ISSN: 1043-3546

6200 Aurora Avenue•Suite 200W
Des Moines, Iowa•USA•50322

DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. APRIL 1997

- 1998 Call for Symposia
- 84th Annual Meeting Program

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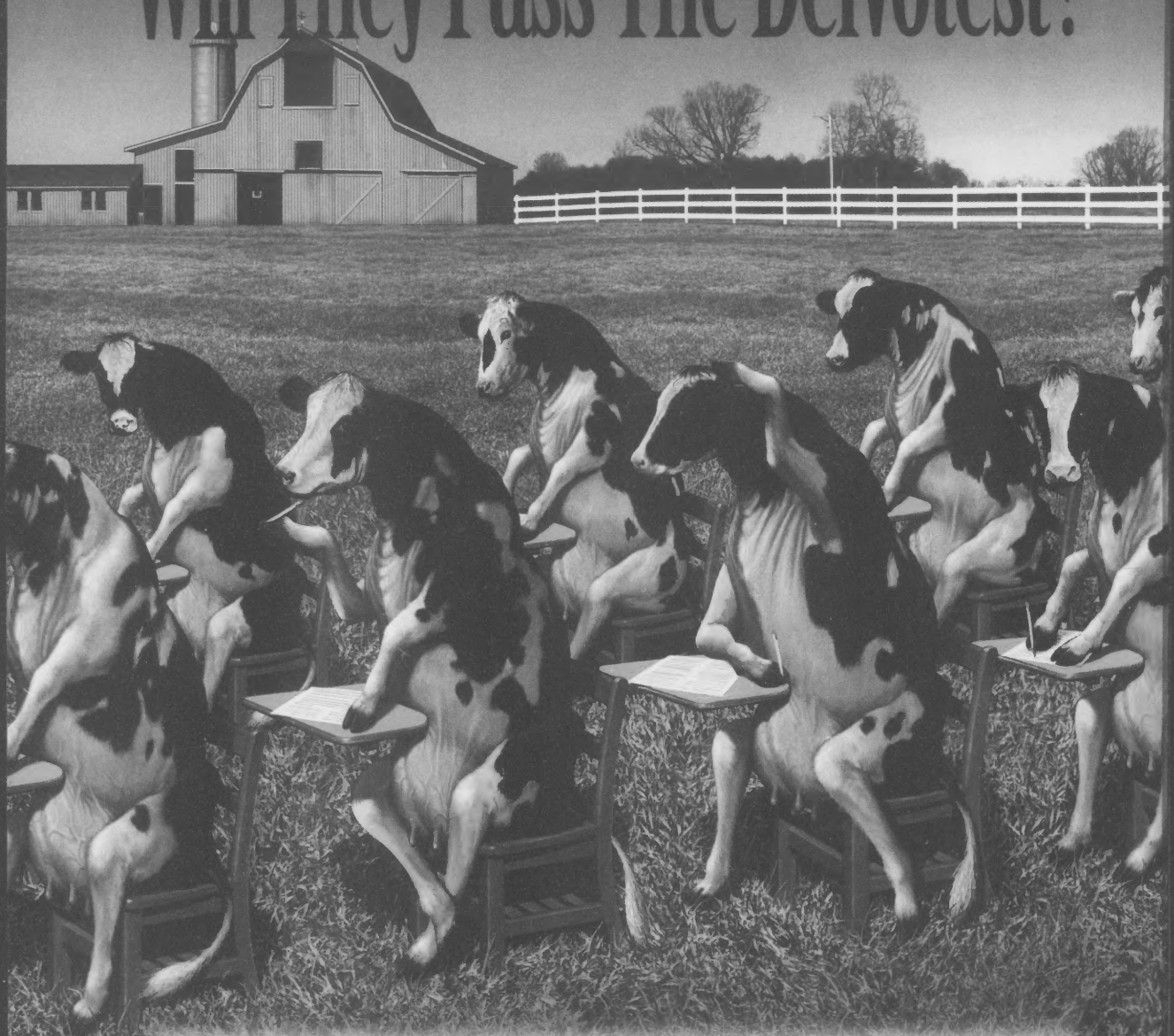

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6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, USA

Dairy, Food and Enviranmental Sanitatian (ISSN-1043-3546) is published monthly beginning with the Jonuory number by the Internotionol Associotion of Milk, Food ond Environmentol Sonitorions, Inc. Eoch volume comprises 12 numbers. Printed by Heuss Printing, Inc., 911 N. Second Street, Ames, IA 50010, USA. Periodicol Postoge poid ot Des Moines, IA 50318 ond odditionol entry offices.

Pastmaster: Send oddress chonges to **Dairy, Faad and Enviranmental Sanitatian,** 6200 Auroro Avenue, Suite 200W, Des Moines, IA 50322-2863, USA.

IAMFES, Inc., Mailing Address: 6200 Auroro Avenue, Suite 200W, Des Moines, IA 50322-2863, USA.

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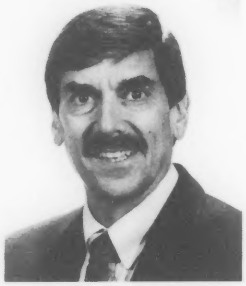
FROM THE PRESIDENT



By MICHAEL H. BRODSKY
IAMFES President

"The human element"

I recently attended a spring workshop "Do You Know Your Risks in Consumer Health?" sponsored by the Ontario Affiliate (Ontario Food Protection Association, Inc.). The lead speaker was Ms. Anne Nickerson-Jackie. You may not have heard of her. She is not a scientist or person renowned in food safety. Certainly, I did not know who she was prior to the meeting. Mrs. Nickerson-Jackie is "simply" a mother with a child who ate an improperly cooked hamburger and subsequently developed a gastrointestinal infection due to *Escherichia coli* O157:H7. Her story about the sequelae to this foodborne infection that her daughter continues to suffer should be mandatory reading for all of us involved in food safety. Her lay presentation was a sobering reminder that behind every contaminated sample could be a person who suffers excruciating agony because someone else did not practice safe food handling techniques.

She had attended a picnic with her two-year old daughter. The little girl wanted a barbecued hamburger to eat, her first ever. Two days later, she began to complain about an upset stomach and within five days had to be hospitalized. She remained in the hospital for a month with an uncertain prognosis. The little girl underwent frequent blood testing, peritoneal dialysis, kidney dialysis and was catheterized for haemodialysis. Now 5 years old, she is suffering from chronic kidney disease, with only 30% function, has severe dietary restrictions, has toxic build up in her blood requiring continuous visits to a clinic for dialysis, and will require life-long medical support. She will require a kidney transplant by the time she is 10-12 years of age, which will probably have to be repeated every 10-15 years. She will also be increasingly susceptible to other diseases and illnesses; including cancer. As a result of her experience, Ms. Nickerson-Jackie established the Jackie Family Fund in cooperation with the Canadian Kidney Foundation, to help other children with similar disorders.

This incident should never have happened and it is our responsibility to ensure that such foodborne episodes do not reoccur. Mrs. Nickerson-Jackie's message to us all should be heeded.

In the U.S. President Clinton recently announced a major food safety initiative to increase funding to improve technology, but he did not refer to the need for improved food safety education. We need to do everything in our power to educate not only food safety professionals, but also the consumer. We need to enhance consumer knowledge and hence empower the consumer to make appropriate decisions with regard to safe food handling practices. We need to make the consumer aware not only of the causes and consequences of foodborne illness, but also how to avoid food poisoning.

This commentary is a request to IAMFES and its affiliates to ensure that we include consumers in our scientific programs. We must never lose sight of those at risk when we gather to exchange and share our scientific knowledge and expertise. Who better to provide this information than those who profess to be the food safety professionals.

As always, if you have any comments on this column, please don't hesitate to contact me (e-mail: brodskm@gov.on.ca, telephone (416) 235-5717, Fax (416) 235-5951).

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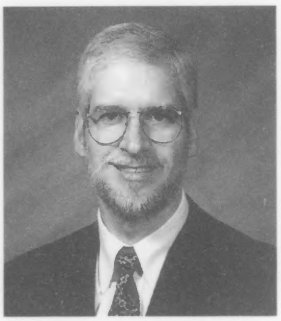
COMMENTARY

FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP
IAMFES Executive Director

"Come for the meeting, stay for the fun"

With spring, thoughts turn to the IAMFES Annual Meeting. This year's Meeting will be held at the Hyatt Regency Grand Cypress Hotel in Orlando, FL, July 6-9. This issue of *DFES* is our Pre-Meeting issue and contains everything you need to plan your participation. Please take time to review the program materials; then make your commitment to attend by sending in your registration forms. Early registration ensures you the lowest rate for the Meeting and hotel.

Come for the Meeting, stay for the fun! Plan to spend extra time at the Hyatt and in Orlando. There is so much to see and do. Of course, Orlando is home to Disney where there is Magic Kingdom, Epcot Center, MGM Studios, Pleasure Island, and more!

You can also visit Universal Studios, Sea World, Splendid China, Busch Gardens, Kennedy Space Center, Cypress Gardens, Church Street Station... just too many to mention. I'm sure you will agree; your entire family would enjoy coming with you!

We have an excellent room rate at the finest hotel property in Orlando. Our rate is more than 60% off the normal rate and is good for July 1-13. The Hyatt Grand Cypress has a golf club with 45 holes, a racquet club with 12 courts, and an equestrian center – don't forget to bring your horse! Canoes, sailboats, and bicycles are available; also a fitness trail, a chip & putt golf course, and a beautiful pool with waterfalls. Now with all this, don't you agree that you should "come for the Meeting, then stay for the fun!"

At last year's Meeting in Seattle, the Program Advisory Committee reviewed symposia proposals for the 1997 Meeting; they then met in January to review abstracts for poster and technical sessions. As a result, the Committee scheduled 25 sessions for the 84th IAMFES Annual Meeting. This Committee puts forth a great effort to develop the program each year and has provided you with excellent, timely topics, and expert presenters. Our thanks to Chairperson John Cerveny and his Committee for their dedicated work.

The Florida IAMFES Affiliate has a Local Arrangements Committee (LAC) who have been organizing their group to ensure all attendees feel welcome during their stay in Orlando. The LAC's planning started almost two years ago and is led by co-chairs Peter Hibbard and John Chrisman, both with Darden Restaurants in Orlando. Local Arrangements coordinates volunteers to staff our meeting rooms and help at registration. After working with Peter, John, and other Florida Affiliate Members, I'm certain you will feel their enthusiasm when you arrive.

Our Executive Board and IAMFES staff begin planning for Annual Meetings about three years before the Meeting. So you can see, much time and effort by many has been combined to bring you the highest quality program in a truly enjoyable atmosphere. Again, take time to review the program in this issue. Identify presentations of interest and remember to register now.

Don't overlook the tours and special events listed. We have three tours this year: Kennedy Space Center, All Around Orlando, and Cypress Gardens. On Sunday, IAMFES Committees, Professional Development Groups and Task Forces meet. In addition, IAMFES will host a golf tournament Sunday morning. Martha Rhodes Roberts, Florida Department of Agriculture and Consumer Services, will be the Ivan Parkin Lecturer for the opening session. Our Cheese and Wine Reception follows. The Monday evening social will be "Sail Away... A Key West Evening." It's sure to be a relaxing, enjoyable time. The Meeting concludes with our Awards Banquet on Wednesday night. The Banquet honors colleagues selected as 1997 IAMFES award winners.

Of course the most important reason for attending the IAMFES Annual Meeting is the educational sessions and networking with food safety professionals from around the world. Each year we are able to improve the Annual Meeting program. This year's Meeting will prove to be the best ever; plan now to be a part of it! We'll see you in Orlando.

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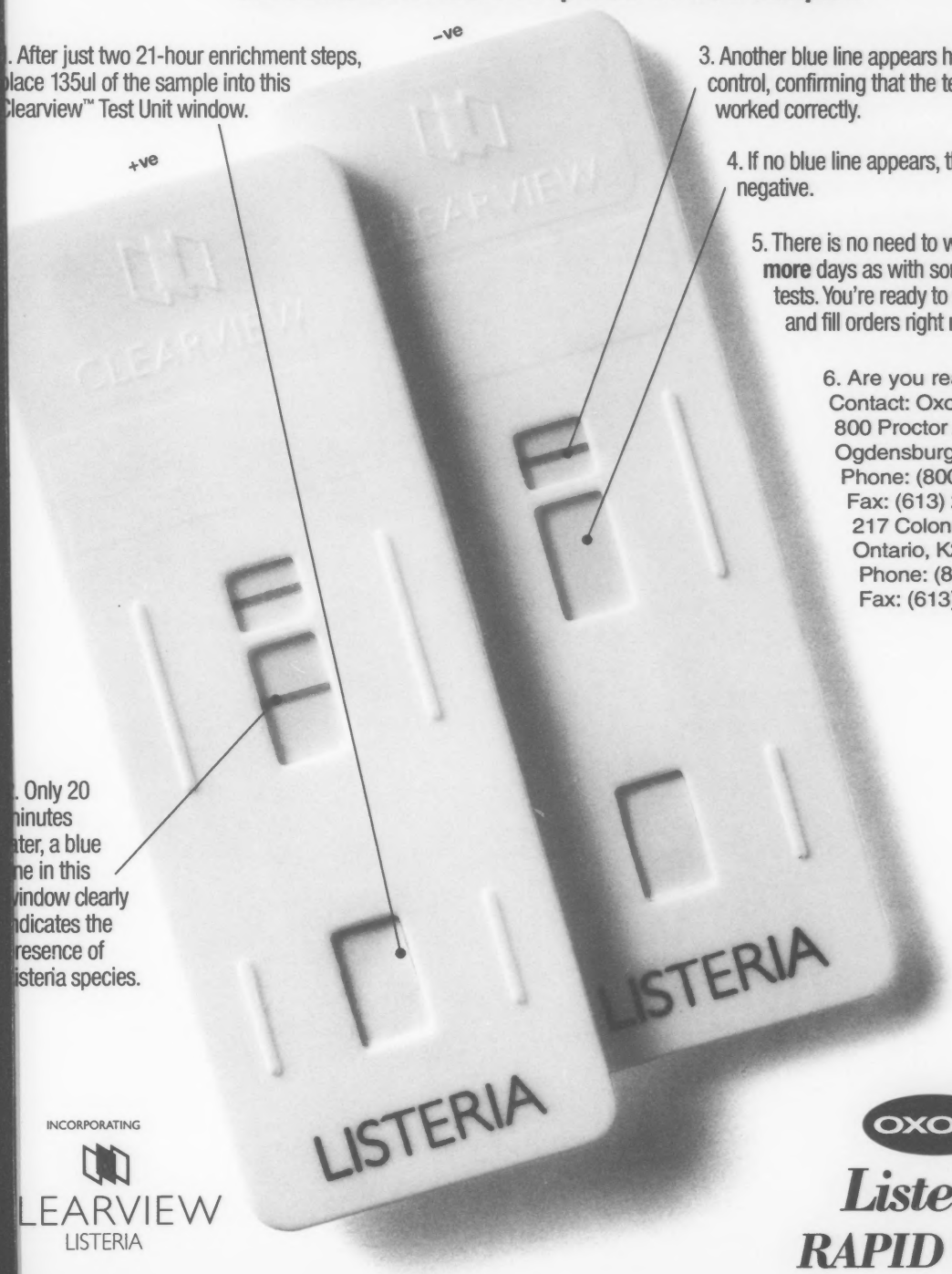

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Dairy, Food and Environmental Sanitation, Vol. 17, No. 4, Pages 210-215

Recovery of Mastitis Pathogens from Udder Cloths Following Several Laundering Methods

Lawrence K. Fox

SUMMARY

Mastitis pathogen counts from cloth towels used to wash cow udders and the changes in counts after several laundering techniques were studied. The center portions of the towels were removed after a premilking cleaning of the teats and before and after applying eight laundering treatments. Laundering treatments consisted of a hot or cold water wash, the use of bleach (yes/no), and forced, hot air drying after washing (yes/no) in a 2×2×2 factorial design experiment. Laundering reduced 10^4-10^8 by the pathogen count CFU/ml on towels. Coagulase-negative *Staphylococci* accounted for most of the recovered pathogens from towels. Significantly more mastitis pathogens were recovered from towels laundered with a cold water wash without bleach and without forced drying. The pathogen counts for all other treatments were similar. These results indicate that mastitis pathogen counts from udder cloth towels are markedly reduced by laundering. A laundry procedure that includes one of the following: hot water wash, bleach during washing, or forced hot air drying, is recommended to ensure that the presence of mastitis pathogens on udder cloths is reduced to levels deemed insignificant.

INTRODUCTION

The quality of individual dairy bulk tank milk varies considerably *(6)*. Milking time hygiene, through the incidence of mastitis, can have a significant influence on milk quality *(12)*. One component of milking time hygiene includes the use of a single service towel in washing and drying the udder before attaching the milking unit *(8)*. Use of a common udder washcloth or sponge is not recommended given the potential for transmitting contagious mastitis pathogens between cows. *Staphylococcus aureus* is the principle contagious mastitis pathogen *(9)* and the pathogen to consider when employing mastitis control strategies *(10)*. Results from a study *(8)* confirm a positive correlation between the use of a common udder cloth or sponge and mastitis prevalence in a herd. Single service paper towels have been used effectively over the years as part of an effective mastitis control program *(1)*. However, given the ecological problems associated with the disposal of paper towels and their cost, the use of cloth

TABLE 1. Description of laundering method[1]

Treatment number	Washer temperature setting	Dryer after wash	Use of bleach in wash cycle
1	hot	yes	yes
2	hot	yes	no
3	hot	no	yes
4	hot	no	no
5	cold	yes	yes
6	cold	yes	no
7	cold	no	yes
8	cold	no	no
9[2]	-	-	-

[1]Five towels per replicate. Three replicates were apportioned to each treatment. There were some cases where only four towels were available per treatment.

[2]No treatment was applied. Culture results of towel centers were baseline values before treatments were applied.

towels is now more common. It has been demonstrated that cloth towels are effective in cleaning teats before milking *(11)*. Yet, inspite of the reduced cost of cloth towels and their demonstrated effectiveness in premilking hygiene, they may play a possible role as a fomite of mastitis infection because cloth towels are washed, not disposed of, after cow milking. The purpose of this study was to contrast the bacterial load recovered from udder cloth cotton towels after milking and before and after several methods of laundering.

METHODS AND MATERIALS

Terry cloth cotton towels, similar in size and weight to common face cloth towels, were used in this study at the Washington State University dairy in Pullman. The herd consists of approximately 140 milking cows. At the time of the study, 14 cows had *Staphylococcus aureus* mastitis infections and were kept in a separate pen, milked last, and, thus, were ostensibly segregated from the remainder of the herd. The segregated pen housed an additional 28 cows free of *S. aureus* IMI which were to be culled, soon, from the herd. Thus, for the purpose of this study, the cows were milked in two separate groups, a non-*S. aureus* group (GI) and a group of cows with *S. aureus* mastitis (GII). This practice of segregating cows infected with *S. aureus* is commonly done to limit the transmission of *S. aureus* to uninfected herd mates *(17)*.

Tap water was sprayed on the udder prior to milking, and an udder cloth was used to scrub the teats clean and dry. More than one cloth was used in cases where the udder was excessively soiled and needed additional cleaning. However, only material from the first cloth used to clean teats was included in the study. Forty-five udder cloths were randomly collected after GI cows were milked and the cloths were split equally into nine treatment groups. Similarly, all cloths were collected after GII cows were milked and split randomly into nine treatment groups. Because only 42 cloths were available for testing after segregated pen cows were milked, some treatment groups consisted of four towels. Treatments 1-8 represented different methods of washing and drying, in a 2×2×2 factorial design experiment, where the use of bleach, wash water temperature, and the use of a dryer after washing varied, as outlined in Table 1. Treatment 9 towels served as controls. Washing was done with a commercial detergent (Cheer, Proctor and Gamble, Cincinnati, OH) following labeled directions. Bleach (Chlorox, Chlorox Co., Oakland, CA) was added according to label directions. Water temperature was determined by collecting 10 ml at the start of the wash cycle. The dryer temperature was determined by including a test tube containing 10-ml water with towels to be dried and measuring the water temperature after 30 min in the dryer. After laundering, a technician wearing latex gloves used sterile scissors to remove a 1 × 2 cm section from the center of each towel. This section was split to form two squares. Using sterile forceps, one square was placed in a sterile tube containing 10-ml lecithin solution *(5)* and the other square was placed in a sterile tube containing either liquid Brain Heart Infusion Broth (Difco Labs, Detroit, MI) for GI towels, or liquid Vogel Johnson broth for GII towels. It was found that liquid Vogel Johnson media selectively enriched the growth of *S. aureus (4)*. Tubes with broth were incubated for 4 h at 37°C in an attempt to increase the recovery of mastitis pathogens. After 4 h incubation, broth tubes and lecithin solution tubes were stored at -5°C until cultured. These procedures were replicated on three separate days.

