Losing milk to antibiotic contamination can be just as costly to your operation as to that of the farmers who supply you. That’s why we developed Delvotest, a simple, reliable test to detect antibiotic residues in milk before they can contaminate your dairy farmers’ bulk tanks. Standardized and self-contained, Delvotest quickly and accurately detects the presence of Beta Lactam and most other veterinary antibiotics. Delvotest is easy to use and, at about a dollar a test, extremely economical for large- and small-scale operations. So encourage your dairy farmers to take the Delvotest. They’ll pass a safer product on to you.
The Standard In Food Safety Training

People count on you to set guidelines and maintain standards for the serving of safe food. So doesn’t it make sense to train foodservice personnel with a program that has certified over 500,000 foodservice managers and trained an additional 1,000,000 front-line employees?

SERVSAFE® Serving Safe Food training, from The Educational Foundation of the National Restaurant Association, is a food safety educational system that provides training and certification specific to the job responsibilities of foodservice managers and employees. The principles covered in SERVSAFE are designed to address critical food safety issues based on the Hazard Analysis Critical Control Point (HACCP) system.

SERVSAFE includes videos and texts, plus interactive techniques to make learning both efficient and highly effective.

Regulatory and industry food safety professionals recognize the benefits of this educational system and have enhanced their knowledge of the HACCP approach to implementing a food safety management system. Clear, precise, and up-to-date, SERVSAFE includes videos and texts, plus interactive techniques to make learning both efficient and highly effective.

The Educational Foundation and the U.S. Food and Drug Administration’s State Training Branch are currently conducting several cooperative training workshops to provide regulatory and industry professionals with an understanding of the principles of HACCP and their practical application within any type of foodservice operation.

For more information on our HACCP-based SERVSAFE system, or on how to arrange a training seminar on Managing a Food Safety System, call 1-800-765-2122, ext. 369.

National Restaurant Association
THE EDUCATIONAL FOUNDATION
ABOUT THE COVER...
Photo courtesy of the Hyatt Regency Grand Cypress, which will be the location of the IAMFES 1997 Annual Meeting.

ARTICLES

Recovery of Mastitis Pathogens from Udder Cloths Following Several Laundering Methods .......... 210
   Lawrence K. Fox

Microbiological Criteria for Military Rations Update 1996 ......................................................... 216
   Edmund M. Powers and Claire H. Lee

Facts and Figures on Food Irradiation ............................................................................................... 222
   Reprinted from Food Inspection Directorate, Fall 1996

ASSOCIATION NEWS

Sustaining Members .......................................................................................................................... 203
Off the Top From the President ....................................................................................................... 206
Commentary From the Executive Director ....................................................................................... 208
New IAMFES Members .................................................................................................................. 226

DEPARTMENTS

Updates ............................................................................................................................................. 227
News .............................................................................................................................................. 229
Industry Products ............................................................................................................................ 233
Business Exchange .......................................................................................................................... 237
Coming Events ................................................................................................................................. 256
Advertising Index ............................................................................................................................ 258

EXTRAS

Call for 1998 Symposia .................................................................................................................... 224
IAMFES 84th Annual Meeting Preliminary Program ...................................................................... 238
IAMFES 84th Annual Meeting Exhibitors ....................................................................................... 250
IAMFES Booklet Order Form ......................................................................................................... 259
IAMFES Membership Application .................................................................................................. 260

The publishers do not warrant, either expressly or by implication, the factual accuracy of the articles or descriptions herein, nor do they so warrant any views or opinions offered by the authors of said articles and descriptions.
The success of your business ultimately depends on the purity of your product. The food industry, more than any other, requires a knowledgeable and technical approach to pest management that is based on sound science and uncompromising quality.

That's why Copesan has developed Signature Care™, a partnership in pest management designed specifically for the food industry.

Copesan offers service and management personnel trained and certified specifically in food industry pest management, as well as over 100 degreed technical experts. Our extensive network of service locations provides quick response to your needs. And, Signature Care™ is backed by strong, written Standards of Performance and Guarantee.

For more information on Signature Care™ and how Copesan can help you with pest management that meets your critical requirements, call 1-800-267-3726, Ext. 404.
Why settle for just a when you could have the whole ?

