Extended use of a mercury lamp at full intensity shortens the bulb's lifespan. With **AttoArc**, scientists can dim the light to as low as 15% of full intensity when the microscope is not in use. Bulbs will last significantly longer, with the resulting savings in time involved in bulb replacement.

Carl Zeiss, Inc., Thornwood, NY

Reader Service No. 372

Important Advancement in Microbiology Testing Unveiled for Food Processors by 3M

3M Petrifilm Series 2000 Rapid Coliform Count Plates for the first time deliver rapid read-out results of coliform colonies, and do so in significantly less time than traditional agar plates.

Specifically, instead of waiting 24 hours to obtain results of coliform colony counts, as is typical of traditional testing methods, microbiology quality assurance teams may begin reading results after 4 hours of incubation. With Petrifilm Series 2000 Plates, presumptive coliform colonies may begin to appear at 6 hours of incubation, and confirmed colonies may begin to appear at 8 hours of incubation. Catastrophic coliform contamination may be apparent after 4 hours of incubation.

To achieve rapid read-out of coliform colonies, 3M's Petrifilm Series 2000 Rapid Coliform Count Plate uses accelerating media coupled with high pH sensitivity to make it easier to identify and count colonies that appear.

Rapid read-out coliform plates don't require instrumentation and provide food processing companies with a highly cost-effective means for obtaining rapid coliform counts.

This can help speed the quality assurance process, resulting in quicker identification and isolation of any potential contamination problems. The result is increased overall plant productivity by reducing and limiting the amount of rejected materials, and allowing product to be moved more quickly through the entire production process and into distribution and shipping.

At present, Petrifilm Series 2000 Plates are specific to coliform colonies, though 3M is developing additional rapid read-out tests and hopes to have a complete line of rapid read-out products for the food processing industry.

3M, Microbiology, St. Paul, MN

Reader Service No. 373

Assay Detects Staphylococci in 80 Minutes

bioMérieux Vitek's Staph Enterotoxin (SET) Assay allows owners of the VIDAS® automated microbiology system to rapidly screen for one of the most common causes of food poisoning.

Although Staphylococci can be destroyed by heat treatment, the preformed toxins are heat stable and can survive heat processing and even retorting.

The VIDAS SET Assay, a qualitative enzyme-linked fluorescent immunoassay, is performed in the fully automated VIDAS® and mini VIDAS® instruments. Following a simple extraction protocol of the food sample, results are available in approximately 80 minutes.

The assay detects Staphylococcal enterotoxins A, B, C1, C2, C3, D and E.

bioMérieux Vitek, Inc., Hazelwood, MO

Reader Service No. 374

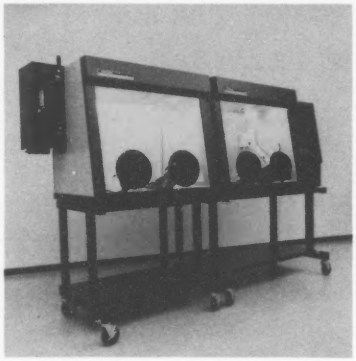
Difco Introduces Bacto® Lactobacilli MRS Agar for Food and Dairy Applications

A new culture medium from Difco Laboratories makes it easier to detect *Lactobacilli* in food and dairy samples. Bacto Lactobacilli MRS Agar, now available from Difco, is used for the enrichment, cultivation and isolation of the *Lactobacillus* species, particularly in dairy and yogurt products.

Bacto Lactobacilli MRS Agar is convenient to use, provides accurate test results, and is readily available from local Difco distributors. It comes as a preformulated, dehydrated medium, eliminating the need to weigh multiple ingredients prior to preparation. Laboratory staff workload may be reduced since growth of organisms other than *Lactobacilli* may be inhibited, which reduces the need to identify organisms which are not of interest. Bacto Lactobacilli MRS Agar is packaged in a convenient 500g bottle for easy use and storage. The bottle features an "off center" opening for weighing and pouring ease. Bacto Lactobacilli MRS Agar meets all laboratory customer quality requirements by complying with AFNOR V04-503, DIN 10109 and IDF 117A norms. It adheres to the same quality standards that Difco, an ISO-9001 manufacturer, sets for all of its products.