Bacteriological analysis was done by culturing several 0.05-ml portions from each thawed tube on several different agar plates within

TABLE 2. Counts[1] (log_{10} ± SD) of mastitis pathogens from center portions of cloth towels used to clean teats before milking[2]

Pathogen	Group I preincubation		Group II preincubation	
	Yes	No	Yes	No
CPS	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
CNS	4.36 ± 0.61	2.84 ± 0.88	3.05 ± 0.33	3.48 ± 0.52
STRP	3.34 ± 1.57	2.01 ± 1.34	3.08 ± 0.30	2.28 ± 1.23
COLI	0.30 ± 1.19	0.26 ± 0.75	2.28 ± 1.23	0.0 ± 0.0
ESC+	2.55 ± 1.27	0.49 ± 1.04	0.60 ± 1.12	2.38 ± 0.62
ESC-	2.27 ± 1.58	1.41 ± 1.31	0.33 ± 0.72	1.16 ± 1.50
MAC	0.33 ± 0.95	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
TOT	5.78 ± 0.63	4.31 ± 0.81	4.58 ± 0.32	4.95 ± 0.42

[1]Colony counts of coagulose-positive stophylococci or coagulose-negative stophylococci from blood agor plotes (CPS, CNS), *Streptococcus* from blood agar plates (STRP), coliforms from blood agor (COLI) or MacConkey plates (MAC), esculin-positive or negative streptococci from Thallium crystol violet agar plates (ESC^+, ESC^-), ond totol mostitis pathogen growth on blood agar plotes.

[2]Two, 1 cm^2 portions were cut from the center of the towel and 1 squore preincuboted in broth culture media for 4 h before being frozen ot -5°C (yes); the other was transferred to a quench solution ond frozen immediately (no).

TABLE 3. Counts[1] (log_{10} ± SD) of mastitis pathogens from center portions of cloth towels used to clean teats before milking from Group I cows, summarized by treatment[2]

Treatment	CPS	CNS	COLI	ESC^+	ESC^-	MAC	TOT
1	0.0 ± 0.0	0.0^c ± 0.0	0.0^b ± 0.0	0.0^b ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0^c ± 0.0
2	0.0 ± 0.0	0.47^{bc} ± 0.82	0.0^b ± 0.0	0.0^b ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.47^b ± 0.82
3	0.0 ± 0.0	0.38^{bc} ± 0.82	0.0^b ± 0.0	0.0^b ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.38^{bc} ± 0.82
4	0.0 ± 0.0	0.16^c ± 0.64	0.0^b ± 0.0	0.0^b ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.16^{bc} ± 0.64
5	0.0 ± 0.0	0.26^{bc} ± 0.53	0.0^b ± 0.0	0.0^b ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.26^{bc} ± 0.53
6	0.0 ± 0.0	0.36^{bc} ± 0.74	0.0^b ± 0.0	0.0^b ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.36^{bc} ± 0.74
7	0.0 ± 0.0	0.73^b ± 1.10	0.0^b ± 0.0	0.0^b ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.73^b ± 1.10
8	0.0 ± 0.0	2.79^a ± 0.97	0.15^a ± 0.59	0.57^a ± 1.02	0.0 ± 0.0	0.14 ± 0.54	2.94^a ± 1.23

[1]Colony counts of coagulase-positive stophylococci or coagulase-negative staphylococci from blood agar plates (CPS, CNS), coliforms from blood agor (coli) or MocConkey plotes (MAC), esculin-positive or negative streptococci from TKT agar plates (ESC^+, ESC^-), ond totol mostitis pathogen growth on blood agar plates. Streptococci were not identified on blood ogor plotes.

[2]Dota within column not shoring a superscript were significontly different, $P < 0.05$.

TABLE 4. Counts[1] (log_{10} ± SD) of mastitis pathogens from center portions of cloth towels used to clean teats before milking from Group II cows, summarized by treatment[2]

Treatment	CPS	CNS	COLI	ESC⁺	ESC⁻	MAC	TOT
1	0.0^{b} ± 0.0	0.10^{ab} ± 0.36	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.10^{ab} ± 0.36
2	0.0^{b} ± 0.0	0.0^{b} ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.14±0.53	0.0 ± 0.0	0.0^{b} ± 0.0
3	0.0^{b} ± 0.0	0.0^{b} ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0^{b} ± 0.0
4	0.0^{b} ± 0.0	0.0^{b} ± 0.0	0.0 ± 0.0	0.12 ±0.44	0.0 ± 0.0	0.0 ± 0.0	0.0^{b} ± 0.0
5	0.0^{b} ± 0.0	0.0^{b} ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0^{b} ± 0.0
6	0.0^{b} ± 0.0	0.0^{b} ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0^{b} ± 0.0
7	0.0^{b} ± 0.0	0.0^{b} ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0^{b} ± 0.0
8	0.13^{a} ± 0.0	0.26^{a} ± 0.54	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.39^{a} ± 0.62

[1]Colony counts of coogulose-positive stophylococci or coogulose-negotive stophylococci from blood ogar plotes (CPS, CNS), coliforms from blood ogor (coli) or MocConkey plotes (MAC), esculin-positive or negotive streptococci from TKT ogar plates (ESC⁺, ESC⁻), ond total mostitis pothogen growth on blood agar plotes. Streptococci were not identified on blood ogor plates.

[2]Doto within column not sharing a superscript were significantly different, $P < 0.05$.

48 h of collection. These plates were MacConkey, blood, thallium crystal violet, and modified Baird-Parker. These agars were used to facilitate enumeration of specific mastitis pathogens. The first three are recommended for identifying mastitis pathogens *(7)*. MacConkey is a selective medium for Gram-negative pathogens, and lactose can be used to differentiate coliforms from other pathogens. Thallium crystal violet agar selects against all organisms other than *Streptococcus* sp. The modified Baird-Parker *(3)* selects against all organisms other than *S. aureus*. The mastitis pathogens, coagulase-positive staphylococci, coagulase-negative staphylococci, *Streptococcus* sp.; and coliforms were presumptively identified on agar plates based on colony morphology and reactions with the different agars. Gram stain, catalase, coagulase, indole, and oxidase reactions were used to confirm the presumptive identification of the aforementioned mastitis pathogens. Appropriate dilution in 0.01 M phosphate buffered (pH 7.4) saline solution and reculturing were done in cases where colony growth exceeded visual capacity to enumerate and classify pathogen types.

Normal milking time hygiene included premilking teat disinfection with a 0.75% orthophosphoric acid, 0.64% sodium chlorite solution (Pregold, Alcide Corp., Redmond, WA). Teats were wiped clean with a cloth towel and the milking unit was automatically removed immediately after milking ceased. Postmilking teat disinfection was performed with a $NaClO_2$/lactic acid (0.64/2.64%) solution (4×LA, Alcide Corp., Redmond, WA), and the postmilking unit was backflushed with a 30-ppm iodine solution. One day prior to initiation of the study, premilking disinfection was replaced by washing teats with tap water.

A general linear model analysis of variance *(13)* was computed for log counts of dependent variables: coagulase-positive staphylococci, coagulase-negative staphylococci, coliforms, esculin-positive and esculin-negative streptococci, and all mastitis pathogens. Independent variables included day of replicating, treatment, and towel. Separate analyses were done for GI and GII towels and for samples preincubated and not preincubated. Four statistical models were computed.

RESULTS

The mean (±SD) dryer temperature 45.9°C was (±3.9). The mean cold and hot water temperatures were 15.4°C (±1.4) and 73.6°C (±2.2) respectively. The baseline log colony counts of mastitis pathogens on Treatment 9 towels, those collected prior to washing or prior to washing and drying, are given in Table 2. Because the combined (GI + GII) total counts of preincubated samples were greater than the combined total counts for towels not preincubated, it would appear that preincubation may have enhanced recovery of mastitis pathogens from towels sampled prior to frozen storage. Pathogen counts tended to be less for preincubated towel samples than for towel samples in GII. Because the findings from the general linear model analysis of variance were

similar, when log bacterial counts from preincubated samples were compared with log counts from samples not preincubated, an effort was made to simplify the presentation of results. Only data from preincubated samples for Treatments 1 to 8 are reported for GI (Table 3) and GII (Table 4).

Counts were greater for towels collected from GI than from GII, and the major contaminant of all towels was the coagulase-negative staphylococci. Environmental mastitis pathogens were ostensibly eliminated by thorough laundering, as streptococci were not isolated on blood agar from laundered towels, rarely isolated from TKT agar, and coliforms were rarely identified after laundering. Total and individual pathogen type counts were consistently greater for Treatment 8 (Tables 3 and 4). Moreover, the only recovery of coagulase-positive staphylococci were from Treatment 8 towels. Overall, the recovery of pathogens was reduced several logfold by washing or washing and drying compared to baseline counts (Tables 2-4).

DISCUSSION

The major thrust of this study was to determine which laundering practice for udder cloths used to clean teats before milkings would result in the lowest residual mastitis pathogen counts. All treatments led to a severalfold reduction in pathogen counts on the cloth towels (Tables 2-4). Environmental mastitis pathogens were almost eliminated from towels after milking, and coagulase-negative staphylococci were reduced several thousand fold by laundering. However, Treatment 8 was a significantly inferior laundering method for pathogen removal, as significantly greater numbers of pathogens were recovered from towels washed in cold water without bleach and without forced hot air drying. Additionally, only Treatment 8 allowed the recovery of *S. aureus* from towels.

Disinfection is accomplished by physical and/or chemical removal or destruction of potential contaminating pathogens. The physical process of cleansing with water alone can achieve partial disinfection. Adding detergent and hot water to the cleansing process will further assist in removing pathogens *(14)*. Indeed, the results presented in this paper are consistent; washing udder cloths in either cold or hot water led to a severalfold reduction in mastitis pathogen counts. Others have examined pathogen reduction on fabrics using standard commercial washers and dryers. Walter and Schillinger *(15)* and Wiksell et al. *(16)* both report that hot water (>50°C) tended to reduce bacterial survival on linens compared to a cold water (<40°C) wash. Christian and co-workers *(2)* reported that 47.8 to 50°C wash water was as effective as water temperatures >57°C in disinfecting hospital fabrics. Christian and co-workers *(2)* suggest that bleach enhanced the disinfection wash process when lower temperature wash water was tested. Wiksell et al. *(16)* reported that drying with a commercial dryer reduced bacterial survival after washing. The results of our study parallel these findings of others *(2, 15, 16)*. Pathogen recovery was similar from Treatments 1 to 3 and 5 to 7 where combinations of bleach and/or hot air drying were employed. The pathogen count following a hot water wash only, Treatment 4, was similar to counts from the other first seven treatments. The absence of hot water wash, bleach, and forced hot air drying, Treatment 8 resulted in higher pathogen counts, including the recovery of *S. aureus*. Because milking time hygiene is designed to control contagious mastitis and *S. aureus* is the most prevalent contagious mastitis pathogen in herds with either excellent or poor mastitis control *(9)*, the recovery of this pathogen from Treatment 8 laundered cloths is significant.

In conclusion, a cold water wash (<20°C), combined with bleach in the wash cycle or forced hot air drying following washing, was as effective as any other treatment tested in reducing the mastitis pathogen load on cloth towels after cleaning teats. Cold water washing in the absence of either forced hot air drying or bleach resulted in significantly greater pathogen loads, including *S. aureus*. The cost of the dryer and the cost of energy for heating water and/or using a dryer were not considered and would vary depending on a dairy's location and utilization of energy saving strategies. Moreover, the cost of bleach and its effect on towel longevity were not considered. These factors would need to be evaluated for each dairy before arriving at a suitable laundering practice for udder cloths. The data from this study indicate that the practice of laundering with hot water, bleach, and forced air drying, did not reduce pathogen counts on towels compared to other treatments, where at least one of those variables was included. Thus, it appears that hot water, bleach, and forced air drying in combination are not necessary for disinfecting udder washcloths. The dairy manager with advice from allied dairy personnel needs to make an individual decision regarding the most appropriate practice for laundering udder cloths prior to the next cow milking.

ACKNOWLEDGMENTS

The author wishes to acknowledge the invaluable assistance of Ms. D. Newkirk and Mr. W. Loertscher.

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Dairy, Food and Environmental Sanitation, Vol. 17, No. 4, Pages 216-221

Microbiological Criteria for Military Rations Update 1996

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SUMMARY

An update of microbiological criteria in military and federal food specifications, first published in 1976, is presented. The criteria are current as of 1996 and are based on surveys, test data on purchased food, and experience in applying criteria to procurement of food. The number of specifications containing microbiological criteria has been decreased from 59 in 1976 to 38, covering more than 78 food commodities. Microbiological requirements vary with the food item and include criteria for the aerobic plate count, coliforms, *Escherichia coli*, salmonellae, yeasts and molds, proteolytic and lipolytic bacteria, psychrotrophs, and direct microscopic count. Sampling plans for most food items purchased by the military were provided by the American National Standard for Inspection (ANSI) of the American Society for Quality Control, but three class attribute sampling plans were applied to selected specifications.

INTRODUCTION

Microbiological criteria in military and federal specifications for foods purchased by these agencies for their own use were first presented in 1976 *(14)*. At that time, 59 of approximately 600 food specifications contained microbiological requirements. As of 1996, 38 military and federal specifications, covering approximately 78 food commodities, contain microbiological requirements. Some specifications for commodities listed in the 1976 report *(14)* and elsewhere *(7, 10, 13)* were cancelled because there was no longer a military requirement for the product; some commodities, were combined into one specification and some commodities such as precooked frozen meals, milk, and milk products, are purchased under a Commercial Item Description (CID) document. MIL-STD-900B *(23)*, which listed microbiological criteria for thermophilic spores in ingredients for canned foods, was cancelled.

An increasing number of products are being purchased under CIDs rather than detailed specifications because of the saving in inspection costs and analytical testing. In lieu of analytical testing to verify the quality of food products, CIDs allow the military to accept certification that the product is the one sold in the commercial marketplace. However, the use of CIDs does not preclude incorporating microbiological criteria which may be occasionally found in CIDs for products considered special or especially sensitive by the preparing activity (Department of Defense or U.S. Department of Agriculture). In any case, all food products purchased by a CID must conform to all applicable federal and state mandatory requirements. Eventually, all military food specifications will be converted to CIDs or performance specifications. A performance specification is similar to a CID except that special perfor-

TABLE 1. Microbiological criteria[a] for dehydrated cooked military rations

Ration	Spec. No.	Maximum count per gram	
		APC[b]	*E. coli*[c]
Beans, green, compressed	MIL-B-43930B		
Beef snacks-cured sausage	MIL-PRF-44394		
Beef stew	MIL-B-43404F		
Beef with rice	MIL-B-4375OH		
Chicken á la king	MIL-C-44137A		
Chicken and chicken products	MIL-C-43135J	n 5	n 5
Chicken with rice	MIL-C-43289F	c 1	c 1
Chicken stew	MIL-C-44148	m 75,000	m ≤3
Chili con carne	MIL-C-43287H	M 150,000	M ≤10
Eggs, scrambled	MIL-E-44470		
Escalloped potatoes w/pork	MIL-E-43749G		
Shrimp	MIL-S-43145E		
Soup, beef, noodles and veg	MIL-S-43931A		
Soup, chicken and noodles	MIL-S-1049H		
Spaghetti and meat sauce	MIL-S-43275H		
Vegetables, mixed	MIL-V-44145		

[a]Three class attribute plan *(9, 10)*:
"n" – number of sample units.
"c" – Maximum number of marginal samples allowed with a count above m.
"m" – Samples with bacterial counts between m and M are of marginal quality.
"M" – Samples with bacterial counts above M are unacceptable.
[b]Aerobic plate count.
[c]Three-tube MPN method.

mance criteria required by the military are incorporated. Sampling procedures and tables for inspection by attributes for military and federal specifications are those of the American Society for Quality Control *(5)* which replaced the cancelled Military Standard 105D *(22)*. However, three class attribute sampling plans are now being applied to commodities, whenever a specification is revised as periodically required, and to new military rations that are not commercially sterile, as recommended by the International Commission on Microbiological Specifications for Foods (ICMSF), *(9)* and others *(2, 10)*.

These criteria are presented so that they may serve as a ready reference for military scientists and technologists involved in research and development, government testing laboratories, and military and federal procurement agencies which must apply them to foods purchased for their own use. This report will also serve as a useful guide to the food industry and to academia where students are taught the application and relevance of microbiological criteria for foods.

Specifications and CIDs may be obtained from the U.S. Naval Publications and Forms Center, NPFC Code 1032, 5801 Tabor Avenue, Philadelphia, PA 19120. Military specifications are prefixed by MIL, federal specifications are prefixed by capital letters other than A, and CIDS are prefixed by the letters A-A.

This report presents an update of the microbiological criteria in military and federal specifications for food, as they existed in 1996, and supersedes all other listings and reports.

METHODS

Microbiological procedures

Microbiological examination of food in the Military and Federal Subsistence System is generally made in accordance with official standard procedures *(2, 6, 27)*. For commodities such as eggs, dairy products, and shellfish, standard procedures of other authoritative agencies are used *(1, 4, 16, 17, 18, 19, 25, 26)*. The standard procedure for counting yeast and mold in cottage cheese was modified to enhance recovery *(12)*. Pour plates are used for colony counts and the three-tube most probable number (MPN) method is used for coliform and *Escherichia coli* counts *(2)*. Enrichment procedures are used for recovery of injured and noninjured salmonellae *(2)*. Repair media are used to recover injured bacteria when indicated *(2)*.

Sampling plans

Sampling procedures and tables for inspection by attributes are in accordance with American National Standard for Inspection (ANSI) *(5)*, unless otherwise stated. The number of samples tested and defect levels are dictated by the lot size and inspection level selected. Three class attribute plans *(9)* were also applied to dehydrated cooked foods.

MICROBIOLOGICAL CRITERIA

Dehydrated cooked foods

Microbiological criteria for cooked foods that were dehydrated are presented in Table 1. The three class attribute sampling plan recommended by the ICMSF was applied *(9)*. Five sample units (N = 5) are analyzed. The value for c indicates that only one sample can exceed the m value. The lot will be rejected if any sample

TABLE 2. Microbiological criteria[a] for milk and milk products and miscellaneous dairy products

Milk product	Spec. No.	Maximum count per ml (g) APC[b]	Coliforms	Yeast and molds
Buttermilk, fluid	A-A-20113B	c	c	
Cheese, American, processed, dehydrated	MIL-C-35053D	50,000[d]	90	
Cheese bar, compressed	MIL-C-3893B	30,000	10	
Cottage cheese	A-A-20154A	c	c	
Cream, sour, cultured or acidified	A-A-20113B	c	c	
Cream substitute dry, nondairy	MIL-C-43338E	20,000	10	
Creamer, nondairy, dry	A-A-20043	20,000[d]	10	
Malted milk	C-M-50A	30,000	10	
Milk and milk products	A-A-20113B	c	c	
Milk, filled, dry plain or chocolate, fortified	MIL-M-43241A	30,000[d]	90	
Milk, nonfat, dry and instant	A-A-20085B	c	c	
Milk (plain or chocolate), cream, half and half, filled	MIL-M-35082B	20,000	10	
Plastic cream ingredient in cheddar cheese spread	MIL-C-595E	5,000	10	20

[a]Sampling plan: ANSI *(5)*.
[b]Aerobic plate count.
[c]Commercial item description (CID) does not require testing but must conform to all applicable federal and state mandatory requirements, e.g. milk and milk products, APC, 20,000/g and coliforms, 10/g; cottage cheese, psychrotrophs, ≤100/g[b], coliforms, 10/g, and yeast and molds, 10/g; milk, nonfat, dry and instant, APC 50,000/g, salmonellae neg/100g; creamer, nondairy, dry, salmonellae neg/25g.
[d]Salmonellae negative per 25g.

exceeds the M value of 150,000/g for the aerobic plate count (APC) or if two or more sample units exceed the m value of 75,000 APC/g. The lot will be accepted if all units have APCs less than 150,000/g and no more than one unit has an APC greater than 75,000/g. *E. coli* is counted by the three-tube MPN method *(2)*. Four of five sample units must not have *E. coli* counts greater than the m value (≤ 3/g; all MPN tubes negative), and only one unit can exceed 3/g. The lot is rejected if any unit has an *E. coli* count greater than 10/g (M).