Receiving monthly issues of Dairy, Food and Environmental Sanitation is just one of the many benefits of being a member of the International Association of Milk, Food and Environmental Sanitarians.

To find out what you've been missing and how you can join IAMFES, please contact: Julie Cattanach, Membership Coordinator, IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2863; telephone (515) 276-3344 or (800) 369-6337; Fax (515) 276-8655; E-mail: jcattanach@iamfes.org

Warren — Your Center for Analytical Needs

Using overnight express and instant communications, Warren Analytical is your local testing laboratory — wherever you may be located. We have a proven record of superior quality and service, the kind you expect from the Lab next door.

Call on Warren Analytical — experts in microbiology, residue chemistry, food chemistry and nutritional labeling to solve your special testing requirements.

Give Warren a Call
1-800-945-6669

Warren Analytical Laboratory
650 "O" Street • R.O. Box G • Greeley, Colorado 80632-0350

Reader Service No. 225 1997 IAMFES Exhibitor
Totally Sanitary
Totally Reusable

The New ReSeal™ Sanitary Hose System

A totally sanitary environment for your food or beverage product, now available with the cost-savings of reusable ends! That's right. With the ReSeal™ system, when your hose assembly gets kinked, run over or simply wears out, the couplers can be reattached to a new length of hose. You still have to buy the hose ... but you don't have to buy new couplers. That's usually a savings of 50% to 90% over the price of a complete new assembly!

The innovative ReSeal™ system provides all the features you've come to expect in a sanitary hose assembly: sanitary full-flow compression seal, CIP cleanable, safe and in compliance with regulatory standards — including 3-A Standard 62-00 for sanitary hose assemblies. Call today for a free information packet.

Nelson-Jameson, Inc.
2400 E. 5th St., PO. Box 647
Marshfield, WI 54449

Phone 800/826-8302
FAX 800/472-0840

New Tamper Evident, Leak Proof, Air Tight, Hinged Cap, Sterile Sample Vials

Passes all FDA and USDA leak-proof tests. Available in 2 oz., 3 oz., 4 oz. and 10 oz. FDA approved polypropylene.

Call or write for a FREE SAMPLE of our

NEW SNAP SEAL

800-772-8871

Capitol Vial, Inc.
Union Street Extension, Fultonville, NY 12072
DAIRY, FOOD AND ENVIRONMENTAL SANITATION

IAMFES EXECUTIVE BOARD

President, Michael H. Brodsky, Ontario Ministry of Health, P.O. Box 9000, Terminal A, Toronto, Ontario, Canada M5W 1R5; phone (416) 235-5717; e-mail: brodsky@gov.on.ca

President-Elect, Gale Prince, The Kroger Co., 1014 Vine Street, Cincinnati, OH 45202-1100; phone (513) 762-4209; e-mail: gprince@kroger.com

Vice President, Robert E. Brackett, University of Georgia, Center for Food Safety and Quality Enhancement, GA Experiment Station, Griffin, GA 30223-1797; phone (770) 412-4735; e-mail: rbrocke@cfse.griffin.peachnet.edu

Secretary, Jack Guzewich, New York State Department of Health, Bureau of Community Sanitation and Food Protection, 2 University Place, Room 404, Albany, NY 12203-3399; phone (518) 458-6714; e-mail: jjg01@health.state.ny.us

Past President, F. Ann Draughon, University of Tennessee, Food Science and Technology Department, P.O. Box 1071, Knoxville, TN 37901-1071; phone (423) 974-7425; e-mail: draughrn@utk.edu

Affiliate Council Chair, John C. Bruhn, University of California-Davis, Department of Food Science and Technology, 101 Cruess Hall, Davis, CA 95616-8598; phone (916) 752-2192; e-mail: jcbruhn@ucdavis.edu

EXECUTIVE DIRECTOR

David W. Tharp, 6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2863; phone (515) 276-3344; e-mail: dtharp@iamfes.org