Difco Laboratories, Detroit, MI

Reader Service No. 375



Labconco Corporation

Labconco Protector® Double Glove Boxes are Available for Multi-Hazard and Controlled Atmosphere Applications

Labconco Corporation offers stainless steel lined Double Glove Boxes in two configurations. The Protector Multi-Hazard Double Glove Box provides protection against radioisotope, bacteriological and carcinogenic agents. The Protector Controlled Atmosphere Double Glove Box provides a leak-tight physical barrier for work with organometallic, oxygen sensitive, or moisture sensitive materials.

The Protector Double Glove Boxes are composed of two interior 36.25" wide sections linked by a 9.34" wide raised bridge. The bridge, featuring two 115 volt electrical outlets, accomodates the placement of electronic equipment and protects valuable equipment from chemical spills. Accessories such as gas valves and electrical ports may be installed either on the bridge or inside the glove box chambers. An accessory insert provides a level work surface spanning the entire glove box interior.

Protector Double Glove Boxes feature a one-piece stainless steel liner and durable epoxy-coated steel exterior. Large observation windows of 3/8" laminated safety glass are angled to minimize reflections. Other standard features include a transfer chamber with 15" x 13" outer door, neoprene gloves, two additional 115 volt electrical outlets, one exterior electrical outlet for connection to a vacuum source, two fluorescent lamps, and exterior control switches for fluorescent lamp and electrical outlets. Options include a built-in automatic pressure control module, purge/fill control module, regenerative drying train system, sliding transfer tray, and mini-exchange chamber.

The Multi-Hazard Double Glove Boxes can be customized for various applications with a blower and accessory air filtration kits. The Controlled Atmosphere Double Glove Boxes have pressure gauges on the control panel to monitor the transfer chamber and main chamber pressures.

Labconco Corporation, Kansas City, MO

Reader Service No. 376

Microbial Contamination Detection Kit

American Type Culture Collection (ATCC) announces availability of Culture-Check™, a simple, cost effective kit for testing cell lines and media components for microbial contamination. The kit consists of 5 sets of tubes, each set providing a range of selective media for detecting bacteria and fungi: four bacterial detection tubes– Brain Heart Infusion (BHI), Trypticase Soy Broth (TSB), Harpo's Trypticase Yeast Extract (HTYE), and Sheep Blood Agar (SBA); and one fungal detection tube– Sabouraud Broth (SAB). Each kit provides five complete contamination tests.

Culture-Check™ is ideal for differentiation between normal cell debris and impuritites due to bacterial or fungal contamination. The test procedure involves a simple inoculation of a set of tubes with .2ml of test liquid, followed by observation of the tubes daily for a period of 1-3 weeks. Visible growth in any of the tubes is indicative of contamination.

American Type Culture Collection, Rockville, MD

Reader Service No. 377

BusinessExchange

Services/Products

Sanitation Manager

Frito-Lay, Inc., the world leader in the snack food industry is currently seeking experienced sanitation personnel for the Southeast Division. Responsible for plant sanitation management, maintenance of equipment and supervision of approximately 65 employees. Strong technical knowledge, food science background, and the ability to maintain American Institute of Baking standards is essential. Experience with F.D.A., E.P.A., and the Department of Agriculture also required. Bachelors degree, 5-7 years of sanitation experience, and the ability to work 3rd shift and weekends is necessary. We offer a competitive salary, benefits and bonus. Please submit resume with cover letter to:

Frito-Lay, Inc.
Attn: Employment - S
2911 Nevada Boulevard
Charlotte, NC 28273
Fax: (704) 588-3250

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Reader Service No. 129

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Reader Service No. 163

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Reader Service No. 153

ComingEvents

FEBRUARY 1996

·2-29, **University of Minnesota Plans Agricultural Tour,** to Australia and New Zealand. The agricultural emphasis of the tour is on dairying, and it will provide insight into the world's most efficient dairy operations. There will be visits to dairy farms, cattle and sheep ranches, agricultural colleges, and research facilities. For a brochure about the tour, contact Extension Special Programs, 405 Coffey Hall, University of Minnesota, St. Paul, MN 55108-6068; phone 1-800-367-5363 or (612) 625-1978.

·5-7, **Flavors: Their Creation, Definitions and Use,** This course is designed to provide the participant with a basic understanding of the TQM process and its implementation in the food industry. For more information, contact Registrar, The Center for Professional Advancement, PO Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; fax (908) 238-9113.

·7-8, **Food Processors Sanitation Workshop,** held in Santa Nella, CA. Sponsored by the University of California, Davis. Contact Karen Jo Hunter, Dept. Food Science & Technology; phone (916) 752-1466; fax (916) 752-4759; e-mail: kjhunter@ucdavis.edu.