Dehydrated cooked foods are consumed after rehydration by adding hot water. If hot water and a heat source are not available, they can be rehydrated with cold water and consumed cold. These dehydrated, cooked products remain shelf stable for at least 3 years at 27°C (80°F).

Milk and milk products and miscellaneous dairy products

The microbiological criteria for milk and milk products are presented in Table 2. The APC limitations range from 5000/ml (g) to 50,000/ml (g). Coliforms are limited to 10/ml (g), except for dehydrated American cheese and dry filled milk products (90/g). These two products also have criteria for salmonellae (negative in 25 grams). Six CIDs are listed to indicate products no longer governed by military specifications, but instead are commercial products purchased in the marketplace, are certified to be the same products available to other consumers, and are in conformance with federal and state requirements. Only plastic cream ingredient for cheddar cheese spread has a yeast and mold limitation (≤20/ml (g).

Ice cream, ice milk, sherbert, novelties and mixes

Table 3 presents the microbiological criteria for ice cream and related products. With one exception, the military specifications for these products were cancelled, and all the specifications for these products were combined in Federal Specification E-E-I-116E. Only one military specification remains and that is for the mixes. The APC limitation is 50,000/g for all products listed. Coliforms are limited to 10/g except in chocolate mixes (20/g). The soft serve ice milk and milk shake mixes must also be negative for salmonellae in 25 grams. The soft serve yogurt mix has a maximum limit of 10/g for the yeast and mold count. There is no *E. coli* criterion because the action or indicator organisms are coliforms.

Frozen egg and egg products and dehydrated egg mix

The microbiological criteria for frozen and dehydrated egg products are listed in Table 4. The

TABLE 3. Microbiological criteria[a] for ice cream, ice milk, sherbert, novelties, and mixes

Item	Spec. No.	Maximum caunt per gram APC[b]	Coliforms
Ice cream, regular	EE-I-116E	50,000	10
Ice cream, mellarine,[c] all flavars, fruit and nuts	EE-I-116E	50,000	10
Ice milk	EE-I-116E	50,000	
Ice milk, mellorine	EE-I-116E	50,000	10
Ice milk, milk shake, and yagurt mixes[d]	MIL-I-43717D	50,000[d]	10/20[d]
Navelties: ice cream bars, ice cream sandwich, ice cream cane (preformed)	EE-I-116E	50,000	10
Sherbert and ices	EE-I-116E	50,000	10
Sherbert, mellorine	EE-I-116E	50,000	10

[a]Sampling plan: ANSI *(5)*.
[b]Aerobic plate count.
[c]Cantains vegetable fat instead of butter fat.
[d]Types I-IV: Type III mix for saft serve and milk shakes must be negative far salmonellae in 25 grams. Type IV mix far saft serve yagurt has a maximum yeast and mald requirement af 10 per gram. The maximum coliform criterian is 10/g far vanilla flavars and 20/g far chocolate flavared mixes.

TABLE 4. Microbiological criteria[a] for frozen egg and egg products and for dehydrated egg mix

Faad item	Spec. Na.	Maximum caunt per gram APC[b]	Salmanellae[c]	Yeast and mald
Frazen egg and egg products	C-E-230E			
whale egg, table-grade		15,000	Neg	50
whole eggs		50,000	Neg	50
egg white		50,000	Neg	50
egg yolk		50,000	Neg	50
sugared yalk		50,000	Neg	50
salted yalk		50,000	Neg	50
Egg mix, dehydrated	Mil-E-43377D	25,000[d]	Neg	-

[a]Sampling plan: ANSI *(5)*.
[b]Aerobic plate count.
[c]Per 25 grams.
[d]*Escherichia cali* shall be less than 3/g (all tubes negative) by the MPN method.

frozen egg and egg products are governed by a federal specification and the dehydrated egg mix is governed by a military specification. Except for table-grade frozen whole eggs (APC, 15000/g), the maximum APC for frozen egg products is 50,000/g. All of the frozen egg products must be negative for salmonellae/25g and the limitation for yeast and molds is 50/g. The dehydrated egg mix has a APC limitation of 25,000/g, salmonellae must be negative in a 25 gram sample, and *E. coli* must not exceed 3/g by the three tube MPN method (all tubes negative).

Miscellaneous foods

Table 5 contains microbiological criteria for broad categories of foods purchased by the military, items which have the same requirements regardless of the product type, such as chocolate candy, canned or thermostabilized foods, and dehydrated cooked vegetables. Specific food items are also included. Although candy and chocolate confections are governed by a CID, chocolate purchased for the military must be tested and must be negative for salmonellae in a 25 g sample unit *(6)*. Thermostabilized and radappertized foods must be commercially sterile as required by federal and state agencies. Dehydrated cooked items will have the same criteria as items in Table 1 except for oral liquid feeding products. Because the latter items are fed to patients with reduced resistance to infection because of trauma or illness, the microbiological criteria are lower and more restrictive than for other dehydrated cooked foods, and a three class attribute sampling plan is applied. Shelf stability and safety of MRE (meal-ready-to-eat) pouched bread depend on low water activity, pH, potassium sorbate, and low residual oxygen. Low oxygen levels are achieved and maintained by inserting oxygen scavaging packets into the sealed pouch *(15)*. Raw oysters *(1, 26)* conform to state and federal requirements, and peanut

TABLE 5. Microbiological criteria[a] for miscellaneous foods

Item	Spec. No.	Maximum criteria
Chocolate candy	A-A-20177	Salmonellae neg/25g
Canned foods, thermostabilized	Various	Commercial sterility
Dehydrated cooked vegetables	Various	Table 1
Dehydrated oral liquid feeding products	Various	n 5, c 1, APC[b], m 25,000/g, M 50,000/g *E. coli* negative/g Salmonellae negative/25g
Dehydrated soups	Various	Table 1
Irradiated meat and poultry, radappertized	Custom made for NASA	Commercial sterility
MRE bread, pouch, shelf stable	MIL-B-44360A[c]	a_w ≤0.84, pH 5.7, 0.1% KS, oxygen ≤0.1%
MRE foods, pouch, thermostabilized	Various	Commercial sterility
Oysters, fresh, chilled and frozen, shucked	PP-O-956G	APC 500,000/g Fecal coliforms, 230/100g[d]
Peanut butter for MRE	MIL-C-44068B	Aflatoxin ≤ 20 ppb
Precooked frozen meals	A-A-20037A	Freeze to 0°C within 2 hours
Shortbread bar, survival	Mil-S-44463	Table 1
Topping, dessert, frozen or dehydrated	A-A-20196	APC 10,000/g, Coliforms <10/g, Salmonellae neg/25g
Tray pack foods, thermostabilized	Various	Commercial sterility
Tubed foods, high altitude, thermostabilized	Custom made for Air Force	Commercial sterility
Wintergreen bar, survival	MIL-W-44464	Table 1

[a]Sampling plan: ANSI *(5)*, except for Table 1 and dehydrated liquid feeding products.
[b]Aerobic plate count.
[c]Bacterial growth controlled by water activity and pH. Yeast and molds controlled by potassium sorbate (KS) and low oxygen content produced by oxygen scavengers *(15)*.
[d]Five-tube MPN method *(26)*.

butter *(7, 19, 29)* has a tolerance for aflatoxin of 20 ppb, as required by the U.S. Food and Drug Administration. Irradiated foods and thermostabilized tubed foods are commercially sterile and are custom made for NASA and the Air Force, respectively, so that they do not have procurement specifications. Precooked frozen meals are now governed by a CID and no longer have microbiological requirements *(14)*. However, the CID requires that the products be frozen to 0°C within two hours after precooking to ensure their microbiological safety.

DISCUSSION

Microbiological criteria established for military foods by the Department of Defense or the Department of Agriculture are included in a specification or CID. The CID and specification, then, become part of a contract on which a supplier bids, and thus, they become contractual in nature. Very little resistance is encountered from suppliers because these criteria and other requirements are usually tested in a limited purchase document. With such a small (limited) purchase, it can be determined whether or not the requirements are attainable and administratively feasible, while still producing an acceptable product. Before an official specification is written, adjustments can, then, be made consistent with wholesomeness and good manufacturing practices, so that the requirements are realistic, enforceable, and within the capability of industry to consistently produce products in compliance.

Microbiological criteria are useful for making discriminating judgments about the quality, safety, postprocessing contamination, sanitation, and shelf life of food products. Low bacterial counts are usually associated with safe foods and enhanced shelf life, whereas high counts are usually associated with poor sanitation, decomposition, or inadequate processing. However, microbiological criteria applied to endproducts alone will not assure the safety and quality of a food. For this reason, in military and federal specifications, great emphasis is placed on sanitation of food production plants or facilities, as prescribed by Military Standard 668E *(24)*, and of food service facilities and programs, as prescribed by Army Regulation AR-40-5 *(21)*. Application of a systematic program to prevent and control contamination embodied in the Hazard Analysis Critical Control Point (HACCP) System *(2, 10)* is also recommended.

The criteria presented in this report are current as of 1996 and are presented as they appear in military or federal specifications and CIDs. They are based on surveys, data accumulated by military testing laboratories, and years of experience in applying

microbiological criteria to food purchases. These criteria are not unusual and can be enforced. They are similar to those recommended by the ICMSF *(9)*, other government agencies *(20, 28, 29, 30)*, state governments *(25)*, and other countries *(11)*. Procedures used for microbiological analysis are given in the specifications and are also recommended by leading public health authorities *(1, 4)*, other government agencies *(16, 17, 18, 26, 27)* and international associations *(6)*.

Policy requires revision and updating of military and federal specifications and CIDs every five years. Consequently, they are subject to change. Revisions may occur sooner if there is an urgent need for procurement, or if several changes have been made. To reduce procurement costs, the goal of the U.S. Government is to convert all remaining food specifications to CIDs and performance specifications. Because they are beyond the scope of this paper, the original specification or CID should be consulted for information regarding quality assurance, inspection, sampling, packaging, analytical methods, and storage.

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Dairy, Food and Environmental Sanitation, Vol. 15, No. 4, Pages 222-223

Reprinted from *Food Inspection Directorate*, Fall 1996

SAFETY WATCH

Facts and Figures on Food Irradiation

Foodborne disease bulletin

The process of food irradiation is experiencing a global resurgence in interest. Trade opportunities and third-world food shortages are demanding cost-effective remedies for the constant challenges of food spoilage and foodborne disease. Simultaneously, there are escalating consumer and regulatory concerns over environmentally unfriendly fumigants such as methyl bromide, and some potentially carcinogenic chemical preservatives such as ethylene oxide. These chemicals continue to be in widespread use but are being progressively phased out with effective replacements. Food irradiation is increasingly emerging as the treatment of choice in meeting the needs of industry and the demands of consumers in both developed and developing nations.

The Food Preservation Section of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture of the International Atomic Energy Agency (IAEA) compiles information on the application of food irradiation around the world. It publishes this information several times per year in the Food Irradiation Newsletter, as well as a variety of other booklets and factsheets. The Food Preservation Section has most recently prepared a list of thirty-nine nations that have specific legislation regulating irradiation of a total of 224 categories of food and agricultural products. Switzerland has recently passed legislation permitting food irradiation, bringing the new total to forty. However, the legislation has not yet identified any specific product clearances. Several additional countries in the mid-east have food irradiation initiatives in progress, but have not yet passed legislation to regulate this process.

"The process of food irradiation is experiencing a global resurgence in interest."

A number of countries in southeast Asia also have new food irradiation legislation in progress, with efforts underway to see that the regulations are standardized to facilitate international trade.

South Africa has been the most liberal supporter of irradiation processing of food, with 82 specific product clearances. Japan and Uruguay only allow irradiation of potatoes, while Iran only allows irradiation of spices. Amongst Canada's current free trade partners, the USA and Mexico have 10 and 49 clearances respectively. Chile and Israel, which have free-trade negotiations with Canada in progress, have clearances in place for 17 and 15 products. Canada has seven products approved for irradiation, although several petitions for additional product clearances are currently under review by Health Canada.

The dosage for almost all approved food applications fall under 10 kiloGray (kGy), the level pronounced by the WHO/FAO/IAEA Joint Expert Committee on Food Irradiation as presenting no

toxicological hazards warranting further investigation. Six countries permit irradiation of spices at doses up to 30 kGy, because they are frequently heavily contaminated and they constitute a very minor component of a diet by weight. Six countries allow the production of sterile meals or meats, generally for hospital patient use, using maximum absorbed doses of 10 to 112.5 kGy. The USA has a special high dose clearance exclusively for the space program.

Irradiation processing is controlled and regulated through documentation, labelling and well calibrated dosimetry, rather than surveillance based on laboratory analysis. A number of techniques have been developed to identify foods that have been irradiated and to estimate the absorbed dose, but these are not in routine use. The Ministry of Agriculture, Fisheries and Food in the UK has funded a multi-year developmental study of a variety of methods to detect irradiated foods. It has selected a few, such as electron spin resonance, which give sufficiently consistent performance that they will soon be recognized as official methods. The IAEA also has an international working group which reviews and reports on such methods.

Thirty-two countries report having irradiation facilities actively producing irradiated foods. In addition, Egypt, Libya, Iraq, Iran and Pakistan have pilot-scale facilities in place, and Morocco has one under construction. Syria, Turkey and Saudi Arabia are building or converting facilities that could accommodate food irradiation. China has over 50 commercial gamma-irradiation plants – two processing exclusively garlic – and more than 20 electron beam facilities capable of food irradiation processing. The USA has 37 commercial facilities processing predominantly medical products but also some spices. There is one American plant in Florida dedicated to food irradiation, and another under construction in Washington state. Canada has two commercial gamma processing facilities, one training/demonstration gamma facility which processes some spices, and several smaller research facilities on university campuses.

There are 13 companies worldwide which reportedly build gamma irradiation facilities, and 15 which build electron beam/X-ray facilities. Canada is a leader in supplying the world with both forms of irradiation technology through two spin-off companies originating within Atomic Energy of Canada. Canada is the world's largest supplier of cobalt-60 for medical and industrial irradiation.

The volume of food which is irradiation processed each year is uncertain, but estimates indicate it is 100,000 tonnes or more. China processes 10,000 tonnes of garlic alone. A single electron beam facility in the Ukraine previously processed up to 100,000 tonnes of grain annually, but is no longer in full operation.

Attempts to standardize regulatory requirements and approvals under the Codex Alimentarius General Standard for Irradiated Foods and the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures have set the stage for wider international trade in irradiation processed foods. Signatory countries may now be challenged to defend restrictions on imported irradiated food products produced within the guidelines set out in the Codex standards through a defensible risk assessment. Until now many countries such as Canada and the USA have taken a passive stance in demanding the industry prove the safety of irradiated products for which clearances are requested.

Most countries, including Canada, require labelling of irradiated products at wholesale and retail, but not at food service. Some countries require both the internationally prescribed radura symbol, as well as specific wording to identify products treated with ionizing radiation, while others require simply one or the other. Attempts to replace the stigmatized term "radiation" with "ionization" or "picowave" processing have met with poor to limited support in regulatory circles. China does not currently require labelling of irradiated food, but is studying the issue.

As international bodies such as the IAEA provide economic and technical support to developing countries for the construction of food irradiation facilities, pressures to accept these products into the developed countries seems likely to grow, particularly for countries such as Canada which are marketing this technology to the world based on internationally accepted standards. Encouragingly, the expansion of incident-free marketing of irradiated fruits into at least one larger American store chain last year, rather than merely a handful of individual markets, was a significant indicator of growing confidence in the retail sector that consumers are ready to accept this technology.

Call for Symposia

1998 IAMFES Annual Meeting
August 16 -19, 1998
Nashville, TN

The Program Advisory Committee invites IAMFES members to submit symposia proposals for presentation during the 1998 IAMFES Annual Meeting. Proposals may be submitted by mail to IAMFES headquarters (for receipt prior to June 16, 1997) or by presenting the proposal to the Program Advisory Committee at its meeting on Sunday, July 6, 1997 in Orlando, FL. Proposals may be prepared by individuals or by committees.

Generally, each symposium will be a half-day session (8:30 to Noon or 1:30 to 5:00) with a scheduled break. Symposia emphasize a central theme and usually consist of six 30-minute presentations by each speaker. Proposals will be evaluated by the Program Advisory Committee for relevance to current science and to IAMFES members.

Guidelines for submitting symposia proposals: Use the printed Symposium Proposal form that appears on the following page or reasonable facsimile. The following information must be included: (1) Title of Symposium, (2) Names, telephone numbers, fax numbers, and complete mailing addresses of the person(s) organizing the symposium and conveners of the session, (3) Topics for presentations, suggested speakers, affiliations, complete addresses, (4) Description of audience to which this topic would be of greatest interest, and (5) Signature of submitter.

Organizers for accepted proposals will be contacted after the 1997 Annual Meeting to secure speaker commitment.

Questions? Contact the Program Advisory Committee Chairperson for the 1998 IAMFES Annual Meeting:

Dr. Susan Sumner, Virginia Tech. Food Science & Technology, Blacksburg, VA 24061-0418; telephone (540) 231-5280; fax (540) 231-9293; E-mail: sumners@vt.edu.

Symposium Proposal

1998 IAMFES Annual Meeting
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Title of symposium: _____

Organizer's name: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Topics for Symposium — Suggested Speakers (Complete address and phone number of Speaker) — Affiliation

1. _____

2. _____

3. _____

4. _____

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6. _____

Conveners of Session — Address — Phone — Fax

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Description of Audience: _____

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UpDates

New England Account Manager Appointed by Captive Plastics

Captive Plastics, Inc., a leading manufacturer of plastic packaging for the personal care, pharmaceutical, food and chemical industries, recently appointed Scott Fleming as account manager to service customers in the southeast region. Captive Plastics offers in-house engineering, tooling, molding, decorating and assembly of products.

Mr. Fleming brings with him a variety of experience gained from several positions in the plastic packaging industry. He previously was employed by Summit Plastics. Prior to that, Mr. Fleming held positions with Empire Bottle and All-Pak.

Mr. Fleming earned his B.S. degree from Villanova University and an M.B.A. from SUNY and is currently a resident of Amherst, Massachusetts. He will be relocating to the PA/NJ area.

New Business Development and Marketing Manager Joins G&H Products Corp.

Chip Bresette, of Milwaukee, WI, has joined G&H Products Corp. as the new business development and marketing manager responsible for all aspects of G&H's marketing and strategic business development programs.

Chip has ten years of experience in business to business marketing, including seven years in a management capacity. He comes to G&H from Electromotive Systems, Inc. of Menomonee Falls, WI, where he served as director of marketing.