EDITORIAL BOARD

SIDNEY BARNARD ................................................................. University Park, PA
HAROLD BENGSCH ............................................................. Springfield, MO
FLOYD W. BODYFELT ........................................................... Carville, LA
JOHN C. BRUHN ................................................................. Davis, CA
J.H. BURKETT ................................................................. Sioux City, IA
WARREN S. CLARK, JR. .................................................... Chicago, IL
WILLIAM W. COLEMAN, II ................................................ St. Paul, MN
OLIVER D. COOK .............................................................. Rockville, MD
NELSON COX ................................................................. Athens, GA
RUTH G. FUQUA ............................................................... Mt. Juliet, TN
THOMAS M. GILMORE ....................................................... Rockville, MD
DAVID GOMBAS .............................................................. Arlington Heights, IL
CHARLOTTE W. HINZ .......................................................... Leroy, NY
RICHARD F. JOLLEY ........................................................... Brevard, FL
JAMES W. LITTLEFIELD ..................................................... Austin, TX
PAUL F. MARTIN ............................................................... Chicago, IL
JOHN R. MOLENA ............................................................ Salisbury, MD
DEBBY L. NEWSLOW ......................................................... Plymouth, FL
DARYL S. PAULSON ........................................................... Bozeman, MT
DAVID H. PEPPER .............................................................. Sioux City, IA
MICHAEL PULLEN .............................................................. White Bear Lake, MN
J. REEDER ................................................................. Reston, VA
ROBERT L. SANDERS .......................................................... Pensacola, FL
P.C. VASAVADA ................................................................. River Falls, WI

"The mission of IAMFES is to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply."
Sustaining Members

3M Microbiology Products, 3M Center, Bldg. 275, St. Paul, MN 55144-1000; (612) 733-9558

ABC Research, 3437 S.W. 24th Avenue, Gainesville, FL 32607; (352) 372-0436

Accurate Metering Systems, Inc., 1651 Wilkening Road, Schaumburg, IL 60173; (708) 882-0690

Applied Research Institute, 8 Blanche's Walk, P.O. Box 810, Newtown, CT 06470; (888) 324-7900

APV Crepaco, 9525 W. Bryn Mawr Ave., Rosemont, IL 60018; (708) 678-4300

ASI Food Safety Consultants, Inc., 7625 Page Blvd., St. Louis, MO 63133; (800) 477-0778

Becton Dickinson Microbiology Systems, Inc., 7 Lovetown Circle, Sparks, MD 21152-9212; (410) 584-7188

Bentley Instruments, Inc., 4004 Peavey Road, Chaska, MN 55318; (612) 448-7600

BioControl Systems, Inc., 19805 N. Creek Parkway, Bothell, WA 98011; (425) 487-2055

Biolog, Inc., 3938 Trustway, Hayward, CA 94545; (510) 785-2585

BioMérieux Vetek, Inc., 595 Anglum Drive, Hazelwood, MO 63042-2395; (800) 638-4835

Bioscience International, Inc., 11607 Magruder Lane, Rockville, MD 20852-4365; (301) 230-0072

Capitol Vial, Inc., P.O. Box 446, Fultonville, NY 12072; (518) 853-3377

Celsius, Inc., 1801 Maple Ave., BRL Bldg., Evanston, IL 60201; (847) 467-6600

Charm Sciences, Inc., 36 Franklin Street, Malden, MA 02148; (617) 322-1523

Copesan Services, Inc., 3490 N. 127th St., Brookfield, WI 53005; (800) 267-3726

Dairy and Food Labs, Inc., 3401 Crow Canyon Road, Suite 110, San Ramon, CA 94583-1307; (510) 830-0350

Dairy Quality Control Institute, 5205 Quincy Street, Mounds View, MN 55112-1400; (612) 785-0484

DARDEN Restaurants, P.O. Box 59330, Orlando, FL 32859-3330; (407) 245-5330

Darigold, Inc., 635 Elliott Ave., P.O. Box 79007, W. Seattle, WA 98119; (206) 286-6772

Dean Foods, P.O. Box 7005, Rockford, IL 61101-7005; (815) 962-0647

Decagon Devices, 950 N.E. Nelson Court, P.O. Box 835, Pullman, WA 99163; (509) 332-2756

Difco Laboratories, Inc., P.O. Box 31058, Detroit, MI 48232; (313) 462-8478

Diversey-Lever, 46701 Commerce Center Drive, Plymouth, MI 48170; (313) 414-5012

DonLevy & Associates, Inc., 1551 E. 89th Ave., Merrillville, IN 46410; (219) 736-0472

Dynal, Inc., 635 Elliott Ave., P.O. Box 79007, W. Seattle, WA 98119; (206) 286-6772