·13-15, **Institute of Food Technologists Low-Calorie Food Product Development,** Grosvenor Resort, Orlando, FL. Course co-sponsored by the IFT Continuing Education Committee and American Association of Cereal Chemists. For more information, contact Dean Duxbury, IFT's Director of Professional Development, 221 N. LaSalle St., Suite 300, Chicago, IL 60601; telephone (312) 782-8424; fax (312) 782-8348.

·14-16, **The University of Florida Presents The Backflow Prevention Assembly Repair & Maintenance Course,** held at the TREEO center in Gainesville, FL. This is an advanced course for certified backflow technicians. Individuals wishing to register should call (904) 392-9570, ext. 112.

·17-20, **International Sweetener Colloquium,** Bonaventure Resort & Spa, Ft. Lauderdale, FL. The program will cover a variety of international and domestic issues facing the future of the sweetner industry. For more detailed information, please call (202) 737-4332.

·17-20, **Ice Cream Technology Conference,** Red Lion's La Posada Resort, Scottsdale, AZ. A concise, up-to-the minute symposium exclusively for manufacturers of frozen desserts. For more detailed information, please call (202) 737-4332.

·21-22, **The University of Florida Presents a Cross-Connection Control Course,** held at the TREEO center in Gainesville, FL. This conference will address current issues in cross-connection control and backflow prevention. Individuals wishing to register should call (904) 392-9570, ext. 112.

·21-23, **American Association of Cereal Chemists,** will sponsor the following educational event: Natural Flavors, in Orlando, FL. For more information contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@ scisoc. org.

·28-March 1, **Industrial Sterilization and Microbiological Quality Control,** East Brunswick, NJ. This course examines steam, ethylene oxide, filtration and radiation sterilization in the medical device, diagnostic and pharmaceutical industries in relation to technique, method selection and equipment required. For more information, contact Registrar, The Center for Professional Advancement, PO Box 1052, East Brunswick, NJ 08816; telephone (908) 613-4500; fax (908) 238-9113.

MARCH 1996

·4-5, **IBC's World Summit on Agricultural Biotechnology,** A comprehensive, interactive forum on utilizing biotechnology to improve agricultural processes, Santa Fe, NM. For further information call (508) 481-6400; fax (508) 481-7911.

·4-6, **Quality Assurance for the Food Industry,** This course is designed to provide the participant with a basic understanding of the TQM process and its implementation in the food industry. For more information, contact Registrar, The Center for Professional Advancement, PO Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; fax (908) 238-9113.

·4-6, **IBC's Second Annual International Symposium, Obesity-Advances in Understanding and Treatment,** held at Washington Vista Hotel in Washington, DC. Posters will be accepted up to Feb. 12, 1996. Call (508) 481-6400 or fax (508) 481-7911—IBC for immediate registration or write IBC, USA Conferences, 225 Turnpike Road, Southborough, MA 01772-1749.

·4-8, **Mold Identification Workshop,** sponsored by the Food Science Dept. at Purdue University. For more information contact, Dr. Maribeth A. Cousin, Food Science Dept., 1160 Smith Hall, Purdue University, West Lafayette, IN 47907; phone (317) 494-8287.

• **4-8, Backflow Prevention Technician Training & Certification,** at the TREEO Center in Gainesville, FL. This course provides guidelines for acceptable practices for annual testing of backflow prevention assemblies used in cross-connection control programs. Individuals wishing to register should call (904) 392-9570, ext. 112.

• **11-12, International Seminar on Microbiological Criteria & Risk Analysis,** Wolfpassing, Austria. Further information obtainable from E. Hopkin, International Dairy Federation, 41 Square Vergote, B-1040 Brussels/Belgium, telephone +32 2 733 16 90; fax +32 2 733 04 13.

• **13-15, Symposium on Bacteriological Quality of Raw Milk,** Wolfpassing, Austria. Abstracts of oral presentations and posters are welcome until January 31, 1996 and should be sent to: Dr. G. Hahn, Institut für Hygiene, Postfach 60 69, D-24121 Kiel (Germany), (fax) +44 431 609222.

• **19-20, Carolinas Association of Milk, Food and Environmental Sanitarians Annual Meeting,** will be held at the Best Western–Merchandise Mart in Charlotte, NC. Please contact Kay Sigmon at (704) 663-1699 for further details.