Ruda to Head ADPI Cheese Division

Kevin J. Ruda, president, Beatrice Cheese, Inc. Waukesha, WI, was unanimously elected chairman of the Cheese Division of the American Dairy Products Institute at an Organizational Meeting of the Division held on February 6, 1997. The meeting was attended by representatives and friends of Charter Members of the Cheese Division. Charter members of the Division are: Beatrice Cheese, Inc., Waukesha, WI; Brewster Cheese, Brewster, OH; Dairyman's Cooperative Creamery Assn., Tulare, CA; Davisco Foods International, Le Sueur, MN; Mid-America Dairymen, Inc., Springfield, MO; Reilly Dairy & Food Co., Tampa, FL; Rochester Cheese Sales, Rochester, MN; Swiss Valley Farms Co., Davenport, IA; Tate Cheese Co., Valley City, IL; and, Tillamook County Creamery Assn., Tillamook, OR.

Among projects to receive immediate attention by the newly formed Cheese Division are the following: Codex International Standards for cheese products; consideration of microbiological standards for cheese; evaluation of existing Standards of Identity and Grade Standards for cheese and cheese products; and, cooperation with USDA in the development of a dairy industry self-certification program.

Quality Chekd Names New President, Slate of Officers

Quality Chekd Dairies, Inc. has elected a new president and named three new board members. These leaders will join the board in guiding the organization toward its continuing goals of ongoing leadership in the industry; higher-than-industry quality standards; strong marketing programs; group purchasing programs; and comprehensive training and professional education.

The organization has named Paul Arbuthnot of Sunshine Dairy, Inc., Portland, OR, its new president. Other officers elected to serve the organization include:

- Lynn Oller, vice president; Hiland Dairy Company, Springfield, MO.
- Larry Losasso, secretary; Sinton Dairy Foods Company, Colorado Springs, CO.
- Wayne Newson, treasurer; Beatrice Foods, Inc., Ontario, Canada.

Members newly named to the board of directors are:

- Rich Chaffin, Nebraska Dairy, Norfolk, NE.
- Ron Richardson, Roberts Dairy, Omaha, NE.
- Dan Soehnlen, Superior Dairy, Inc., Canton, OH

Quality Chekd Dairies, Inc., headquartered in Napaville, III., is an organization of dairy of processing companies. Members are located throughout the United States, Canada, and Latin America.

Janet Nuzum to Join IDFA Staff

U.S. International Trade Commissioner Janet Nuzum joined the International Dairy Foods Association (IDFA) as vice president and counsel, effective February 1. Nuzum will work primarily in the area of economic policy affecting the U.S. dairy industry, with an emphasis on developing international markets for dairy products.

Nuzum has over 15 years of experience in both the public and private sector, including her 5-year

term as commissioner of the U.S. International Trade Commission (USITC). During her tenure, USITC played a critical role in resolving numerous controversial trade disputes and advised the President and Congress on the economic effects of the World Trade Organization (WTO) agreements and the North American Free Trade Agreement (NAFTA). While at USITC, she also worked to identify trade and investment opportunities for the U.S. in Latin America and the Asia Pacific regions. Nuzum was appointed to the Commission by President Bush in 1991, and appointed vice chairman of the Commission by President Clinton in 1994.

Prior to her work at USITC, Nuzum was on the staff of the House Ways and Means Committee's Subcommittee on Trade. While on the subcommittee staff, she worked on several historic trade laws and the 1985 and 1990 Farm Bills.

Nuzum holds a B.A. from Smith College and a J.D. from the Georgetown University Law Center. She is a member of the District of Columbia Bar and has held leadership positions in the D.C. Bar Association and the American Bar Association. In 1995, she was named "Outstanding Woman in International Trade" by the Association of Women in International Trade.

Expanded DMI Board of Directors Elects Officers, Welcomes New Directors

Herman Brubaker of West Alexandria, OH, was re-elected chairman for his third, one-year term by the Dairy Management, Inc. board of directors during its annual elections recently.

Mary Cameron of Hanford, CA, is also serving a third term in her position as secretary. Additionally, National Dairy Board chairman Maynard Lang, Brooklyn, IA, was elected vice chairman and DMI Board member Joseph Bavido, Sharon, TN, was elected treasurer.

The DMI board also seated eight new board members: Lang; Jane Gillette, Turin, NY; William Higginbotham, Washington, GA; and Paul Rovey, Glendale, AZ filled seats vacated by members whose terms had expired. Elizabeth Anderson, Onalaska, WA; Roger Rebout, Janesville, WI; Kima Simonson, Deer Park, WA and Donald Sipple, Menomonie, WI were selected to fill four new seats.

The Washington and Wisconsin representatives are a reflection of the United Dairy Industry Association (UDIA) new membership funding guidelines. As a result of these changes, the Washington State Dairy Products Commission and the Wisconsin Milk Marketing Board joined UDIA on January 1.

AFFI Names Krese Manager of Publications

The American Frozen Food Institute (AFFI) has named former Congressional aide Chris Krese its manager of publications.

Most recently, Krese served as press secretary for U.S. Rep. Bill Clinger (R-Penn), chairman of the U.S. House of Representatives Government Reform and Oversight Committee. In this role, Krese communicated with the media on issues of importance to AFFI members, including economic development, transportation, regulatory reform and oversight of the executive branch.

Previously, as legislative aide and media assistant for the House Committee on Education and the Workforce, he worked on such AFFI-related issues as the National School Lunch Program, nutrition and workplace policy.

In making the announcement, Steven C. Anderson, AFFI's president and chief executive officer said, "With four years of communications and public policy experience on Capitol Hill, Chris is particularly well-qualified to communicate AFFI's messages to consumers, the media, the retail and foodservice trade, government officials and other constituencies."

As AFFI's manager of publications, Krese handles the writing and production of *AFFI Letter*, AFFI's award-winning newsletter; *Frozen Food Report* magazine and other materials designed to promote the frozen food industry and communicate with AFFI members and the media. He also serves as an information resource for members and other audiences seeking industry information.

Voght Named Operation Manager for Cherney Microbiological Services, Ltd.

Cherney Microbiological Services Ltd. announced the appointment of Mary C. Voght as operations manager. "We are positioning the resources we need to manage our growth and ensure maximum results, customer service and accuracy," said Debra Cherney, president. Ms. Voght has a master's degree in Administration from the University of Wisconsin-Milwaukee and experience in operations and sales management with both small and national companies. Most recently she was the marketing and sales director for a 90 million dollar district of a national health care corporation. Cherney Microbiological Services Ltd. is an independent microbiological testing and consulting corporation whose technical experts examine food products and environmental samples for microbial contamination of public health significance. Cherney's experienced staff assist customers with problem-solving in critical situations.

AFFI Backs Flexible Poultry Labeling Proposal

The American Frozen Food Institute (AFFI) voiced the frozen food industry's strong support for a proposal to allow manufacturers the flexibility, under certain conditions, to interchange the amounts and kinds of poultry used in poultry products without requiring costly new labels for each formulation.

In comments submitted to the Food Safety Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA), AFFI said adoption of the agency's proposed rule could offer manufacturers of frozen further processed poultry products "greater product formulation flexibility without the burden of maintaining costly label inventories" and "could result in cost savings to consumers."

The labeling flexibility proposed for poultry products currently applies to meat products, and AFFI said the rule would "create greater consistency among federal poultry product inspection regulations and federal meat inspection regulations."

In addition to supporting the proposal, AFFI urged FSIS to clarify in any final rule that the regulation applies to mechanically separated species. The Institute also urged FSIS to extend the same regulatory approach to products which contain meat and poultry mixtures.

USDA Grants Vulcan Chemical Technologies Approval to Use DPD Method for Chlorine Dioxide

The USDA has recently approved the use of the DPD method (Standard Methods for the Examination of Water and Wastewater – Method 4500 ClO_2-D) for use in determining chlorine dioxide residuals in poultry chill water. The petition was requested by Vulcan Chemical Technologies, Inc. (formerly Rio Linda Chemical), a Vulcan Chemicals company. In 1994, Rio Linda obtained approval for the FDA to use chlorine dioxide as an alternative to chlorine in disinfection of poultry chill water.

The only method previously approved to monitor chlorine dioxide residuals in poultry chill water was an amperometric titration method (Standard Methods 4500-ClO_2E). While this method remains the only approved method for determination of chloride dioxide purity, the DPD method is a simpler to use "test kit" method for chlorine dioxide residuals. The DPD test kit measures in terms of free chlorine which must be converted to chlorine dioxide through multiplication by a factor. USDA has determined that a reading of 1.7 ppm on the HACH DPD free chlorine test kit will be considered equivalent to the 3.00 ppm tolerance for residual chlorine dioxide.

Chlorine dioxide has a number of substantial advantages in disinfection of poultry chill water. Because it does not react with organic material in process water, residuals can be maintained that aggressively reduce water microbiology, which in turn improves carcass quality. *E. coli* and coliform counts can be reduced by 1 to 3 logs in most instances. Chlorine dioxide reacts almost exclusively by oxidation, and does not chlorinate organic compunds.

Inchcape Testing Services and NSF International to Offer Joint Testing and Certification Services

Inchcape Testing Services (ITS), and NSF International, announced an agreement that offers customers the advantage of receiving both the NSF Certification mark and the ETL Listed mark through a single point of contact. Under the agreement, manufacturers will be able to obtain two marks for commercial food service equipment, pool and space equipment, certain medical products and plastic pipe that must comply with applicable product safety and sanitation standards while working directly with one organization.

Previously, manufacturers requiring both the ETL Listed mark and the NSF Certification mark would need to approach both organizations separately. The broad network of ITS and NSF International testing facilities, customers can now choose the laboratory most convenient for them to conduct all relevant compliance business. Each certification mark can only be authorized by the respective certifier, but either company will coordinate your entire request.

Combined follow-up inspection services are also part of this agreement. Both organizations currently perform regularly scheduled plant inspections as part of their certification programs: ITS requires quarterly visits and NSF International an annual inspection. Under the agreement, manufacturers will have one less inspection each year. Now, ITS will conduct three inspections along with one joint inspection conducted by NSF International.

The simpler certification process is intended to save a great deal of time and effort for manufac-

turers of commercial food service equipment. The ability to receive these widely recognized certification marks through a single contact offers manufacturers a streamlined approach to product safety and sanitation compliance.

Sentencing in Smuggling Case

On January 21, 1997, U.S. District Judge Thomas J. Curran, sentenced Jannes (John) Doppenberg, president of Vitek Supply Corporation, Oak Grove, Wisconsin, to 44 months in prison. Vitek and Doppenberg were convicted in June 1996 on 12 felony counts stemming from a scheme to smuggle into the United States and distribute unapproved animal drugs for use in veal calves.

In addition to the prison sentence, Judge Curran fined Doppenberg $25,000 and ordered him and Vitek to pay restitution totaling $29,452 to the United States Customs Service and $705,814 for damages to a meat-packing company that destroyed a substantial quantity of veal because its calves had been fed furazolidone, one of the unapproved drugs distributed by Vitek. Judge Curran also sentenced Vitek to pay a fine of $350,000. In addition to the fine, Vitek was ordered to provide a written program to the Court outlining how they would institute procedures to prevent similar violations from occurring in the future.

At the sentencing hearing, Assistant U.S. Attorney Eric J. Klumb emphasized the risk to public health created by Doppenberg and Vitek's scheme. The unapproved drugs involved included clenbuterol, a drug that has been associated with acute food poisoning in humans who consumed meat from treated animals; avoparcine, an antibiotic that, if widely used in animals, may result in the transfer to humans of bacteria resistant to treatment by vancomycin, an antibiotic used extensively in human medicine; and furaltadone, furazolidone, and nitrofurazone, drugs shown to be carcinogenic.

This case involved extensive cooperation by the U.S. Department of Justice, Office of Consumer Litigation and U.S. Attorney's Office, the U.S. Customs Service, the U.S. Department of Agriculture, as well as the Food and Drug Administration. Doppenberg is scheduled to begin his jail term on March 10, 1997.

Colloidal Silver not Approved for Treating Animals

FDA has received reports that products containing colloidal silver are being promoted for use in the treatment of mastitis and other serious disease conditions of dairy cattle, as well as for various conditions of companion animals. For example, FDA's Center for Veterinary Medicine has received reports from the Agency's regional milk specialists and state inspectors that colloidal silver products have been found on some dairy farms. Also, recent articles in some farm newspapers and journals promote the use of colloidal silver in treating mastitis and claim that no milk discard is needed.

FDA is not aware of any substantial scientific evidence that supports the safe and effective use of colloidal silver ingredients or silver salts for any animal disease condition. Also, in the October 15, 1996 *Federal Register*, FDA proposed to establish that all over-the-counter human drug products containing colloidal silver ingredients or silver salts for internal or external use are not generally recognized as safe and effective and are misbranded.

Use of colloidal silver ingredients in food-producing animals constitutes a potentially serious public health concern because of the possibility of residues in milk or meat. According to several scientific publications mentioned in the October 15, 1996 *Federal Register* proposal, the human consumption of silver may result in argyria – a permanent ashen-gray or blue discoloration of the skin, conjunctive, and internal organs.

In addition to the possible human health concerns, use of these products to treat a serious illness in animals (including pets) could potentially endanger the health of the animal by delaying timely, appropriate treatment.

Colloidal silver-containing products have not been approved by FDA for use in any animal species. Promoting the use of colloidal silver for treating animal diseases causes such products to be misbranded veterinary drugs under the Federal Food, Drug, and Cosmetic Act (the Act). Labeling colloidal silver products to treat animals causes such products to be new animal drugs which are adulterated under the Act.

FDA has taken action against colloidal silver products, and is continuing to investigate the promotion and use of colloidal-silver products in dairy and other animals. If necessary, FDA will take further appropriate regulatory action.

Penn State Scientist Heats Up Research on Package Humidity

When it comes to improving the quality and shelf life of packaged fresh mushrooms, it's not the heat, it's the humidity, says a food scientist Penn State's College of Agricultural Sciences.

The shelf life of the common button mushroom is limited to three to five days on a store shelf,

says Ramaswamy Anantheswaran, associate professor of food science. Typically, mushrooms are packaged in containers covered by plastic film with air holes.

Anantheswaran has recently completed research on two mushroom packaging methods. One project focused on modifying the oxygen concentration within individual wrapped packages, and the other sought ways to modify the humidity within single-wrapped packages.

Anantheswaran's idea to control oxygen content within mushroom packages evolved from research on controlled atmosphere storage, in which precisely controlled gases are used to keep produce from ripening or spoiling.

In the laboratory, Anantheswaran found that controlling oxygen within a package worked well. Unfortunately, the package had to be maintained at a relatively constant temperature, a factor that cannot be guaranteed on the mushrooms' trip from processor to market.

Undeterred by the havoc heat had brought to his modified atmosphere work, Anantheswaran turned to humidity. "When mushrooms are harvested, more than 90 percent of their weight is water," he explains. "Mushrooms also don't have a skin like other types of produce, and give off much more water vapor."

This vapor can collect within the package and cause discoloration and growth of bacteria. Humidity within produce packaging is a common problem that can affect the appearance and safety of the food product. Excess humidity also fosters the growth of harmful microorganisms.

"Although mushroom packages are vented with air holes, it is difficult to remove moisture once it forms," Anantheswaran points out.

Anantheswaran is currently testing several commercially available moisture adsorbers to regulate moisture within food packaging. Adsorption occurs when thin layers of molecules adhere to the surface of solids or liquids, much like odors are absorbed by baking soda.

"Modifying the humidity in mushroom packages is particularly challenging because mushrooms respire at a high rate when harvested and gradually level off," says Anantheswaran. "Also, the adsorbing agent cannot totally eliminate humidity, because the produce would then dry out."

Adsorbing agents such as salt crystals and sorbitol, a chemical adsorbent, were tested in different amounts. Anantheswaran and other researchers tested a variety of plastic films for water vapor permeability as well. "The aim of the research was to keep the moisture production of the mushrooms slightly higher than the combined rates of moisture absorption by the absorbing agent and moisture loss through the package film," Anantheswaran says.

According to Anantheswaran, the modified humidity packaging improved the maturity of the mushrooms, effectively increasing the shelf life for the product. Anantheswaran is currently looking into a package design that would incorporate moisture adsorbers into the structure of the package.

"This modified humidity packaging can be used with any type of produce," Anantheswaran says. "Why stop with mushrooms? Other types of produce emit varying amounts of moisture, and the amount of absorbing agent can be adapted to maintain the humidity within a range of values."

WQA Certification Training

At Osmonics' request, the Water Quality Association (WQA) held a Certified Water Specialist (CWS I) training for the new Osmonics® Product Sales Group. All the salespeople who took the exam received CWS I certification.

The CWS certification exam tests an individual's knowledge of water treatment technologies and commitment to ethical selling practices. WQA offers five levels of CWS training. To be certified for CWS I, applicants must pass an exam that covers the entire range of residential water treatment technologies from water softening to home reverse osmosis systems. This exam also tests applicants on their knowledge of water chemistry and water quality measurement techniques. The WQA certification program is voluntary and is not required by any state or federal law. Certification status is valid for three years.

HACCP and Food Safety Literature

Hazard Analysis Critical Control Points (HACCP) principles are the focus of ASI's (St. Louis, MO) three newest books. They are: *Managing a Food Distribution Center Using HACCP Principles, Operating a Plant Manufacturing Food Packaging Material Using HACCP Principles* and *Guidelines for Operating a Retail Food Store Using HACCP Principles*. In these books, HACCP is defined and its use justified. In addition, extensive instructions and explanatory materials to develop a HACCP program are presented.

Four guidebooks for dairies, food processing plants, food processing facilities and food distribution centers are also available. Grading systems, critical conditions and inspection logs are included in each.

The 30-minute video, "It Can be Done" is also in ASI's food safety library. The video explains and demonstrates safe storage techniques for food in warehouses.

Food Industry Executives Have Supported the FRDC for Ten Years

In 1987, Agriculture and Agri-Food Canada set up a leading-edge research centre devoted entirely to food processing, the Food Research and Development Centre (FRDC).

With supporting industrial research and development as its top priority, the FRDC had to closely align itself with the needs of Canadian food companies. A number of business leaders wished to put their experience to work for the new research centre to help choose its main areas of development. This is how the first FRDC Board of Governors came into existence ten years ago. The mandate of its 12 members was to inform and advise the Centre's director on the industry's expectations.

Throughout the years, the Board has closely followed the formation of targeted research sections on dairy products, meat, bioingredients and food preservation technologies, as well as research projects underway at the FRDC. It was the Board of Governors that encouraged the creation of the Centre's Industrial Program for which, since 1992, clients pay access fees. To ensure the Centre's flexibility in its technology transfer activities, the Board set up the Governor's Foundation in 1992. Today, the Foundation is pursuing its mission of encouraging innovation in the food sector and partnerships between industry and government. The Board also initiated the construction of a pavilion that will house the new Centre library, which is scheduled to open in September 1997.

The entire Centre staff wishes to thank the past and present members of the Board of Governors for their support. Through them, the FRDC has always benefited from private sector input and participation in decisions that have been important to its development.

CVM Policy on Competitive Exclusion Products

The Center for Veterinary Medicine (CVM) has recently evaluated the sale and use of competitive exclusion (CE) products in animals. Competitive exclusion products are products containing live microorganisms isolated from the gastrointestinal tract of chickens and other animals. In addition, these products are labeled and/or promoted with therapeutic and/or structure/function claims which include statements about reduction in the level of *Salmonella* and other enteric pathogens. Therefore, competitive exclusion products are classified as drugs under the Federal Food, Drug, and Cosmetic Act. Because these products are not generally recognized as safe and effective, they are considered unapproved new animal drugs when labeled with drug claims or misbranded if promoted for drug purposes. To continue to market these products they must be properly labeled and the subject of an approved New Animal Drug Application. Any previous opinions by the Center advising a different regulatory position are no longer valid.

Another class of products are the direct-fed microbial products which may be regulated as food under the provisions of Compliance Policy Guide (CPG) 689.100. These products consist of specific organisms listed in the Association of American Feed Control Officials (AAFCO) official publication and contain known quantities of the microbes (i.e. colony forming units). In contrast, CE products consist of unquantified and/or unidentified microorganisms. CE products are not considered candidates for marketing under the provisions of the Direct-Fed Microbial CPG.