Ecolab Inc., 370 Wabasha St. N., St. Paul, MN 55102; (612) 293-2364

Ecoliab Inc., 370 Wabasha St. N., St. Paul, MN 55102; (612) 293-2364

Educational Foundation of the National Restaurant Assn., 250 S. Wacker Drive, Suite 1400, Chicago, IL 60606-3834; (800) 765-2122

Electrol Specialties Company, 441 Clark Street, South Beloit, IL 61080; (815) 389-2291

Evergreen Packaging, Division of International Paper, 2400 6th Street, S.W., Cedar Rapids, IA 52406; (319) 399-3236

F & H Food Equipment Co., P.O. Box 3985, Springfield, MO 65808; (417) 881-6114

Foss Food Technology Corporation, 10355 W. 70th Street, Eden Prairie, MN 55344; (612) 941-8870

FRM Chem, Inc., P.O. Box 207, Washington, MO 63090; (314) 583-4360

G & H Products Corp., 8201 104th Street, P.O. Box 909, Pleasant Prairie, WI 53158-0909; (414) 694-1010

Gardex Chemicals, Ltd., 7 Meridian Rd., Etobicoke, ON M9W 4Z6; (800) 563-4273

GENE-TRAK Systems, 94 South Street, Hopkinton, MA 01748; (508) 435-7400

Gist-brocades Dairy Ingredients Group, N93 W14560 Whittaker Way, Menomonee Falls, WI 53051; (800) 423-7906

Glo Germ Company, 1120 S. Highway 191, Moab, UT 84532; (800) 842-6622

Great Western Chemical Co., 1717 E. Fargo, Nampa, ID 83687; (208) 466-8437

Hardy Diagnostics, 1430 W. McCoy Ln., Santa Maria, CA 93455; (805) 346-2766

Hess & Clark, Inc./KenAg, 7th & Orange Street, Ashland, OH 44805; (800) 992-3594
Sustaining Members

IBA, Inc., 27 Providence Road, Millbury, MA 01527; (508) 865-6911

IDEXX Laboratories, Inc., 1 Idexx Drive, Westbrook, ME 04092; (207) 856-0300

International BioProducts, Inc., 14780 N.E. 95th Street, Redmond, WA 98052; (206) 837-4332

International Dairy Foods Association, 1250 H Street, N.W., Suite 900, Washington, D.C. 20005; (202) 737-4332

Kalyx Biosciences, 20 Camelot Drive, Nepean, ON K29 5X8; (613) 723-1114

Land O'Lakes, Inc., P.O. Box 116, Minneapolis, MN 55440-0116; (612) 481-2870

Malthus Diagnostics, Inc., 35888 Center Ridge Road, North Ridgeville, OH 44039; (216) 327-2585

Maryland & Virginia Milk Producers Assn., Inc., 1985 Isaac Newton Square, Reston, VA 20190; (703) 742-6800

Medallion Labs, 9000 Plymouth Ave., Minneapolis, MN 55427; (612) 540-4453

Metz Sales, Inc., 522 W. First Street, Williamsburg, PA 16693; (814) 832-2907

Michelson Laboratories, Inc., 6280 Chalet Drive, Commerce, CA 90040; (562) 928-0553

Mid America Dairymen, Inc., 3255 E. Chestnut Expressway, Springfield, MO 65802-2584; (417) 865-7100

NSF International, 3475 Plymouth Road, Ann Arbor, MI 48105; (313) 769-5523

NASCO International, 901 Janesville Avenue, Fort Atkinson, WI 53538; (414) 563-2446

The National Food Laboratory, 6363 Clark Ave., Dublin, CA 94568; (510) 551-4231

National Food Processors Association, 1401 New York Ave. N.W., Washington, D.C. 20005; (202) 639-5985

Nelson-Jameson, Inc., 2400 E. Fifth Street, P.O. Box 534, Marshfield, WI 54449-0647; (715) 387-1151

NESTLÉ USA, Inc., 800 N. Brand Blvd., Glendale, CA 91203; (818) 549-5799

New Horizons Diagnostics, 9110 Red Branch Road, Columbia, MD 21045; (410) 992-9357

Norton Performance Plastics Corp., P.O. Box 3660, Akron, OH 44309-3660; (216) 979-2840