• **19-21, HACCP Workshops,** sponsored by The Educational Foundation of the National Restaurant Association and the Food and Drug Administration. For more information, contact Kyle Gould at (312) 715-5369.

• **20, Food Industry Conference,** sponsored by the Food Science Dept. at Purdue University. For more information contact, James V. Chambers, Food Science Dept., 1160 Smith Hall, Purdue University, West Lafayette, IN 47907; phone (317) 494-8279.

• **20-22, Food Irradiation Technology,** Chicago, IL. This course is designed to bring food industry people up-to-speed in this important area of new technology. The basic science and technology pertinent to food irradiation are covered. For more information, contact Registrar, The Center for Professional Advancement, PO Box 1052, East Brunswick, NJ 08816; telephone (908) 613-4500; fax (908) 238-9113.

APRIL 1996

• **3-5, Missouri Milk, Food & Environmental Health Association 1995 Annual Educational Conference,** in Columbia, MO. For further details, contact Stephen St. Clair, R.S. at (314) 221-1166.

• **11-13, The Association of Water Technologies Spring Conference,** to be held in Anaheim, CA at the Disney Land Hotel. Please contact Mary Beth Belka at (703) 524-0905 or fax (703) 524-2303 for further information.

• **14-16, Annual Meeting of the Milk Industry Foundation Board, the National Cheese Institute Board and the International Ice Cream Association Board,** to discuss current issues. For more information contact, IDFA, 1250 H St., NW, Suite 900, Washington, DC 20005; phone (202) 737-4332; fax (202) 331-7820.

• **14-18, The Fourth Latin American Congress on Food Microbiology & Hygiene,** will be held in Lima, Peru. The program of activities includes plenary speeches by worldwide known specialists, round tables, posters and oral presentations, courses and seminars. For more information, contact Dr. Fernando Quevedo, Honorary President, 11604 Deborah Dr., Potomac, MD 20854; phone (301) 299-9291; fax (301) 299-9448, USA; or in Peru: Santa Luisa 155, Suite 204, San Isidro, Lima 27, fax (5114) 218 317 or (5114) 373 152. President of the Congress: Dr. Alina Ratto, Av. del Ejercito 467 Miraflores, Lima, Peru Tel/fax (5114) 413 939.

• **17-19, Chemical Leavening,** San Diego, CA sponsored by the American Association of Cereal Chemists. For more information, contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097, USA; phone (612) 454-7250; fax (612) 454-0766; E-mail aacc@scisoc. org.

• **29-May 1, Food Protection Workshop,** at the Holiday Inn Downtown-Riverfront, St. Louis, MO. This comprehensive 3-day seminar covers GMP's, HACCP, ISO 9000, food safety issues and regulatory trends, insect and rodent control, cleaning and sanitizing techniques, proper conditions for storage and tranportation of food products. For more information, contact Vicki Bodrow, ASI Food Safety Consultants, Inc., 7625 Page Blvd., St. Louis, MO 63133 or call (314) 725-2555 or (800) 477-0778.

MAY 1996

• **6-8, Third International Conference on Residues of Veterinary Drugs in Food,** Veldhoven, The Netherlands. Inquiries to Dr. N. Haagsma, Utrecht University, Faculty of Veterinary Medicine, Dept. of the Science of Food of Animal Origin, section Food Chemistry, P.O. Box 80.175, NL-3508 TD Utrecht, The Netherlands; telephone +31-30-535365/535367; fax +31-30-532365.

• **6-8, Introduction to Food Chemistry,** Chicago, IL sponsored by the American Association of Cereal Chemists. For more information, contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097, USA; phone (612) 454-7250; fax (612) 454-0766; E-mail aacc@ scisoc. org.

• **7-9, Food Regulations and Their Impact on Additives and Ingredients Seminar,** Radisson Hotel, Newark, NJ. This new seminar presents the impact of regulations in the EC, U.S.A., and some Latin American countries on the usage of food additives and ingredients. For detailed

seminar agendas and registration please call (717) 291-5609; fax (717) 295-4538.

·**12-15, Associates of Clinical Pharmacology 20th Annual Meeting,** in Nashville, Tennessee. The meeting will take place at the Opryland Hotel Convention Center. For more information contact, Dr. Frederic Harwood at (202) 737-8100 or fax (202) 737-8101.