Unapproved microbial products are subject to immediate regulatory action, however, the Agency is prepared to work closely with any company actively seeking approval for their products. For information on obtaining approval for competitive exclusion products contact Dr. Steven Vaughn, director of the Division of Therapeutic Drugs for Food Animals, Office of New Animal Drug Evaluation at (301) 594-1642. For information about the regulation of direct-fed microbial products, contact Dr. George Graber, Director of the Division of Animal Feeds, Office of Surveillance and Compliance at (301) 594-1724.

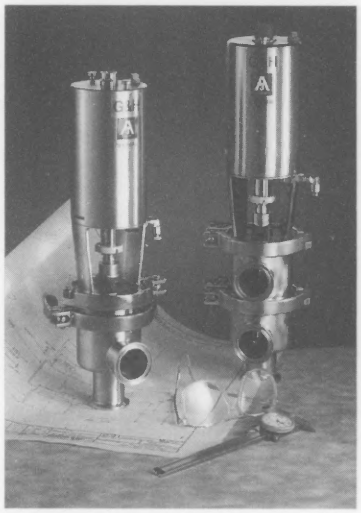
New Sanitation Consulting

ASI is proud to announce the beginning of a new service for its clients. Due to the increasing emphasis on sanitation in the food industry, ASI has begun offering sanitation consulting. The hiring of food sanitation expert George Kellner means that ASI can evaluate the total sanitation programs for the food industry.

Mr. Kellner has over 18 years experience as a sanitation advisor for Madison Chemical Company and for West Agro Chemical Company. He has extensive experience working with food plants on their sanitation programs.

Mr. Kellner can evaluate sanitation programs, make recommendations on chemicals and sanitizers to use, what kind of equipment to use and will train employees on correct methods of cleaning and sanitizing in the plant. In addition, he can assist in writing sanitation schedules and procedures. He can work with chemical companies and engineers to reduce costs while maintaining a high standard of cleanliness.

For more information, call Christine VerPlank or George Kellner at (800) 477-0778.



G & H Products Corp.

Sanitary Single Seat Valves Provide Ultra-Clean Design

Sanitary Remote Control (SRC) valves from G&H Products Corp. are designed with a double lip seal on its plug and stem assembly instead of O-rings, to provide ultra-clean operation. The SRC's lip seal design wipes product from the stem on the valve's upstroke, and wipes atmospheric particulate matter from the stem during the downstroke to further ensure hygienic standards and stem durability.

The SRC valve guarantees extended seat life with its unique valve closure. By pressing a flat elastomer disk against the flat seat in the valve body, seal wear is minimized. A modular valve design also allows complete flexibility within the product line. By adding or changing a few parts, the valve can be converted into 2 separate manual versions, or an actuated aseptic version. In addition, six different body combinations are available to provide many configuration options to fulfill application needs. The SRC's actuator can also be easily adapted from normally open to normally closed for changing flow conditions in the field.

The SRC valve is 3-A approved for sanitary operation. The valve body and plug stem are AISI 316L stainless steel, with the plug stem being hard-chrome plated. The lip seal and replaceable seats are temperature resistant to 284°F with the standard EPDM elastomer.

G&H Products Corp., Pleasant Prairie, WI

Reader Service No. 353

Bactometer System Helps Make QA/QC Decisions Rapidly, Improving Laboratory Productivity

bioMérieux Vitek's Bactometer® microbiology system helps make quality assurance/quality control (QA/QC) decisions rapidly, three to five times faster than traditional methods, reducing testing costs, and improving laboratory productivity. The Bactometer can test raw materials, finished products, and environmental swab samples.

Through automatic microbiological screening bacteria may be detected without serial dilution, plates or counting. The Bactometer is designed for the detection of a wide range of microorganisms including total microbial counts, coliforms, yeast, and mold and lactic acid bacteria. The system may also be used to perform challenge tests, shelf life tests, functional sterility testing and environmental monitoring.

Bactometer applications are routinely used to perform testing of: milk and dairy products, meat/poultry/seafood, fruits, vegetables, fresh/shelf-stable/frozen foods, beverages, dried foods, candies and confections, cosmetics and toiletries and pharmaceuticals.

The Bactometer system is made up of five components: the *Bactometer processing unit (BPU)* that incubates the test modules and performs readings automatically; the *computer*, which manages all data collection, storage and interpretation; the *Bactometer processing software (BPS)*, which incorporates the data analysis programs; the *monitor/printer* which provides visual and permanent information on system status and test sample results; and the disposable *test modules* which are individually packaged and ready to accept solid or liquid media plus the test sample.

bioMérieux Vitek, Hazelwood, MO

Reader Service No. 354

Anderson Introduces Completely New Line of Circular Chart Recorders and Recording Controllers

The Anderson Instrument Co. released for sale the new AJ-300 line of microprocessor-based recorders and recording controllers. The instruments are specifically designed to meet all the environmental, performance, and legal requirements for recorders and controllers in sanitary fluid processing plants. One or two colored pens print on the large 12" chart with modular options available such as relay outputs, 4-20mA retransmission, PID control, "event" pen, and 24 Volt transmitter power supplies. Bright red LED displays are standard for both channels. Simple programming is provided via large, tactile keys on a sealed, external keypad. The units are universal with respect to input type, accepting voltage, current, RTD, and all standard thermocouples. The NEMA 4X enclosure provides maximum protection against moisture and corrosion, without an exposed "piano" type hinge found on most competitive units.

Anderson Instrument Co., Inc., Fultonville, NY

Reader Service No. 355

Ecolab's New Flume Treatment Offers Safer, More Effective Alternative to Traditional Oxidizing Agents

Ecolab's new Tsunami flume treatment offers food processors an effective and economical alternative to chlorine-based oxidizing agents for their fruit and vegetable processing operations.

Tsunami is a patented broad spectrum, peroxyacetic acid-based deposit, odor, and microbial control agent. It is formulated to achieve reduction in aerobic species and has also proven to reduce coliforms in the flume water and on vegetable surfaces.

Tsunami has undergone an FDA petition and approval process to ensure that it is safe for use in the waters for processed fruits and vegetables in both batch and continuous operations.

Completely water soluble at active-use concentrations, Tsunami will not off-gas and, therefore, reduces the risk to plant workers. After use, it rapidly breaks down into water, oxygen and acetic acid so that no extra demands are placed on processors' waste treatment systems. And since the flume stays cleaner with Tsunami, it helps to reduce labor and water costs.

Ecolab, St. Paul, MN

Reader Service No. 356

International BioProducts

Chicken Carcass Sampling Kit Offers Convenient, Quality Solution for HACCP Testing

Whole chicken carcass sampling for the new USDA-mandated HACCP program is easy, efficient and cost-effective with the Chicken Carcass Sampling Kit, now available from International BioProducts. A unique trio of products, designed specifically in accordance with USDA guidelines, provides everything you need to perform the whole chicken rinse procedure: the Bird Rinse 400™, the Chicken Rinse Bag, and a pair of sterile polyethylene sampling gloves. Each kit contains supplies for 15 samples.

The Bird Rinse 400™ is a crystal-clear, break-resistant PET plastic bottle, pre-filled with 400 ml of sterile Butterfield's Phosphate Buffer. The clear bottle enables visual inspection of the Butterfield's Buffer for cloudiness, as required by USDA specifications, while its plastic construction eliminates the hazards of glass in the production area. The Chicken Rinse Bag, with a substantial thickness of 3 mil and USDA-mandated dimensions of 20.25" × 15.25", offers ample size and strength to withstand repeated rocking of the bird. The top edge of each bag is sealed to ensure sterility, and perforated to facilitate opening. After collection of the sample, the rinse fluid is easily poured from the bag into the wide-mouthed bottle; sealed with the extra enclosed cap, featuring a pressure-sensitive inner-liner to maintain sterility; and transported to the laboratory for analysis.

International BioProducts, Redmond, WA

Reader Service No. 357

Blender for *Giardia* and *Cryptosporidium* Isolation

The Stomacher® Lab Blender 3500W, from Tekmar-Dohrmann has been designed for isolation of *Giardia* cysts and *Cryptosporidium* oocytes from raw and finished drinking water. The Stomacher can rapidly remove the microorganisms from the fiber filter used to entrap them. The filter and diluent in a sterile plastic bag are placed into the Stomacher where reciprocating paddles force the microorganisms from the filter into the diluent. The Stomacher method is more reproducible than hand washing of the filters, reduces the analyst's contact and is 80% faster, allowing the machine to quickly pay for itself.

Tekmar-Dohrmann, Cincinnati, OH

Reader Service No. 358

BIND® *Salmonella* Gives Results in 22 Hours

IDEXX Laboratories, Inc., announces BIND® *Salmonella*, a new test that accurately detects the presence of *Salmonella* in just 22 hours. BIND is proven to detect more than 500 strains of *Salmonella*, including the most prevalent strains reported by CDC, yet it has only 4 steps and less than one minute of hands-on time per sample. In addition, BIND drastically reduces false-positive rates, since cross-reactivity with *Citrobacter* and other microbes is rare compared to other methods.

To perform the test, simply pre-enrich the food sample in a standard growth medium overnight (14 to 20 hours). Dilute the pre-enriched sample 1:10 into buffered peptone water. Pipette 0.5 ml into one BIND detection tube and one control tube, and let tubes stand at room temperature for 2.5 hours. Then pipette into the sample tray and cool 20 minutes in the BIND SuperCooler. Positive samples freeze and turn orange; negative samples remain yellow.

BIND (Bacterial Ice Nuclation Detection) uses genetically-engineered bacteriophage containing the *ina* gene, which induces *Salmonella* to produce a protein that causes solutions to freeze. When reagents are mixed with samples containing *Salmonella*, a coded message is inserted into *Salmonella* cells, causing *Salmonella* to produce ice nucleation proteins in less than 2.5 hours. When the temperature of the sample is lowered to -8.5°C, positive samples freeze, turn orange and are easily identified with the naked eye.

IDEXX Laboratories, Inc.,

Reader Service No. 359

Sellers Cleaning Systems

Sellers Cleaning Systems Announces New Model 363 Low Flow Rotary Tank Cleaner

Sellers Cleaning Systems announces its new Model "363" low flow rotary tank cleaner. The Model 363 offers all the proven quality and performance features of the current Model 360, but it also includes some innovative design changes and cutting edge technology.

The Model 363, which is constructed of 316 stainless steel, provides a full 360 degree indexing pattern, and has been specifically designed to handle lower flow rates from 15-50 gpm (57-189 lpm) at pressures up to 500 psi (34.5 bar). Nozzles from 3.10 mm to 6.35 mm (.125" to .250") are available, as well as specialty extended nozzles for extended reach capability. Innovative rotor and stator combinations provide a large selection of cycle times. The Model 363 is hydraulically driven by the cleaning solution, and both oil lubricated or flow thru gearbox designs are available. Choice of 2 or 3 nozzle configurations provide maximum cleaning flexibility. The Model 363 is immersible, and is suitable for both CIP or portable applications.

Coupling the Sellers' BX Injector with the Model 363 provides an efficient system when recirculation is not required.

Sellers Cleaning Systems, Piqua, OH

Reader Service No. 360

Another Food Pathogen Targeted by Qualicon™

Qualicon™, A DuPont Subsidiary, has announced the commercial release of BAX™ for Screening/*Listeria monocytogenes*, a fast, accurate test that detects the presence of this pathogenic bacteria in frozen desserts, soft cheeses, and other foods.

PCR is a Nobel Prize-winning technique that can very rapidly produce millions of copies of a single segment of an organism's DNA. The BAX™ systems, through the use of packaged, tableted PCR reagents, make this technique easy and convenient to use. By using genetic information to target pathogenic bacteria, the BAX™ systems are the most accurate products of their kind available.

The BAX™ systems were named to the R&D 100 for 1996 as one of the most technologically innovative products of the year.

Only the *Listeria monocytogenes* species of the common *Listeria* genus is a significant threat to human health. While a number of tests exist that target the *Listeria* genus, the BAX™ system offers the unique advantage of detecting the *Listeria monocytogenes* species in the same amount of time it takes other tests to detect the *Listeria* genus.

Qualicon™, Wilmington, DE

Reader Service No. 361

Chromogenic Medium Differentiates *E. coli* and Other Coliforms from Background Flora

The new Oxoid Chromogenic *E. coli*/Coliform Medium (CM956) enables simple differentiation of *E. coli*, coliforms, and background flora. This nonselective nutrient medium, based on nutrient agar, facilitates the recovery of stressed microorganisms, enabling an accurate total viable count (TVC) to be obtained and providing presumptive identification of *E. coli* and coliforms after only 18 hours.

E. coli is frequently present in food and water samples along with other coliforms and background flora. A method which will differentiate between these microorganisms, but still allow a TVC to be obtained, is a valuable diagnostic procedure.

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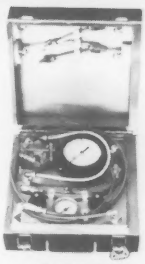

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PRELIMINARY PROGRAM

of the IAMFES 84th Annual Meeting

Monday Morning—July 7, 1997

Opening Doors to New Dairy Markets

- New Product Opportunities, What are Consumers Seeking?—CHRISTINE BRUHN, University of California, Davis, CA
- Moo Kooler—Breaking New Ground—DAVID STIEFER, Milk Marketing, Inc., Strongsville, OH
- Square Pegs in Round Holes—SCOTTIE MAYFIELD, Mayfield Dairy Farms, Inc., Athens, TN
- How do IDF, Codex and Trade Agreements Impact the Dairy Farmer?—DUANE SPOMER, USDA, Washington, D.C.
- Some Implications of the Dairy Portions of the Farm Bill—RICHARD MCKEE, USDA, Washington, D.C.

Technical Session—Foodborne Pathogens

- Effects of Culture Temperature, Inoculum Concentration, and Contact Time on Attachment of *E. coli* O157:H7 and *L. monocytogenes* to Chicken Skin—R. DANIELLE BENEFIELD, and D. Conner, Auburn University, Auburn, AL
- Factors Affecting Inhibitory Activity of Lactates Against *E. coli* O157:H7 at 10°C—DONALD CONNER and K. Tamblyn, Auburn University, Auburn, AL
- A Sensitive 24-h Vero Cell Tissue Culture Assay for Cytotoxins of EHEC O157:H7 Strains—RAMAKRISHNA NANNAPANENI, R. Story, and M. Johnson, University of Arkansas, Fayetteville, AR
- Stimulation of Growth and Survival of *E. coli* O157:H7 at Suboptimal Temperatures by Sodium Lactate—KATHERINE TAMBLYN and D. Conner, Auburn University, Auburn, AL
- A Small Outbreak of Listeriosis Linked to the Consumption of Imitation Crab Meat—JEFFREY FARBER, E. Daley, M. Mackie, and B. Limerick, Health Canada, Ottawa, Ontario, Canada
- Thermal Destruction of *L. innocua* in Ground Beef Patties with 5, 25 or 50% Fat—JAMES GOFF, M. Christie, R. Story, and M. Johnson, University of Arkansas, Fayetteville, AR
- Accelerated Recovery on Injured *Salmonella* through Media Modification—JOSEPH BAILEY, M. Myszewski, and N. Cox, USDA-ARS-RRC-PMSRU, Athens, GA
- *Salmonella* Control in Poultry—NELSON COX, J. Bailey, N. Stern, and J. Line, USDA-ARS-RRC-PMSRU, Athens, GA
- Factors Affecting Growth and Toxin Production by *Clostridium botulinum* in Peanut Spread—M. ROCELLE CLAVERO, R. Brackett, L. Beuchat, and M. Doyle, University of Georgia, Griffin, GA
- Response to Acid Challenge by *Yersinia enterocolitica* Depends on Physiological State and Strain—ROBERT MERKER, F. Khambaty, and D. Shah, FDA, Washington, D.C.
- A Quantitative Risk Assessment of *Vibrio vulnificus* in Gulf of Mexico Oysters Consumed in Canada—EWEN TODD, S. Stavric, W. Ross, and B. Buchanan, Banting Research Centre, Ottawa, Ontario, Canada

Quantitative Microbial Risk Assessment

- Risk Assessment: A Means of Linking HACCP and Public Health—ROBERT BUCHANAN, USDA-ARS-ERRC, Wyndmoor, PA
- Estimation of Distribution of Numbers of Organisms in Raw Product—HARRY MARKS, USDA, Washington, D.C.
- Growth and Inactivation Models to be Used in Quantitative Risk Assessments—SUZANNE VAN GERWEN, Wageningen Agricultural University, Wageningen, The Netherlands

- Dose Response Modeling–DAVID VOSE, David Vose Risk Analysis Services, Wincanton, United Kingdom
- Simulation Modeling–Monte Carlo Techniques–MICHAEL CASSIN, Decisionanalysis Risk Consultants, Guelph, Ontario, Canada
- Risk Assessment and Economic Analysis for Managing Risk–ROBERTA MORALES, North Carolina State University, Raleigh, NC

Special Poster Session—Washing Makes a Difference (Posters without authors will be displayed until Tuesday at noon)

- Update of Washing and Sanitizing of Milk Haulers and Dairy Plant Equipment–TOM BOWMAN, FDA, Atlanta, GA
- An Assessment of the Cleaning and Disinfection of Poultry Transport Containers and Truck Beds–SAM JOSEPH, University of Maryland, College Park, MD
- Efficacy of Holding Pen Washing to Reduce Bacterial Levels–KATHLEEN RAJKOWSKI, USDA-ARS-ERRC, Wyndmoor, PA
- New Methods for Sanitization of Egg Shells–S. D. WORLEY, Auburn University, Auburn, AL
- Biofilms in Aquatic Food Processing–DOUGLAS MARSHALL, Mississippi State University, Mississippi State, MS
- Washing Fresh Fruits and Vegetables–JERRY BARTZ, University of Florida, Gainesville, FL

Safety of Refrigerated Foods—An Update

- Refrigerated Food Safety: Regulatory Perspective–THOMAS SCHWARZ, FDA, Washington, D.C.
- Refrigerated Food Safety: Industry Perspective–DONALD ZINK, Nestle, USA, Inc., Glendale, CA
- Packaging Refrigerated Foods–E. JEFFERY RHODEHAMEL, Cryovac North America, Duncan, SC
- Antimicrobial Strategies for Refrigerated Foods–ERIC JOHNSON, University of Wisconsin-Madison, Madison, WI
- Intervention Strategies of Minimally Processed Refrigerated Foods–ROBERT BRACKETT, University of Georgia, Griffin, GA
- Predictive Microbiology in Formulating Safe Refrigerated Foods–MARTIN COLE, Nabisco Biscuit Company, East Hanover, NJ