Organon Teknika, 100 Akzo Avenue, Durham, NC 27712; (919) 620-2000

PE Applied Biosystems, 850 Lincoln Centre Drive, Bldg. 400, Foster City, CA 94404; (415) 638-5413

Penn State University, University Creamery, 12 Borland Laboratory, University Park, PA 16802; (814) 865-7555

Pharmacia & Upjohn Animal Health, 7000 Portage Road, Kalamazoo, MI 49001; (616) 385-6726

PRISM, 8300 Executive Center Drive, Miami, FL 33166-4680; (305) 592-6312

Qualicon, A DuPont Subsidiary, P.O. Box 80557, Wilmington, DE 19880; (302) 695-2262

R-Tech, P.O. Box 116, Minneapolis, MN 55440-0116; (800) 328-9687

REMI, L.P., 12076 Santa Fe Dr., Lenexa, KS 66215; (800) 255-6730

Ross Laboratories, 625 Cleveland Avenue, Columbus, OH 43215; (614) 227-3353

Seiberling Associates, Inc., 94 North High Street, Suite 350, Dublin, OH 43017-1100; (614) 764-5854

Silliker Laboratories Group, Inc., 900 Maple Road, Homewood, IL 60430; (708) 957-7878

Sparta Brush Co., Inc., P.O. Box 317, Sparta, WI 54656; (608) 269-2151

Tekmar-Dohrmann, P.O. Box 529576, Cincinnati, OH 45242-9576; (513) 247-7000

Tri-Dim Filter Corp., 999 Raymond St., Elgin, IL 60120; (847) 695-2600

Unipath Co., Oxoid Division, 800 Proctor Ave., Ogdenburg, NY 13669-2205; (800) 567-8378

VICAM, L.P., 313 Pleasant St., Watertown, MA 02172; (617) 926-7045

Vulcan Chemical Technologies, Inc., 4255 W. Riverside St., Kansas City, MO 64150; (816) 741-2410

Walker Stainless Equipment Co., 902 2nd Main St., Elroy, WI 53929; (608) 462-8461

Wal-Mart Stores, Inc., 702 S.W. 8th St., Bentonville, AR 72712; (501) 273-4903

Warren Analytical Laboratory, 650 'O' St., P.O. Box G, Greeley, CO 80632; (800) 945-6669

Weber Scientific, 2732 Kuser Road, Hamilton, NJ 08691-9430; (609) 584-7677

West Agro, Inc., 11100 North Congress Avenue, Kansas City, MO 64153; (816) 891-1528

Zep Manufacturing Co., 1310 Sea- board Industrial Blvd., Atlanta, GA 30318; (404) 352-1680
The Editors are seeking articles of general interest and applied research with an emphasis on food safety for publication in *Dairy, Food and Environmental Sanitation*.

Submit your articles to:

**Managing Editor**  
*Dairy, Food and Environmental Sanitation*  
c/o IAMFES, Inc.  
6200 Aurora Ave., Suite 200W  
Des Moines, Iowa 50322-2863

Please submit three copies of manuscripts along with a fourth copy on 3 1/2" computer disk.

---

Identifying Microbes?

Choose a system that provides accuracy & flexibility

If you haven’t seen the Biolog line of MicroLog™ Systems you may think your choices are limited. Think again. Biolog’s proven universal chemistry brings the most powerful identification and research capability directly into your lab. The MicroLog database of over 1100 species, provides four times the number species offered by competitive systems. The systems also allow you to save unknown organism’s patterns for future reference. With only three test panels, gram negative, gram positive, and yeast, you won’t worry about stocking the wrong test card. The System offers simple, affordable, operation. It is easy to set up, and easy to use. No ancillary tests required, and no oil overlays. With Biolog’s MicroLog Line of Systems, your choice for identifying microbes just got easier! For more information visit us at www.biolog.com or call:

**Biolog**  
Biolog, Inc. 9938 Trust Way, Hayward, CA 94545, USA  
Tel: 510.782.2591 • Fax: 510.782.4639 • www.biolog.com

---

User Definable Database

Easy 4 step set-up!

Identifications in as little as 4 hours!

Purple = +  
Clear = -  

Over 1100 species
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).
For automated sterility testing, BacT/Alert® stands alone.