·**27-31, Fourth World Congress on Environmental Health,** will take place in Aberdeen, Scotland. Subjects to be covered during the Congress include Pollution Control; Food Safety; Occupational Health and Safety; Waste Management; Housing; Water; Environmental Protection; and Communicable Disease Control. For further information, call (01896) 754751; fax (01896) 757003.

JUNE 1996

·**2-4, IDDA's 32nd Annual Seminar & Expo; Dairy-Deli-Bake 96,** held at the Minneapolis Convention Center in Minneapolis, MN. For further information contact IDDA, PO Box 5528, Madison, WI 53705-0528; phone (608) 238-7908; fax (608) 238-6330.

·**4-6, 4th ASEPT International Conference, Sécurité Alimentaire 96/Food Safety 96, co-sponsored by IAMFES.** Laval, France, with the ASEPT/EHEDG Symposium 1996. Contact AMGAR-ASEPT-BP49-53020 LAVAL CEDEX-France or call 33-16 43 49 22 22; fax 33-16 43 53 36 53.

·**10-12, The 18th Mycotoxin Workshop,** organized by the Institute of Mycrobiology and Toxicology, and held in Kulmbach, Germany. Further information available by phone +49-9221-803-221; or fax +49-9221-803-331.

·**30-July 3, International Association of Milk, Food and Environmental Sanitarians, Inc. 83rd Annual Meeting,** in Seattle, WA. For additional information contact Julie Cattanach at (800) 369-6337; fax (515) 276-8655.

JULY 1996

·**12-19, Rapid Methods and Automation in Microbiology: International Workshop XVI,** Kansas State University, Manhattan, KS. A mini-symposium will occur on July 12-13. Contact Dr. Daniel Y. C. Fung, Workshop Director for further information, telephone (913) 532-5654; fax (913) 532-5681.

Advertising Index

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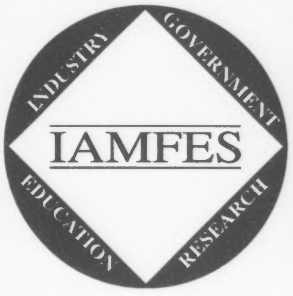

This is Your Personal Invitation to Join

The International Association of Milk, Food and Environmental Sanitarians, founded in 1911, is a non-profit educational association of food protection professionals. The IAMFES is dedicated to the education and service of its members, specifically, as well as industry personnel in general. Through membership in the Association, IAMFES members are able to keep informed of the latest scientific, technical and practical developments in food protection. IAMFES provides its members with an information network and forum for professional improvement through its two scientific journals, educational annual meeting and interaction with other food safety professionals.

Who are IAMFES Members?

The Association is comprised of a diverse membership of over 3,200 from 75 nations. IAMFES members belong to all facets of the food protection arena. The main groups of Association members fall into three categories: Industry Personnel, Government Officials and Academia.

Why are They IAMFES Members?

The diversity of its membership indicates that IAMFES has something to offer everyone involved in food protection and public health.

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Dairy, Food and Environmental Sanitation — Published monthly, this is the official journal of IAMFES. Its purpose is the disseminating of current information of interest to the general IAMFES membership. Each issue contains three to five informational applied research or general interest articles, industry news and events, association news, columns on food safety and environmental hazards to health, a food and dairy industry related products section, and a calendar of upcoming meetings, seminars and workshops. All regular IAMFES members receive this publication as part of their membership.

Journal of Food Protection — A refereed monthly publication of scientific research and authoritative review articles. Each issue contains 15 to 20 technical research manuscripts and one to five articles reporting a wide variety of microbiological research pertaining to food safety and quality. The *Journal of Food Protection* is internationally recognized as the leading publication in the food and dairy microbiology field. This journal is available to all individuals who request it with their membership.

The IAMFES Annual Meeting — Held in a different city each year, the IAMFES Annual Meeting is a unique educational event. Three days of technical sessions, scientific symposia and commercial exhibits provide members and other industry personnel with over 200 presentations on the most current topics in food protection. It offers the opportunity to discuss new technologies and innovations with leading authorities in various fields concerned with food safety. IAMFES members receive a substantially reduced registration fee.

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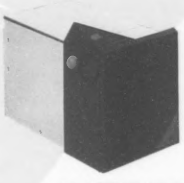

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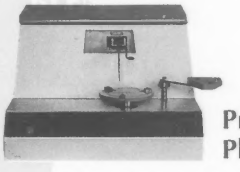

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