Poster Session—Methodology

- A New Rapid Automated Method for the Detection of *Listeria* spp. from Environmental Swabs–RUTH FIRSTENBERG-EDEN and L. Shelef, MicroSys, Inc., Ann Arbor, MI
- Development of a New Medium to Assess Injury in Heat & Sanitizer Injury for *Listeria*–MISTY VANDERBUSH and N. Sullivan, Difco Laboratories, Inc., Ann Arbor, MI
- Suitability of Selective Media for Recovery and Enumeration of Sublethally Heat-and Acid-Injured *L. monocytogenes*–ROBERT WILLIAMS and D. Golden, University of Tennessee, Knoxville, TN
- Identification and Enumeration of *Salmonella* on Sample Slides of Poultry Carcass Wash Water Using Image Analysis–JINPING HUANG, Y. Li, M. Slavik, and G. Bayyari, University of Arkansas, Fayetteville, AR
- Evaluation of an Automated Enzyme-Linked Fluorescence Immunoassay (ELFA) for the Detection of *Salmonella*–MELVINA KEITH, Ross Products Divison of Abbott Labs, Columbus, OH
- Antibody-Direct Epifluorescent Filter Technique (Ab-DEFT) for Rapid, Specific Enumeration of *Listeria* in Food–DIANA STEWART and M. Tortorello, FDA-NCFST, Summit-Argo, IL
- Quantitative Screening of Reactivity of *Bacillus* and *Clostridium* Spores in a Dot-Blot Immunoassay–NANCY STANLEY, J. Quinlan, and P. Foegeding, North Carolina State University, Raleigh, NC
- Detection of *Staphylococcus aureus* Using an Enhanced Chemiluminescent Biosensor–PHILIP PIVARNIK, J. Sperry, C. Brown, S. Letcher, A. Senecal, and A. Rand, University of Rhode Island, W. Kingston, RI
- Multiplex PCR for the Detection of Human Enteroviruses, Hepatitis A Virus, and Norwalk Virus–SORAYA ROSENFIELD and L. Jaykus, North Carolina State University, Raleigh, NC
- Modification of the Sample Preparation Protocol in the BAX™ System for Screening *Salmonella* to Permit Detection of Food Matrices with Inhibitory PCR Effects–CHERYL SOBITIES, G. Tice, L. Ecret, and E. Cole, Qualicon, Wilmington, DE
- Rapid Molecular Method for the Detection of *Salmonella* spp. Using PCR and LCR–SORAYA ROSENFIELD and L. Jaykus, North Carolina State University, Raleigh, NC
- Rapid Detection of *Salmonella* in Feces from Dairy Cows Using a Fluorescent PCR-Based Assay–ANNA PASCUZZI, S. McCulloch, J. Tuttle, and R. Cano, California Polytechnic State University, San Luis Obispo, CA
- Results of Testing a Variety of Foods for *Salmonella* Using a Fluorogenic PCR-Based Assay–LISA YAGI, M. Matsuura, R. Green, S. Kawasaki, B. Kimura, S. Flood, E. Schreiber, and C. Paszko-Kolva, PE Applied Biosystems, Foster City, CA
- Evaluation of an Enzyme-Linked Immunosorbent Assay, Direct Immunofluorescent Filter Technique and Multiplex PCR for Detection of *E. coli* O157:H7 in Beef Carcass Wash–PINA FRATAMICO and T. Strobaugh, Jr., USDA-ARS-ERRC, Wyndmoor, PA
- Development of PCR-Based Homogeneous Confirmative Assays for *L. monocytogenes* and *E. coli* O157:H7 –BARBARA KRIEGER, W. Barbour, and C. Sobities, Qualicon, Wilmington, DE

- Development and Evaluation of a PCR-Based Assay for the Detection of *L. monocytogenes* in Foods–MARK BARBOUR, B. Andaloro, M. Jensen, G. Tice, W. Hudson, C. McGuire, J. Hazel, and A. Stoltzfus, Qualicon™, Wilmington, DE
- Concentration of Pathogenic Microorganisms from Dairy Products for Detection of PCR–LISA LUCORE and L. Jaykus, North Carolina State University, Raleigh, NC
- Rapid Methods for Identification of Lactic Acid Bacteria–SUSAN FREUND, M. Tamplin, H. Trenk, and C. Wei, University of Florida, Gainesville, FL
- Genetic Characterization of *Shewanella putrefaciens* and *Pseudomonas* spp. Isolated from Fish Processing and Spoilage Using Automated Ribotyping–AMY MCCARDELL, S. Gudmundsdottir, B. Gudbjornsdottir, and H. Einarsson, Qualicon™, Wilmington, DE
- Comparison of Excision Versus Swabbing Techniques for Assessing the Bacteriological Quality of Pig Carcass Surfaces–PATRICIA KLEIN, S. Palumbo, and A. Miller, USDA-ARS-ERRC, Wyndmoor, PA
- A Novel Technique for *E. coli* Testing of Beef and Pork Carcasses–J. ERDMANN, J. Dickson, and M. Grant, Iowa State University, Ames, IA
- A 24 h Test for Enumeration of Total Coliforms and *E. coli* in Food–ROBIN IRVING, C. Smith, A. Naqui, and D. Townsend, IDEXX Laboratories, Inc., Westbrook, ME
- The Occurrence of Non-Coliform Bacteria on VRBA–CHOONG CHUNG and E. Norm, KonKuk University, Kwangjin, Seoul, Korea
- Evaluation of a Novel Method for the Detection of *Staphylococcus aureus* in Dairy Samples–JILL GEBLER, Murray Gouldburn Co-operative Co., Ltd., Yarram, Victoria, Australia
- The Evaluation of an Automated Rapid Microbial Detection System for Sterility Testing of an Aseptically Processed Tomato-Based Vegetable Beverage–Y. JENNIFER LEE and L. Kanen, Amway Corporation, Ada, MI
- SimPlate™ for Yeast and Mold: A New Method for Rapid Fungi Enumeration in Food–CHUN-MING CHEN, H. Gu, D. Townsend, and A. Naqui, IDEXX Laboratories, Inc., Westbrook, ME

Fresh-Cut Fruits—Pitfalls and Challenges for the Future

- An Introduction to Fresh-Cut Fruits Market Potential in Both the Foodservice and Retail Arenas–EDITH GARRETT, IFPA, Alexandria, VA
- Factors Affecting the Suitability of Commodity Fruits Headed for the Fresh-Cut Processor–ADEL KADER, University of California-Davis, Davis, CA
- Processing and Quality Factors Affecting the Quality and Storage Life of Fresh-Cut Processor–DEVON ZAGORY, Devon Zagory and Associates, Davis, CA
- Fruit Spoilage–BILL CONWAY, USDA-ARS, Beltsville, MD
- Microbiological Safety and Control of Fresh-Cut Fruits–JEFFREY FARBER, Health Canada, Ottawa, Ontario, Canada

Technical Session—Methodology and Education

- Comparison of *Staphylococcus aureus* Detection by Conventional and New Petrifilm™ Methods–PATRICK MACH, C. Binsfeld, H. Lubrant, and L. Pederson, 3M Microbiology Products, St. Paul, MN
- A Single Test Unit for Quantitating Coliforms, *E. coli* and *Salmonella* in Waters and Foods–ROBERT SALTER, E. Zomer, and M. Gandman, Charm Sciences, Inc., Malden, MA
- Ensuring the Microbiological Quality of a Low Proof Beverage–GORDON WHITNEY, J. Montgomery, K. Smith, and E. Vaughn, Brown-Forman Beverages, Louisville, KY
- Assessing Surface Cleanliness–An Integrated Approach Using ATP Bioluminescence and Microbiological Analysis–CRAIG DAVIDSON, C. Griffith, A. Peters, and L. Fielding, University of Wales Institute, Cardiff, Wales, United Kingdom
- The Use of Bioluminescence for Evaluating Plant Cleanliness in a Baking Facility–REBECCA ILLSLEY, E. Jackson, K. McRae, and J. Feirtag, University of Minnesota, St. Paul, MN
- Rapid Molecular Method for Detection of Human Enteric Viruses in Prepared Hamburgers and Leaf Lettuce–PARIS LEGGITT and L. Jaykus, North Carolina State University, Raleigh, NC
- Immunomagnetic Separation and Flow Cytometry for Rapid Detection of *E. coli* O157:H7–KUNHO SEO, R. Brackett, and J. Frank, University of Georgia, Griffin, GA
- Hazard Analysis Critical Control Point (HACCP) Implementation of Food-service Directors–ELIZABETH BARRETT, Kansas State University, Manhattan, KS
- Handwashing vs. Gloving for Food Protection–MICHAEL DOLAN, E. Fendler, and R. Williams, GOJO Industries, Inc., Cuyahoga Falls, OH
- Foodborne Disease in the Home–ELIZABETH SCOTT, Newton, MA
- Statewide Training for Environmental Health Specialist–BIBBY MOORE, Div. Environmental Health, Raleigh, NC
- Recipe HACCP–O. PETER SNYDER, JR., Hospitality Institute of Technology and Management, St. Paul, MN

USDA "Mega-Reg" Microbiological Requirements

- Microbiological Sampling and Testing Aspects of the "Mega-Reg"—GARY ACUFF, Texas A & M University, College Station, TX
- *E. coli* Testing and Process Control—MIKE ROBACH, Continental Grain Company, Gainesville, GA
- *E. coli* and *Salmonella* Levels on Beef Carcasses–Survey Results Compared to Mega-Reg Requirements—JOHN SOFOS, Colorado State University, Fort Collins, CO
- The Importance of the Feedback Loop in HACCP: The Consumer Perspective—CAROLINE SMITH-DEWAAL, Center for Science in the Public Interest, Washington, D.C.
- International Perspective of the "Mega-Reg" Microbiological Testing Requirements—PETER MILLER, Australian Embassy, Washington, D.C.
- Microbiological Performance Standards and HACCP—DANE BERNARD, NFPA, Washington, D.C.

Food Allergies and Intolerances

- Medical Aspects of Food Allergies and Intolerance—ROBERT K. BUSH, University of Wisconsin, Madison, WI
- Food Allergy: Scope, Risk and Severity Issues—SUSAN HEFLE, University of Nebraska, Lincoln, NE
- Assessing the Potential Allergenicity of New Food Pathogens—STEVE GENDEL, U.S. FDA, Summit, IL
- The Consumer Perspective on Food Allergy—ANN MUNOZ-FURLONG, The Food Allergy Network, Fairfax, VA
- Food Allergy: Food Industry Risk Management—LYDIA MIDNESS, General Mills, Inc., Minneapolis, MN
- Food Allergy: The Regulatory Perspective—JANIS OLIVER, FDA-CFSAN, Washington, D.C.

Poster Session—General Food Microbiology

- Biological Properties of a Bacteriocin-Like Inhibitory Substance Produced by a Newly Isolated *Bacillus subtilis*—GUOLU ZHENG and M. Slavik, University of Arkansas, Fayetteville, AR
- Use of HPLC to Demonstrate Aflatoxin B_1 Degradation by *Flavobacterium aurantiacum* in Corn—LALIT BOHRA, S. Reuger, R. Phebus, J. Smith, and D. Grieger, Kansas State University, Manhattan, KS
- Occurrence of Molds and Levels of Aflatoxins and Fumonisins in Venezuelan Corn—R.M. RAYBAUDI and A. Martínez, Universidad Central de Venezuela, Caracas, Venezuela
- Enumeration and Characterization of *Aeromonas* sp. in Vegetable Products from Venezuela—R.V. DÍAZ, A. Martínez, R. Raybaudi, D. Brión, C. Rodriguez, and R. Oritz, Universidad Central de Venezuela, Caracas, Venezuela
- Inhibition of Microbial Growth and Toxin Production in Honey—HASSAN GOURAMA, S. Doores, K. Barlow, and G. Holcomb, Penn State University, Reading, PA
- Effect of Diet on the Indicative and Pathogenic Microbiological Quality of Aquacultured Pacu (*Piaractus mesopotamicus*)—SHARMA PULLELA, C. Fernandes, G. Flick, G. Libey, S. Smith, and C. Coale, Virginia Tech, Blacksburg, VA
- Antibiotic Resistant Bacteria in Aquacultured Catfish Fillets—CUSTY FERNANDES, G. Flick, J. Silva, and T. McCaskey, Virginia Tech, Blacksburg, VA
- Effect of Production System on the Indicative and Pathogenic Microbiological Quality of Aquacultured Finfish—SHARMA PULLELA, D. Fernandes, G. Flick, G. Libey, S. Smith, and C. Coale, Virginia Tech, Blacksburg, VA
- Effects of Vitamin E Supplementation and High vs. Low Initial Microbial Loads on Retail Display Life of Beef Muscle—HENRY ZERBY, K. Belk, J. Sofos, G. Smith, and L. McDowell, Colorado State University, Fort Collins, CO
- Rapid Catalytic Activity Method for Measurement of End-Point Temperature in Cooked Beef and Sausage—CARL DAVIS and S. Cyrus, USDA-ARS-RRC, Athens, GA
- Shelf-Life of Ground Beef Patties Treated by Gamma Irradiation—WILLIAM ROBERTS and J. Weese, Auburn University, Auburn, AL
- Sensory Changes of Irradiated Ground Beef through Six Weeks of Storage—JEAN WEESE, J. Johnson, and W. Roberts, Auburn University, Auburn, AL
- The Effect of Growth Medium and Heating Menstruum on Heat Resistance of *Pediococcus* sp.—BASSAM ANNOUS and M. Kozempel, USDA-ARS-ERRC, Wyndmoor, PA
- Evaluation of Changes in Microbial Populations on Beef Carcasses Resulting from Steam Pasteurization—TED BROWN, R. Phebus, P. Peters, and A. Nutsch, Kansas State University, Manhattan, KS
- Comparison of Methods for Beef Carcass Decontamination—ALEJANDRO CASTILLO, L. Lucia, K. Goodson, and G. Acuff, Texas A & M University, College Station, TX
- Efficacy of Trisodium Phosphate for Destruction of *Salmonella* on Cantaloupe—AUBREY MENDONCA and D. Fultz, North Carolina A & T State University, Greensboro, NC
- Growth and Adherence on Stainless Steel by *Enterococcus faecium*—NELIO ANDRADE, D. Ajao, and E. Zottola, University of Minnesota, St. Paul, MN
- Evaluation of Surface Topography of Food Grade Polyethylene, Polypropylene, Acetatl and Stainless Steel by Scanning Electron Microscopy—RICK KANE, P. Hildebrant, G. Braun, and J. Feirtag, University of Minnesota, St. Paul, MN

- Scanning Electron Microscopy of High Density Polyethylene Conveyor Surfaces during Normal Processing in Meat Plant Operations–RICK KANE, P. Hildebrant, G. Braun, and J. Fiertag, University of Minnesota, St. Paul, MN
- Delamination in Polyethylene Structures and the Influence of Multilayered Upper Surfaces on Deterioration Processes–RICK KANE, P. Hildebrant, P. Wjotas, and J. Feirtag, University of Minnesota, St. Paul, MN
- Microbial Spoilage of Chub-Packed Ground Beef from Four Processing Plants in the United States–SHANTINI GAMAGE, P. Peters, L. Kerwin, R. Phebus, and J. Luchansky, Food Research Institute, Madison, WI
- Simulation of *Bacillus* Spoilage in a Model Food System–MARISA CAIPO, M. Llaudes, and D. Schaffner, Rutgers University, New Brunswick, NJ
- Development of an Experimental Model for Microbial Cross-Contamination and Evaluation of the Efficiency of an Antibacterial Kitchen Disinfectant–TONG ZHAO, P. Zhao, M. Doyle, and J. Rubino, University of Georgia, Griffin, GA
- Efficacy of Three Sanitizers Against Food Spoilage Bacteria–ALEXANDER VON HOLY and D. Lindsay, University of the Witwatersrand, Wits, Johannesburg, South Africa
- Bacterial Populations of Different Sample Types from Poultry–IFIGENIA GEORNARAS, A. de Jesus, E. van Zyl, and A. von Holy
- Microbial Ecology of South African Retail Sorghum Beer–ALEXANDER VON HOLY, T. Pattison, and I. Geornaras, University of Witwatersrand, Wits, Johannesburg, South Africa
- Microbiological Quality of Cream-Fillings from Doughnuts Sold at Bulawayo, a Zimbabwean City–RICHARD OKAGBUE, Applied Biology & Biochemistry Dept., Bulawayo, Zimbabwe
- Microbial Quality of Koshari, One of the Most Famous Floksy Meals Common in Egypt–USAMA ABDUL-RAOUF and M. Ammar, Al-Azhar University, Assuit, Egypt

Tuesday Morning—July 8, 1997

Ensuring Proper Equipment Design

- World Issues and Organizations Involved in Equipment Design and Standards Harmonization–JOHN HOLAH, Campden & Chorleywood Food Research Association, Chipping Campden, Glos, United Kingdom
- The Meaning of the 3-A Symbol–WARREN CLARK JR., American Dairy Products Institute, Chicago, IL
- Regulatory and Inspection Bodies Involved–A Panel Discussion–ROCKLYN BATES, USDA, Ag Marketing Service, Washington, D.C.
- Regulatory and Inspection Bodies Involved–A Panel Discussion–STEVE SIMS, FDA, Washington, D.C.
- Regulatory and Inspection Bodies Involved–A Panel Discussion–DAN RACKLEY, Oklahoma State Dept. of Health, Muskogee, OK
- Interested Parties: Is the System Working? A Panel Discussion–RICHARD SMITH, Elmhurst, IL
- Interested Parties: Is the System Working? A Panel Discussion–VINCE MILLS, Evergreen Packaging, Cedar Rapids, IA

Technical Session—General Food Microbiology

- A Risk Assessment for *Salmonella enteritidis* in Eggs in Canada–EWEN TODD, W. Ross, T. Gleeson, K. McIntyre, P. Sockett, R. Irwin, A. Muckle, C. Poppe, J. D'Aoust, and R. Medaglia, Banting Research Centre, Ottawa, Ontario, Canada
- Verification of a Quantitative Risk Assessment for *E. coli* O157:H7 in Hamburgers–EWEN TODD, W. Ross, M. Cassin, A. Lammerding, and R. Khakhria, Banting Research Centre, Ottawa, Ontario, Canada
- Rapid Desiccation with Heat in Combination with Water Washing for Reducing Bacteria on Beef Carcass Surfaces–CATHERINE CUTTER, W. Dorsa, and G. Siragusa, USDA-ARS-Roman L. Hruska, Clay Center, NE
- A Purge Sampling Method to Detect Total Aerobic Bacteria and *E. coli* O157:H7 in Raw Beef Combos–WARREN DORSA and G. Siragusa, USDA-ARS-Roman L. Hruska, Clay Center, NE
- Evaluation of the USDA Sponge Sampling Technique for Beef Carcasses for Enumeration of *E. coli*–NAHED KOTROLA, J. Kotrola, R. Phebus, J. Marsden, and C. Kastner, Kansas State University, Manhattan, KS
- Reductions in Microbial Populations at Five Anatomical Locations on Steam Pasteurized Beef Carcasses–ABBEY NUTSCH, R. Phebus, J. Kotrola, T. Brown, M. Riemann, and R. Wilson, Kansas State University, Manhattan, KS
- Characterization of Lactic Acid Bacteria from a Sow, a Healthy Piglet and an Ill Piglet–BECKY PETERSON, A. Piva, and J. Luchansky, University of Wisconsin-Madison, Madison, WI
- Thermotolerance of *Enterobacter sakazakii* in an HTST Pasteurizer–MARIA NAZAROWEC-WHITE, R. McKellar, and P. Punidadas, Agriculture and Agri-Food Canada, Ottawa, Ontario, Canada
- Reducing Conditions and Seryl and Sulfhydryl Inhibitors on Aflatoxin B_1 Degradation by *F. aurantiacum*–DORIS D'SOUZA and R. Brackett, University of Georgia, Griffin, GA
- Effect of Prebiotics on *Bifidobacterium*–SHU-JEAN TSAI and J. Luchansky, University of Wisconsin-Madison, Madison, WI

Safety of Genetically Modified Foods

- Genetic Modification of Proteins in Foods–PETER DAY, Rutgers, New Brunswick, NJ
- The Safety of Genetically Modified Foods–The Issues in Perspective–PAT SANDERS, Monsanto Corp., Chesterfield, MO
- Evaluating the Safety of Novel Foods–STEVE GENDEL, U.S. FDA Center for Food Safety and Technology, Summit, IL

  Novel Foods–Consumer Response: Who Sees Benefits, Who is Concerned, How Can We Communicate? CHRISTINE BRUHN, University of CA Center for Consumer Research, Davis, CA
- Changes in Nutritional Content and Bioavailability of Nutrients in Bioengineered or Novel Foods–Myth or Fact?–BARBARA PETERSEN, Novigen Sciences, Inc., Washington, D.C.
- Genetic Modification of Foods–*Codex Alimentarius* Issues and Perspective–H. MICHAEL WEHR, National Milk Producers Federation, Arlington, VA
- Effective Communication of the Safety of Novel Food Biotechnologies and Genetically Modified Organisms–DOUG POWELL, University of Guelph, Guelph, Ontario, Canada

International Trends in Microbiological Methods

- Laboratory Accreditation: Is It Needed and Can It be Standardized?–RUSSELL FLOWERS, Silliker Laboratories, Inc., Homewood, IL
- International Efforts to Standardize Microbiological Methods–PAUL TEUFEL, Federal Institute for Health Protection of Consumers and Veterinary Medicine, Berlin, Germany
- Tolerance Limits and Methodology: Effect on International Trade–JEFF BANKS, Campden and Chorleywood Food Research Association, Chipping Campden, United Kingdom
- How to Design a Comprehensive Validation Program: Association of Official Analytical Chemists (AOAC)–WALLACE ANDREWS, U.S. FDA, Center for Food Safety and Applied Nutrition, Washington, D.C.
- MicroVal, A Challenging Project (Validation and Certification of Alternative Methods for Microbiological Analysis of Food, Animal Feeding Stuffs, and Beverages)–IRENE RENTENAAR, Dutch Standards, Institute, Delft, The Netherlands