BacT/Alert®. For many leading food producers, there's no system they would trust more for sterility testing of their aseptic products.

Imagine what BacT/Alert® could do for you.

- Sterility test results in as little as one-half the time of conventional methods
- Superior sensitivity
- Continuous monitoring with walk-away automation
- Bar-coded sample tracking
- Sophisticated data management capabilities

To find out more about the BacT/Alert® microbial detection system, call 1-800-682-2666.

Also see us at IFT Booth 2501

Organon Teknika Corporation • ISO 9001 CERTIFIED • 100 Akzo Avenue, Durham, NC 27712

BacT/Alert is a registered trademark of Organon Teknika Corporation.
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.
The 20-minute Listeria Test from Oxoid. Because time is money.

The Oxoid Listeria Rapid Test from Unipath is a fast and reliable method for the detection of Listeria species in food samples.

1. After just two 21-hour enrichment steps, place 135ul of the sample into this Clearview™ Test Unit window.

2. Only 20 minutes later, a blue line in this window clearly indicates the presence of Listeria species.

3. Another blue line appears here as a control, confirming that the test has worked correctly.

4. If no blue line appears, the sample is negative.

5. There is no need to wait up to 5 more days as with some other tests. You're ready to ship product and fill orders right now.

6. Are you ready to call for details? Contact: Oxoid Inc.
800 Proctor Ave.,
Ogdensburg, NY 13669.
Phone: (800) 567-TEST.
Fax: (613) 226-3728. Or Oxoid Inc.
217 Colonnade Road, Nepean,
Ontario, K2E 7K3 Canada.
Phone: (800) 267-6391.
Fax: (613) 226-3728.
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 2x2x2 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

<table>
<thead>
<tr>
<th>Treatment number</th>
<th>Washer temperature setting</th>
<th>Dryer after wash</th>
<th>Use of bleach in wash cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>hot</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>2</td>
<td>hot</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>3</td>
<td>hot</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>4</td>
<td>cold</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>5</td>
<td>cold</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>6</td>
<td>cold</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>7</td>
<td>cold</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>8</td>
<td>cold</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>9*</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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

*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 2x2x2 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 x 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>
<thead>
<tr>
<th>Pathogen</th>
<th>Group I preincubation</th>
<th>Group II preincubation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CPS</td>
<td>0.0 ± 0.0 0.0 ± 0.0</td>
<td>0.0 ± 0.0 0.0 ± 0.0</td>
</tr>
<tr>
<td>CNS</td>
<td>4.36 ± 0.61 2.84 ± 0.88</td>
<td>3.05 ± 0.33 3.48 ± 0.52</td>
</tr>
<tr>
<td>STRP</td>
<td>3.34 ± 1.57 2.01 ± 1.34</td>
<td>3.08 ± 0.30 2.28 ± 1.23</td>
</tr>
<tr>
<td>COLI</td>
<td>0.30 ± 1.19 0.26 ± 0.75</td>
<td>2.28 ± 1.23 0.0 ± 0.0</td>
</tr>
<tr>
<td>ESC+</td>
<td>2.55 ± 1.27 0.49 ± 1.04</td>
<td>0.60 ± 1.12 2.38 ± 0.62</td>
</tr>
<tr>
<td>ESC-</td>
<td>2.27 ± 1.58 1.41 ± 1.31</td>
<td>0.33 ± 0.72 1.16 ± 1.50</td>
</tr>
<tr>
<td>MAC</td>
<td>0.33 ± 0.95 0.0 ± 0.0</td>
<td>0.0 ± 0.0 0.0 ± 0.0</td>
</tr>
<tr>
<td>TOT</td>
<td>5.78 ± 0.63 4.31 ± 0.81</td>
<td>4.58 ± 0.32 4.95 ± 0.42</td>
</tr>
</tbody>
</table>

1Colony counts of coagulase-positive staphylococci or coagulase-negative staphylococci from blood agar plates (CPS, CNS), Streptococcus from blood agar plates (STRP), coliforms from blood agar (COLI) or MacConkey plates (MAC), esculin-positive or negative streptococci from Thallium crystal violet agar plates (ESC+, ESC-), and total mastitis pathogen growth on blood agar plates.