Cyclospora—The Parasite that Raspberries Made Famous

- Epidemiology of the Outbreak–BARBARA HERWALD, Centers for Disease Control, Atlanta, GA
- Tracebacks–Untangling the Maze–STEVE OSTROFF, Centers for Disease Control, Atlanta, GA
- Microbiology and Testing of Cyclospora–JOSEPH MADDEN, FDA, Washington, D.C.
- Ontario Experience and Response to Cyclospora Ontario Infection,1996–CHARLES LEBER, Ontario Ministry of Health, North York, Ontario, Canada
- Cyclospora–FDA Regulatory Aspects–JANICE OLIVER, FDA, Washington, D.C.
- Environmental Assessment in Guatemala–FRANK BRYAN, Food Safety Consultation and Training, Lithonia, GA

Poster Session—Foodborne Pathogens

- Survival of *L. monocytogenes* in Refrigerator Dill Pickles–MARK HARRISON, J. Harrison, and R. Rose, University of Georgia, Athens, GA
- Fate of Gamma Irradiated *L. monocytogenes* on Raw or Cooked Turkey Breast Meat during Refrigerated Storage–DONALD THAYER, G. Boyd, J. Fox, Jr., H. Farrell, Jr., A. Kim, K. Snipes, and S. Edelson, USDA-ARS-ERRC, Wyndmoor, PA
- Effectiveness of Two Cooking Systems in Destroying *E. coli* O157:H7 and *L. monocytogenes* in Ground Beef Patties–ELAINE D'SA, M. Harrison, S. Williams, and M. Broccoli, University of Georgia, Athens, GA
- Fate of *E. coli* O157:H7, *L. monocytogenes*, and *Salmonella* spp. in Reduced Sodium Beef Jerky–JUDY HARRISON, M. Harrison, and R. Rose, University of Georgia, Athens, GA
- The Impact of Cold Shocking on the Minimum Growth Temperature for *E. coli* O157:H7–JILL BOLLMAN, G. Blank, and M. Ismond, University of Manitoba, Winnipeg, Manitoba, Canada
- Influence of Package Atmosphere on Growth and Survival of Uninjured and Sublethally Heat-Injured *E. coli* O157:H7–JEFFREY SEMANCHEK and D. Golden, University of Tennessee, Knoxville, TN
- Fate of Selected Pathogens in Vacuum-Packaged Dry-Cured (Country-Style) Ham Slices at 2°C and 25°C–BRUCE LANGLOIS, W. Ng, and W. Moody, University of Kentucky, Lexington, KY
- Fate of *L. monocytogenes* on Smoked Fish Coated with Sorbate-Containing Cellulose-Based Edible Films–YAO-WEN HUANG and M. Harrison, University of Georgia, Athens, GA
- Effect of Acidulant Identity on the Acid Tolerance Response of Enterohemorrhagic *E. coli*–ROBERT BUCHANAN and S. Edelson, USDA-ARS-ERRC, Wyndmoor, PA
- Effect of pH and Acid Tolerance on Radiation Resistance of Enterohemorrhagic *E. coli*–ROBERT BUCHANAN, S. Edelson, and G. Boyd, USDA-ARS-ERRC, Wyndmoor, PA
- Acid Tolerance and Acid Shock Responses of *E. coli* O157:H7 and Non-O157:H7 Strains in the Presence of Arginine, Lysine and Methionine–DONNA GARREN and M. Harrison, University of Georgia, Athens, GA

- Characterization of Acid Shock and Acid Tolerance Response in *L. monocytogenes* Strains V7, V37, and CA–SADHANA RAVISHANKAR and M. Harrison, University of Georgia, Athens, GA
- Comparison of Chlorine and a Produce Rinse for Killing Pathogens on Fresh Produce–LARRY BEUCHAT, B. Nail, B. Adler, and M. Clavero, University of Georgia, Griffin, GA
- Inhibition of *Listeria innocua* in Manchego Cheese by Bacteriocin-Producing *Enterococcus faecalis*–MANUEL NUÑEZ, E. Garcia, M. de Paz, P. Gaya, and M. Medina, INIA, Madrid, Spain
- Inhibition of *L. monocytogenes* on Fresh Pork Loin Using a Nisin-Based Treatment–BRIAN SHELDON and N. Llorca, North Carolina State University, Raleigh, NC
- Control of *L. monocytogenes* by Use of Lysozyme, Lactoferricin-ß and EDTA–YIBEI ZHANG, S. Lewis, D. Kamau, and A. Dessai, Tuskegee University, Tuskegee, AL
- Antimicrobial Activities of Lysozyme and Lactoferricin-ß Against *Salmonella*–SARAH LEWIS, Y. Zhang, D. Kamau, and A. Dessai, Tuskegee University, Tuskegee, AL
- Incidence of *Salmonella* on Beef Carcasses at Various Stages of the Slaughtering Process–JOHN SOFOS, S. Kochevar, G. Smith, J. Reagan, D. Hancock, S. Ingham, G. Lundell, and J. Morgan, Colorado State University, Fort Collins, CO
- Probabilities of Passing *E. coli* Performance Criteria in Seven Beef Slaughtering Plants–JOHN SOFOS, S. Kochevar, G. Smith, J. Reagan, D. Buege, D. Hancock, G. Lundell, and J. Morgan, Colorado State University, Fort Collins, CO
- Incidence of *Edwardsiella*, *Salmonella* and *Shigella* on Fresh Catfish Fillets–CUSTY FERNANDES, T. McCaskey, G. Flick, and J. Silva, Virginia Tech, Blacksburg, VA
- Incidence of *Giardia lamblia* in Finished Potable Water Samples in Hermosillo, Sonora, México–MARTHA ELVIA DÍAZ CINCO, CIAD, A.C., Hermosillo, Sonora, México
- Occurrence of *Vibrio* spp. in Guacuco Clams (*Tivela mactroides*) and Chipi-chipi Clams (*Donas denticulatus* and *Donas striatus*) from Venezuela–L. GUEVARA and R. Diaz, Universidad Central de Venezuela, Caracas, Venezuela
- Revised Model for Aerobic Growth of *Shigella flexneri* to Extend the Validity of Predictions at Low Temperatures–LAURA ZAIKA, J. Phillips, J. Fanelli, and O. Scullen, USDA-ARS-ERRC, Wyndmoor, PA
- Lag Phase Durations of *L. monocytogenes* Cells in Different Physiological States to Changes in the Environment–RICHARD WHITING and L. Bagi, USDA-ARS-ERRC, Wyndmoor, PA
- Updated Models for the Effects of Temperature, pH, NaCl, and $NaNO_2$ on the Aerobic and Anaerobic Growth of *L. monocytogenes*–ROBERT BUCHANAN, J. Phillips, L. Bagi, A. Miller, and L. Zaika, USDA-ARS-ERRC, Wyndmoor, PA
- A Computer Model Describing the Competitive Growth of *L. monocytogenes* and *Lactococcus lactis* in Cucumber Juice–FREDERICK BREIDT and H. Fleming, USDA-ARS, Raleigh, NC
- Modulation of Lag Phase at 5°C of *L. monocytogenes* Scott A by Osmolytes–JEFFREY CALL and A. Miller, USDA-ARS, Wyndmoor, PA

Tuesday Afternoon—July 8, 1997

General Session—Food Safety Issues for Special Populations

- The Special Consumer Subgroup, What Is It?–MORRIS POTTER, Centers for Disease Control and Prevention, Atlanta, GA
- Special Pathogens: Foodborne Agents Posing Special Risk Concerns–THOMAS CEBULA, U.S. FDA CFSAN, Washington, D.C.
- The Impact of an Aging Population on the Special Consumer Risk Concern–ROBERT BUCHANAN, USDA-ARS-ERRC, Wyndmoor, PA
- The Value to Society of Protecting Population Subgroups at Special Risk–RICHARD BELZER, Office of Information and Regulatory Affairs, Washington, D.C.
- Food Safety and the Special Consumer–A Food Industry Perspective–DON ZINK, Nestle, USA, Inc., Glendale, CA
- Communicating Risk: Where Should Special Consumers Get Their Food Safety Information?–MARTHA RHODES ROBERTS, Florida State Dept. of Agriculture & Consumer Services, Tallahassee, FL

IAMFES Business Meeting

Wednesday Morning—July 9, 1997

HACCP Implementation in the Seafood Industry: Are You Prepared?

- Benefits and Pitfalls of HACCP for the Seafood Industry–DONN WARD, North Carolina State University, Raleigh, NC
- Experiences in Implementation of HACCP in Seafood Processing Plant–MICHAEL MONDRAGON, Tyson Seafood Group, Seattle, WA
- Experiences in Implementation of HACCP in Seafood Processing Industry–DOMY BROCE, King and Prince Seafood Corporation, Brunswick, GA
- Experiences in Implementation of HACCP in Seafood Foodservice Industry–ED REICHEL, DARDEN Restaurants, Inc., Orlando, FL

- FDA's Expectation for Seafood Industry Compliance–MARY SNYDER, FDA, Washington, D.C.
- Global Perspective on HACCP in Seafood Industry–ROY MARTIN, National Institute of Fisheries, Fairfax, VA

Future Trends and Considerations in Sanitation

- FSIS Pathogen Reduction/HACCP Rules and Implications for Sanitation–JANET COLLINS, American Meat Institute, Arlington, VA
- History of Contract Cleaning-Evaluation-Is It for You?–STEVEN SANDERS, Contract Services, Ltd., Burlington, IA
- Sanitizers, What Can be Done to Control New and Old Pathogens?–RICHARD BAKKA, Ecolab, Inc., St. Paul, MN
- Pest Control Without Pesticides-2000 and Beyond–ALFRED ST. CYR, American Institute of Baking, Manhattan, KS
- Foreign Material Control, X-Ray and Computer Expanded Tech Update–ARTHUR ISHAM, EG & G Astrophysics, Oak Ridge, TN
- Rapid Hygiene Monitoring, A New Light–ANNE DAVIES, Celsis-Lumac, Cambridge, United Kingdom

Science-Based Strategies for Protecting Our Global Food Supply

- The Birth of an Emerging Foodborne Pathogen and a Strategy for the Future–MICHAEL DOYLE, University of Georgia, Griffin, GA
- Highlights of the March 1997 "Conference on Emerging Foodborne Pathogens: Implications and Control"–KURT DEIBEL, General Mills, Minneapolis, MN
- Lessons Learned from the 1996 Outbreak of Enterohemorrhagic *Escherichia coli* Infection in Japan–YOSHIFUMI TAKEDA, International Medical Center of Japan, Tokyo, Japan
- Panel Discussion–Integrated Science-Based Approaches to Food Safety Protection–ERNESTO SALINAS, Nestle Mexico, Mexico City, Mexico; KAREN DODDS, Health Canada, Ottawa, Ontario, Canada; H. RUSSELL CROSS, Institute of Food Science and Engineering, Texas A & M University, College Station, TX; N. K. CHAWLA, National Dairy Development Board, Anand, India

Issues of Concern to the Juice Industry

- Fruit Juice Safety-An Overview–CAMERON HACKNEY, Virginia Tech, Food Science and Technology, Blacksburg, VA
- *Alicyclobacillus*-An Overview–ISABEL WALLS, National Food Processors Assn., Washington, D.C.
- Current and Alternative Technologies for Processing Fruit Juices–SUSAN SUMNER, Virginia Tech, Food Science and Technology, Blacksburg, VA
- Endogenous Mycoflora of Carton Paperboard–JAN NARCISCO, University of Florida, Winter Haven, FL
- A Quixotic Endeavor? Commercially Sterile-Aseptically Packaged Juice Products–RICHARD SMITH, Pepsico, Inc., Vaihalla, NY

Wednesday Afternoon—July 9, 1997

Viral Foodborne Disease: Emerging Agents, Emerging Methods

- Overview of the Viral Foodborne Disease Issue: New York State Perspective–JACK GUZEWICH, NYS Dept. of Health, Albany, NY
- Presumed Viral–DANIEL MAXSON, Clark County Health District, Las Vegas, NV
- Hepatitis A Virus: Molecular Methods of Detection–THERESA CROMEANS, U.S. Centers for Disease Control, Atlanta, GA
- Detection of Human Enteric Viruses in Foods–LEE-ANN JAYKUS, North Carolina State University, Raleigh, NC
- Inactivated Hepatitis A Virus Detection by Antigen Capture-PCR–DEAN CLIVER, University of California-Davis, Davis, CA
- Application of the 5' Nuclease Assay for the Detection of Bacterial and Viral Foodborne Pathogens–CHRISTINE PASZKO-KOLVA, PE Applied Biosystems, Foster City, CA

Epidemiological Typing of Foodborne Organisms

- Molecular Methods for Epidemiological Typing of Foodborne Pathogens–BALA SWAMINATHAN, Centers for Disease Control, Atlanta, GA
- PCR-RFLP for Epidemiological Typing–IRVIN NACHAMKIN, University of Pennsylvania, Philadelphia, PA
- RAPD and Fatty Acid Profiling for Typing of Foodborne Microorganisms–HEIDI SCHRAFT, University of Guelph, Guelph, Ontario, Canada
- Ribotyping–SCOTT FRITSCHEL, Qualicon, Wilmington, DE
- PFGE for Typing of Foodborne Pathogens–JOHN LUCHANSKY, Food Research Institute, Madison, WI

The Impact of the WTO and *Codex Alimentarius* on International and Domestic Food Standards

- *Codex Alimentarius* Initiatives to Meet International Trade Agreement Responsibilities: Overview–H. MICHAEL WEHR, National Milk Producers Federation, Arlington, VA

- Science/Risk Based Requirements of International Trade: Agreements and Responsibilities of Countries–GRETCHEN STANTON, World Trade Organization, Geneva, Switzerland
- *Codex Alimentarius* Initiatives to Meet International Trade Agreement Responsibilities: Microbiological Risk Assessment: Principles, Relationship to HACCP and Microbiological Criteria, Future Needs–DANE BERNARD, National Food Processors Association, Washington, D.C.
- *Codex Alimentarius* Initiatives to Meet International Trade Agreement Responsibilities: Chemical Risk Assessment: Procedures for Food Additives and Pesticides, Harmonization Activities, Initiatives for Food Additives–BARBARA PETERSEN, Novigen Sciences, Inc., Washington, D.C.
- Risk Assessment/Risk Management: Clarifying the Relationships–KAYE WACHSMUTH, USDA, Washington, D.C.
- U. S. Codex Strategic and Action Plans for Sound Science and Transparency–PATRICK CLERKIN, USDA, Washington, D.C.

Computer-Based Tools for Food Safety Management

- Computer-Based Tools for Management of Food Safety–MARTIN COLE, Nabisco, East Hanover, NJ
- Evaluation of Food Safety Net as a Risk Analysis Tool–DOUG POWELL, University of Guelph, Guelph, Ontario, Canada
- Fast Food on the Information Higway–National Food Safety Database on the World Wide Web–MARK TAMPLIN, University of Florida, Gainesville, FL
- Computer-Based Educational Tools–ROBERT GRAVANI, Cornell University, Ithaca, NY
- Computer-Based HACCP Tools–GEORGE EVANCHO, Campbell Soup Co., Camden, NJ
- Disease Surveliance Using Computer-Based Tools (Salm-Net)–IAN FISHER, Communicable Disease Surveillance Center, London, UK

IAMFES 84th Annual Meeting
TOURS AND SPECIAL EVENTS

Sunday, July 6, 1997 – 8:30 a.m. – 4:30 p.m.
Kennedy Space Center
Registration: $42 (Late $50) Lunch included

Enter the world of outer space with a guided tour of Kennedy Space Center. Hear the history behind the Mercury, Gemini, and Apollo rockets during a tour of the Rocket Garden! Walk through a full-size replica of the space shuttle. Then board the NASA bus and see the launching pads and the enormous Saturn V Rocket. Experience the spectacular IMAX film "The Dream is Alive," filmed by astronauts in outer space. Simply out of this world!

Sunday, July 6, 1997–8:30 a.m.–Shotgun Start
IAMFES Golf Tournament
Registration: $95 (Late $110)

Before dealing with issues of food protection, let's get together for some fun and a great round of golf. A best-ball tournament for all skill levels is scheduled at the Grand Cypress Golf Club designed by Jack Nicklaus. To request a golf registration form, call IAMFES at (800) 369-6337 or (515) 276-3344.

Opening Session
Ivan Parkin Lecture
Sunday, July 6, 1997 – 7:00 p.m.

Lecture: Martha Rhodes Roberts, Ph.D., Florida Department of Agriculture and Consumer Services.

Cheese and Wine Reception
Held in the Exhibit Hall
Sunday, July 6, 1997 – 8:00 p.m. – 10:00 p.m.

Join friends and colleagues for complimentary refreshments while viewing over 80 educational exhibits.

Exhibit Hall Hours

Monday, July 7, 1997 – 9:30 a.m. – 4:00 p.m.
Tuesday, July 8, 1997 – 9:30 a.m. – 4:00 p.m.

Monday, July 7, 1997 – 6:00 p.m. – 10:30 p.m.
Sail Away... A Key West Evening
Registration: $55 (Late $60)

Put on your best Florida shirt and join us poolside at the Hyatt Regency Grand Cypress as we transform you to the relaxing, casual atmosphere like the Florida Keys. Start your evening enjoying a tropical fruit drink with old and new friends. Then move on to a luscious and tantalizing dinner; don't forget the Key Lime pie for dessert!

Spend the rest of the evening enjoying the sounds of the Keys – Jimmy Buffet style. While enjoying the entertainment, you could try your hand at a friendly game of sand volleyball or horseshoe pitching. If that's not your style you can sit comfortably poolside and watch the waterfalls or stroll along the lake. It's sure to be a relaxing night to sail away.

Monday, July 7, 1997 – 9:00 a.m. – 4:00 p.m.
All Around Orlando
Registration: $30 (Late $35) Lunch on own

During this tour you will see Orlando in all its glory. The fun begins with a narrated tour through downtown Orlando. See the historic Church Street District and beautiful Lake Eola. You will drive through and see one of the most exclusive areas of Orlando, Winter Park. Our tour will also stop at the home of the Orlando Magic, the O-rena. Throughout the day there will be opportunities for some unique shopping experiences.

Tuesday, July 8, 1997 – 8:30 a.m. – 4:00 p.m.
Cypress Gardens
Registration: $49 (Late $55) Lunch on own

Travel across the rolling hills of central Florida, through orange groves to Cypress Gardens; a 223-acre family attraction that is home of the first, and still the finest, water-ski show. The botanical garden, created out of a swamp, was first opened to the public in 1936. Walk through exquisite gardens and see huge banyan trees, along with central Florida's flora and fauna. Meet graceful Southern Belles and shop the antebellum village, Southern Crossroads. There are a variety of shows, animal exhibits and rides for kids of all ages. Be sure to visit the all-new "Wings of Wonder" Butterfly Conservatory with more than 1,000 free-flying butterflies.

Wednesday, July 9, 1997
IAMFES Annual Awards Banquet
Reception: 6:00 p.m. – 7:00 p.m.
Banquet: 7:00 p.m.
Registration: $35 (Late $40)

Wednesday, July 9, 1997
IAMFES Children's Banquet
Time: 6:30 p.m. – 9:30 p.m.
Registration: $15 (Late $20)

Child Care

Child care can be arranged through the Hyatt Child Care or Camp Hyatt. Please contact the Hyatt Grand Cypress at (404) 293-1234 ext. 4440 for further details. Pre-registration is advised.