2Two, 1 cm² portions were cut from the center of the towel and 1 square preincubated in broth culture media for 4 h before being frozen at -5°C (yes); the other was transferred to a quench solution and frozen immediately (no).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>CPS</th>
<th>CNS</th>
<th>COLI</th>
<th>ESC⁺</th>
<th>ESC⁻</th>
<th>MAC</th>
<th>TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0 ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
</tr>
<tr>
<td>2</td>
<td>0.0 ± 0.0</td>
<td>0.47⁺ ± 0.82</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.47⁺ ± 0.82</td>
</tr>
<tr>
<td>3</td>
<td>0.0 ± 0.0</td>
<td>0.38⁺ ± 0.82</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.38⁺ ± 0.82</td>
</tr>
<tr>
<td>4</td>
<td>0.0 ± 0.0</td>
<td>0.16⁺ ± 0.64</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.16⁺ ± 0.64</td>
</tr>
<tr>
<td>5</td>
<td>0.0 ± 0.0</td>
<td>0.26⁺ ± 0.53</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.26⁺ ± 0.53</td>
</tr>
<tr>
<td>6</td>
<td>0.0 ± 0.0</td>
<td>0.36⁺ ± 0.74</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.36⁺ ± 0.74</td>
</tr>
<tr>
<td>7</td>
<td>0.0 ± 0.0</td>
<td>0.73⁺ ± 1.10</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.0⁺ ± 0.0</td>
<td>0.73⁺ ± 1.10</td>
</tr>
<tr>
<td>8</td>
<td>0.0 ± 0.0</td>
<td>2.79⁺ ± 0.97</td>
<td>0.15⁺ ± 0.59</td>
<td>0.57⁺ ± 1.02</td>
<td>0.0⁺ ± 0.0</td>
<td>0.14 ± 0.54</td>
<td>2.94⁺ ± 1.23</td>
</tr>
</tbody>
</table>

1Colony counts of coagulase-positive staphylococci or coagulase-negative staphylococci from blood agar plates (CPS, CNS), coliforms from blood agar (COLI) or MacConkey plates (MAC), esculin-positive or negative streptococci from TKT agar plates (ESC⁺, ESC⁻), and total mastitis pathogen growth on blood agar plates. Streptococci were not identified on blood agar plates.

2Data within column not sharing a superscript were significantly different, P < 0.05.
TABLE 4. Counts (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

<table>
<thead>
<tr>
<th>Treatment</th>
<th>CPS</th>
<th>CNS</th>
<th>COLI</th>
<th>ESC*</th>
<th>ESC*</th>
<th>MAC</th>
<th>TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0^a±0.0</td>
<td>0.10^ab±0.36</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.10^ab±0.36</td>
</tr>
<tr>
<td>2</td>
<td>0.0^b±0.0</td>
<td>0.0^b±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.14±0.53</td>
<td>0.0±0.0</td>
<td>0.0^b±0.0</td>
</tr>
<tr>
<td>3</td>
<td>0.0^b±0.0</td>
<td>0.0^b±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0^b±0.0</td>
</tr>
<tr>
<td>4</td>
<td>0.0^b±0.0</td>
<td>0.0^b±0.0</td>
<td>0.0±0.0</td>
<td>0.12±0.44</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0^b±0.0</td>
</tr>
<tr>
<td>5</td>
<td>0.0^b±0.0</td>
<td>0.0^b±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0^b±0.0</td>
</tr>
<tr>
<td>6</td>
<td>0.0^b±0.0</td>
<td>0.0^b±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0^b±0.0</td>
</tr>
<tr>
<td>7</td>
<td>0.0^b±0.0</td>
<td>0.0^b±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0^b±0.0</td>
</tr>
<tr>
<td>8</td>
<td>0.13±0.0</td>
<td>0.26±0.54</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>0.39±0.62</td>
</tr>
</tbody>
</table>

1Colony counts of coagulase-positive staphylococci or coagulase-negative staphylococci from blood agar plates (CPS, CNS), coliforms from blood agar (COLI) or MacConkey plates (MAC), esculin-positive or negative streptococci from TKT agar plates (ESC*, ESC*), and total mastitis pathogen growth on blood agar plates. Streptococci were not identified on blood agar plates.

2Data 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/lactic acid (0.64/2.64%) solution (4xLA, 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 GI. 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 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 several-fold 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 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 several-fold 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 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 several-fold 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 Mr. D. Newkirk and Mr. W. Loertscher.