84th IAMFES Annual Meeting Registration Form

Hyatt Regency Grand Cypress — Orlando, FL — July 6 – July 9, 1997
(Use photocopies for extra registrations)

FOR OFFICE USE
Registration # _____
Date Rec'd. _____
First initial _____ Last name _____

First Name (will appear on badge) (please print) **Last Name**

Title **Employer**

Mailing Address (Please specify: Home or Work)

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

Telephone # **Fax #**

Please check where applicable:

- ___ IAMFES Member
- ___ Non-Member
- ___ Local Arrangements
- ___ 30 Yr. Member
- ___ 50 Yr. Member
- ___ Past President
- ___ Executive Board
- ___ Speaker
- ___ Honorary Life Member
- ___ Exhibitor
- ___ IAMFES Sustaining Member
- ___ IAMFES Program Advisory Committee

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***REGISTER BY MAY 30, 1997 TO AVOID LATE REGISTRATION FEES**

REGISTRATION:	MEMBERS	NON-MEMBERS	AMOUNT
Registration (Banquet included)	$220 ($270 late)*	$305 ($355 late)*	_____
Student Member	$ 35 ($ 45 late)*	Not Available	_____
One Day Registration (Circle: Mon/Tues/Wed)	$110 ($135 late)*	$145 ($165 late)*	_____
Spouse/Companion (Name): _____	$ 35 ($ 35 late)*	$ 35 ($ 35 late)*	_____
Children (14 & Under, Names): _____	FREE	FREE	_____

NEW MEMBERSHIP FEES:		
Membership with *Dairy, Food & Environmental Sanitation*	$ 75.00	_____
Membership with *Dairy, Food & Env. Sanitation & Journal of Food Protection*	$ 120.00	_____
**Student Membership ❒ *Dairy, Food & Env. San.* or ❒ *Journal of Food Protection*	$ 37.50	_____
**Student Membership with *Dairy, Food & Env. San. & Journal of Food Protection*	$ 60.00	_____
***Full-time student verification required.*		
SHIPPING CHARGES: OUTSIDE THE U.S. - SURFACE RATE	$ 22.50 per journal	_____
AIRMAIL	$ 95.00 per journal	_____

OTHER FEES:	PER PERSON	# OF TICKETS	
Cheese and Wine Reception (Sun., 7/6)	FREE	_____	_____
IAMFES Golf Tournament (Sun., 7/6)	$ 95 ($ 110 late)	_____	_____
Sail Away... A Key West Evening (Mon., 7/7)	$ 55 ($ 60 late)	_____	_____
IAMFES Awards Banquet (Wed., 7/9)	$ 35 ($ 40 late)	_____	_____
Children's Banquet (Wed., 7/9)	$ 15 ($ 20 late)	_____	_____

SPOUSE/COMPANION EVENTS:	PER PERSON		
Kennedy Space Center (Sun., 7/6)	$ 42 ($ 50 late)	_____	_____
All Around Orlando (Mon., 7/7)	$ 30 ($ 35 late)	_____	_____
Cypress Gardens (Tues., 7/8)	$ 49 ($ 55 late)	_____	_____

❒ Please indicate here if you have a disability requiring special accommodations.

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Registration Information

Send payment with registration to IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863. Make checks payable to IAMFES. Registration must be post-marked by May 31, 1997. Registration post-marked after May 31, 1997 will be charged the late registration fee. For additional information contact Julie Cattanach at (800) 369-6337.

Refund/Cancellation Policy

The IAMFES policy on refunds and/or cancellations is as follows: Registration fees, minus a $50 processing fee, will be refunded for written cancellations post-marked by June 20, 1997. No refunds will be made for cancellations post-marked after June 20, 1997, however, the registration may be transferred to a colleague with written notification to IAMFES.

Budget Rental Car Information

For information on special rental car rates from Budget call (800) 772-3773. Please mention Rate Code: BCD #: UO51950.

Guest Room Commitment
GOOD UNTIL JUNE 4, 1997
Make Your Reservation Now

HOTEL RESERVATIONS

IAMFES

84th Annual Meeting
July 6 – July 9, 1997
Hyatt Regency Grand Cypress
Orlando, FL

Please check accommodation requested:

❑ Single (1 person) ❑ Triple (3 persons)
❑ Double (2 persons) ❑ Quad (4 persons)

Bed type:

❑ King Bed
❑ 2 Double Beds

Special Requests _____

❒ Please indicate here if you have a disability requiring special accommodations.

NAME _____

SHARING WITH (Name) _____

COMPANY NAME _____

ADDRESS _____

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TELEPHONE _____

ARRIVAL DATE _____ (Check-In Time is after 4 p.m.) DEPARTURE DATE _____ (Check-out Time is 12 p.m.)

SPECIAL REQUESTS _____

All Reservations must be held with one (1) night's deposit payable by credit card (or check received within fourteen (14) days). Reservations canceled less than seventy-two (72) hours prior to arrival will forfeit the deposit. After June 4, 1997, reservations will be accepted on a space and rate available basis.

CREDIT CARD # _____ TYPE OF CREDIT CARD _____

EXPIRATION DATE _____

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SPECIAL ROOM RATES for this convention:
$120 per night, plus taxes

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Or FAX: (407) 239-3800

IAMFES
84TH
Annual Meeting
Orlando, Florida
July 6 – July 9

MAIL DIRECTLY TO:

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C/O RESERVATIONS
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EXHIBITORS

of the IAMFES 84th Annual Meeting

(Companies scheduled to Exhibit as of March 15, 1997)

3-A Sanitary Standards Symbol Council
3020 Bluff Road
Columbia, SC 29209
(803) 783-9258 Fax (803) 783-9265

3M Microbiology Products
3M Center Building 275-4E-1
St. Paul, MN 55144-1000
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3437 SW 24th Avenue
Gainesville, FL 32607
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Norwood, MA 02062
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Brookfield WI 53005
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Pullman, WA 99163
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DQCI Services, Inc.
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Mounds View, MN 55112
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Lake Success, NY 11042
(516) 326-3270, ext. 224 Fax (516) 326-3298

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370 Wabasha Street North
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Washington, DC 20005
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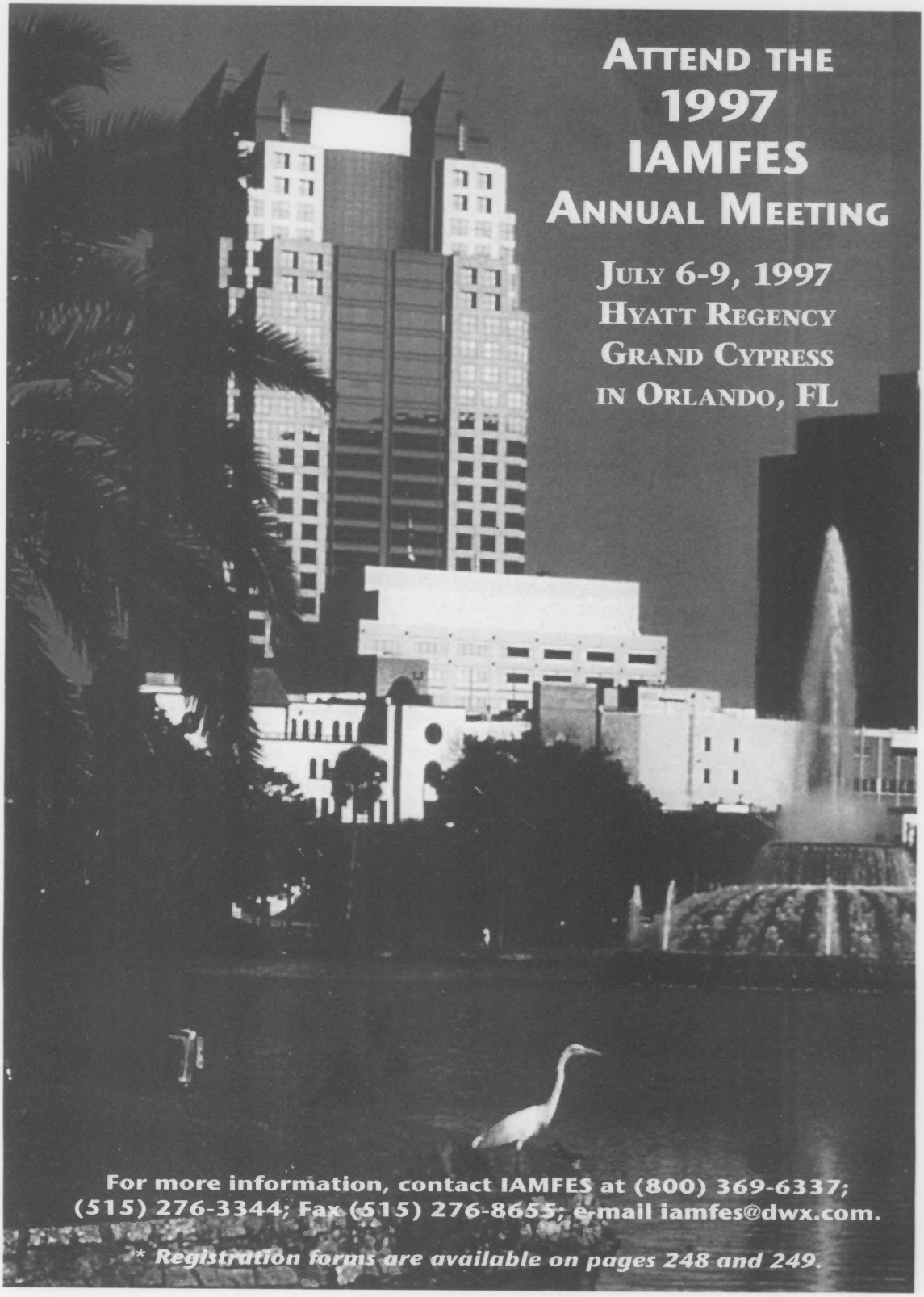
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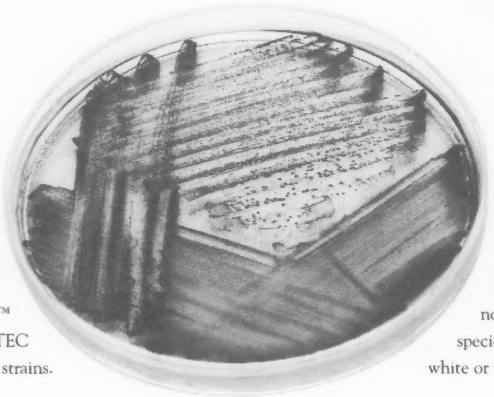

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Please address to: Managing Editor, *Dairy, Food and Environmental Sanitation*,
6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2863, Telephone (515) 276-3344 or Fax: (515) 276-8655.

ComingEvents

MAY

·**3-8, The 26th National Conference on Interstate Milk Shipments,** at the Hyatt Regency, San Francisco Airport. For further information, contact Leon Townsend, NCIMS Executive Secretary, 110 Tecumseh Trail, Frankfort, KY 40601. Telephone and/or fax (502) 695-0253.

·**5, Functional Foods & Wellness: A Research Update,** Guelph Food Technology Centre, Guelph, Ontario. In this unique networking opportunity, you'll share the results of leading scientists as they unlock the "wellness" secrets of ingredients and nutraceuticals for the functional foods of the future. For further information, phone (519) 767-5036; fax (519) 836-1281; e-mail: gftc@uoguelph.ca.

·**5-6, Symposium on Texture of Fermented Milk Products and Dairy Desserts,** in Vicenza, Italy. The objective of the seminar is the presentation and discussion of new information about the different factors affecting the texture of fermented milk and dairy desserts. Besides the key factors influencing the texture of products, an up-to-date will be given on the instrumental and sensory evaluation of texture. For further information, contact Symposium Secretariat, Istituto Sperimentale Lattiero-Caseario, Dr. Roberto Giangiacomo, Via A. Lombardo, 11, 20075 LODI-ITALY; phone +39-371-430990; fax +39-371-35579.

·**5-7, Introduction to Food Chemistry,** Chicago, IL. For more information, contact the AACC Short Course Department, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; Telephone (612) 454-7250; fax (612) 454-0766.

·**6-7, Sanitation and HACCP Workshop,** San Jose, CA. During this workshop the latest issues facing the food industry will be examined, including: management systems for product safety, principles of HACCP, and the need to maintain customer relations by establishing essential programs intended to meet their expections. For additional information, or to enroll, please contact AIB, 1213 Bakers Way, Manhattan, KS 66502; or phone (913) 537-4750; fax (913) 537-1493.

·**12-14, Premier International Conference on Food Preservation,** in Arlington, VA. A major emphasis will be placed on new technologies, global market trends and forecasts from both industrial and the consumer viewpoints. Participants will gain a comprehensive assessment of how the world's communities must proceed to ensure the safe trade and consumption of food. For more information, please contact Jennifer Winch at Intertech Conferences, 411 U.S. Route One, Portland, MA 04105; phone (207) 781-9800; fax (207) 781-2150; or e-mail: info@intertechusa.com.

·**12-16, Pharmaceutical Quality Assurance and Control,** Cincinnati, OH. This course provides an understanding of the principles and practice of pharmaceutical quality assurance and control and of specific topics which have become important because of regulatory interest or recent technological achievements. For further information, contact Registrar, The Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; fax (908) 238-9113.

·**13-14, Fourth Annual Cultured Dairy Products Symposium,** at the Wyndham Milwaukee Center Hotel in Milwaukee. Guest speakers from around the world will address topics on the manufacture and development of yogurt products, frozen yogurt, nonfat cultured products, cottage cheese, and new probiotic cultures. For additional information, contact Lisa Lecher or Dr. Bill Watrous at Chr. Hansen, Inc., by phone at (800) 247-8321; fax (414) 476-2313.

·**19-22, Food Polymer Science,** Minneapolis, MN. For more information, contact the AACC Short Course Department, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; Telephone (612) 454-7250; fax (612) 454-0766.

JUNE

·**2-3, Health Care Continuum Model (HCCM) Symposium,** at the Marriott on M St., Washington, D.C. Sponsored by the Soap and Detergent Association (SDA), the Cosmetic, Toiletry, and Fragrance Association (CTFA), and IAMFES. For further information, contact Dale A. Grinstead, Unilever Research U.S., 45 River Road, Edgewater, NJ 07020; Voice mail: (201) 840-2515; Fax (201) 840-8276; E-mail: dale.a.grinstead@unilever.com.

·**3-4, Texas Affiliate Annual Meeting,** Omni Hotel (Formerly The Wyndham), Austin, TX. A variety of current and informational topics will be discussed. For more information, contact Ron Richter, P.O. Box 10092, College Station, TX 77842 or phone (409) 845-4409.

·**3-5, Crystallization in Foods,** New Brunswick, NJ. The principles of crystallization in foods will be discussed. The conditions and parameters necessary for controlling formation and growth of ice, sugar, and lipid crystals will be discussed through theoretical development and practical examples from the food industry. For additional information, contact Keith Wilson at (908) 932-9271 ext. 617 or fax (908) 932-1187.

·**4-5, Advanced HACCP Application: Training and Implementation,** Chong Yuet Ming Amenities Centre, University of Hong Kong. For more information, contact Miss Monisha Bhattacharya, Dept. of Botany, University of Hong Kong, Pokfulam Road, Hong Kong; telephone + 852 28578522; fax + 852 28583477.

• **4-10, Food Microbiology and Safety: International Perspective,** at the University of Wisconsin - River Falls, River Falls, WI. The course consists of lectures, case studies and laboratory work to accomplish training in microbiological sampling, method validations, and quality assurance in food microbiology laboratory based on fundamentals of microbial ecology, risk assessment, and predictive microbiology. This course is designed for those who need to be familiar with current issues dealing with microbiological quality and safety of foods. For further information, contact The UWRF/Eijkman Foundation Food Microbiology course, Animal and Food Science Department, University of Wisconsin - River Falls, 410 S. 3rd St., River Falls, WI 54022; phone (715) 425-3150; fax (715) 425-3372.

• **7-11, Association of Food and Drug Officials (AFDO) 101st Annual Conference,** Sheraton Park Place, Minneapolis, MN. For more information, contact Ms. Denise Rooney, c/o AFDO, P.O. Box 3425, York, PA 17402 or phone (717) 757-2888.

• **12-13, National Conference on Food Safety Education.** The conference title, "Changing Strategies—Changing Behavior: What Food Safety Communicators Need to Know" conveys the future direction of food safety education. Persons interested in attending the conference can obtain a registration brochure by faxing requests to USDA Graduate School at (202) 401-7304.

• **23-25, Food Extrusion,** St. Etienne, France. For more information, contact AACC Europe (Branch Office), Broekstraat 47, 3001 Heverlee, Belgium. Telephone +1 32 16.20. 40.35; Fax +1 32 16.20.25.35; e-mail: aacc.europe@pophost.eunet.be.

• **26-27, Southwest Milk Marketing Conference,** La Mansion Del Rio Hotel, San Antonio, TX. For further information, contact Dr. Bud Schwart, Dept. of Ag. Eco. TAMU, 458 Blocker Bldg., College Station, TX 77843-2124.

JULY

• **6-9, IAMFES Annual Meeting,** in Orlando, FL at the Hyatt Regency Grand Cypress Hotel. Advancing food protection worldwide with over 200 presentations and posters on the latest issues and research on food safety. Registration materials available in this issue of *DFES* on page 248, or call (800) 369-6337; (515) 276-3344; fax (515) 276-8655.

• **21-23, Current Good Manufacturing Practice (cGMP) for the Pharmaceutical and Allied Industries,** Cincinnati, OH. Topics covered will include not only the legal requirements for cGMP in the Federal Food, Drug, and Cosmetic Act but primarily the practical "how to" of purchasing, manufacturing, packaging, labeling and QA/QC, as well as training production personnel in cGMP. For more information, contact Registrar, The Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816; phone (908) 613-4500; fax (908) 238-9113.

AUGUST

• **11-15, Intro. to Food Science: Principles and Recent Advances,** Brunswick, NJ. The best food technologists need a broad understanding of food science that includes food microbiology, color and flavor chemistry, protein biochemistry, sensory evaluation and nutrition. This five-day program will give you a solid background in the science and applications of emerging technologies in the food industry. For additional information, contact Keith Wilson at (908) 932-9271 ext. 617 or fax (908) 932-1187.

SEPTEMBER

• **8-10, Artisan Bread Decorating Techniques,** Manhattan, KS. This course will teach bread decorating techniques to create display loaves for use in bread displays. For additional information, or to enroll, contact American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502 or phone (913) 537-4750; fax (913) 537-1493.

OCTOBER

• **5-9, Saudi Agriculture 97, 16th Agriculture, Water and Agri-Industry Show,** at the Riyadh Exhibition Centre. Further information can be obtained from Virginia Jensen, Kallman Associates, 20 Harrison Ave., Waldwick, NJ 07463.

• **8-10, Quality Management in the Food Industry,** Statler Hotel, Cornell University, Ithaca, NY. This 3-day introductory course is co-sponsored by the IFT Continuing Education Committee, IFT Food Quality Assurance Division, and Cornell University. For further information, contact Institute of Food Technologist's Professional Development Department at (312) 782-8424.

• **12-16, American Association of Cereal Chemists 82nd Annual Meeting,** at the San Diego Convention Center, San Diego, CA. The Annual Meeting includes a technical program, technical and poster sessions, table-top exhibits, new product/services sessions, educational short courses and social events. For additional information, contact AACC Headquarters, 3340 Pilot Knob Road, St. Paul, MN 55121-2097, or phone (612) 454-7250; fax (612) 454-0766.

• **13-16, Environmental Seminar Series for Asian Processors,** in Las Vegas, NV. For more information, contact Sacha Helfand at (703) 684-1080; e-mail: fpmsa@clark.net.

• **20-23, Packaging Basics for the Food Industry, School of Packaging,** Michigan State University, E. Lansing, MI. This 3-day introductory course is co-sponsored by the IFT Continuing Education Committee, IFT Food Quality Assurance Division, and Cornell University. For further information, contact Institute of Food Technologists Professional Development Department at (312) 782-8424.

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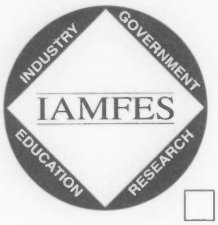

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