REFERENCES


### ABOUT THE AUTHOR

Department of Veterinary Clinical Science, Washington State University, Pullman, WA 99164-6610; telephone (509) 335-0786; E-mail: fox@wsu.edu
Microbiological Criteria for Military Rations
Update 1996

Edmund M. Powers* and Claire H. Lee

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 for dehydrated cooked military rations

<table>
<thead>
<tr>
<th>Ration</th>
<th>Spec. No.</th>
<th>Maximum count per gram</th>
<th>E. coli ≤</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans, green, compressed</td>
<td>MIL-B-43930B</td>
<td>APC</td>
<td>n 5</td>
</tr>
<tr>
<td>Beef snacks-cured sausage</td>
<td>MIL-PRF-44394</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef stew</td>
<td>MIL-B-43404F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef with rice</td>
<td>MIL-B-43750H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken à la king</td>
<td>MIL-C-44137A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken and chicken products</td>
<td>MIL-C-43135J</td>
<td>c 1</td>
<td></td>
</tr>
<tr>
<td>Chicken with rice</td>
<td>MIL-C-43289F</td>
<td>m 75,000</td>
<td>c 1</td>
</tr>
<tr>
<td>Chicken stew</td>
<td>MIL-C-44148</td>
<td>M 150,000</td>
<td>M ≤ 10</td>
</tr>
<tr>
<td>Chili con carne</td>
<td>MIL-C-43287H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs, scrambled</td>
<td>MIL-E-44470</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escallopated potatoes w/pork</td>
<td>MIL-E-43749G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shrimp</td>
<td>MIL-S-43145E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soup, beef, noodles and veg</td>
<td>MIL-S-43931A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soup, chicken and noodles</td>
<td>MIL-S-1049H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spaghetti and meat sauce</td>
<td>MIL-S-43275H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables, mixed</td>
<td>MIL-V-44145</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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.

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). For 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* for milk and milk products and miscellaneous dairy products

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

*Sampling plan: ANSI (5).
**Aerobic plate count.
*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; 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.
≥200 salmonellae negative per 25g.
≥200 salmonellae negative per 25g.
≥200 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. 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, 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 for ice cream, ice milk, sherbert, novelties, and mixes

<table>
<thead>
<tr>
<th>Item</th>
<th>Spec. No.</th>
<th>Maximum count per gram</th>
<th>APC</th>
<th>Coliforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice cream, regular</td>
<td>EE-l-116E</td>
<td>50,000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Ice cream, mellorine, all flavors, fruit and nuts</td>
<td>EE-l-116E</td>
<td>50,000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Ice milk</td>
<td>EE-l-116E</td>
<td>50,000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Ice milk, mellorine</td>
<td>EE-l-116E</td>
<td>50,000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Ice milk, milk shake, and yogurt mixes</td>
<td>MIL-l-43717D</td>
<td>50,000</td>
<td>10/20</td>
<td></td>
</tr>
<tr>
<td>Novelties: ice cream bars, ice cream sandwich, ice cream cone (preformed)</td>
<td>EE-l-116E</td>
<td>50,000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Sherbert and ices</td>
<td>EE-l-116E</td>
<td>50,000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Sherbert, mellorine</td>
<td>EE-l-116E</td>
<td>50,000</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

*aSampling plan: ANSI *(5)*.
*bAerobic plate count.
*Contains vegetable fat instead of butter fat.
*Types I-IV: Type III mix for soft serve and milk shakes must be negative for salmonellae in 25 grams. Type IV mix for soft serve yogurt has a maximum yeast and mold requirement of 10 per gram. The maximum coliform criterion is 10/g for vanilla flavors and 20/g for chocolate flavored mixes.

### TABLE 4. Microbiological criteria for frozen egg and egg products and for dehydrated egg mix

<table>
<thead>
<tr>
<th>Food item</th>
<th>Spec. No.</th>
<th>Maximum count per gram</th>
<th>APC</th>
<th>Salmonellae/c and mold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frozen egg and egg products</td>
<td>C-E-230E</td>
<td>15,000</td>
<td>Neg</td>
<td>50</td>
</tr>
<tr>
<td>whale egg, table-grade</td>
<td>C-E-230E</td>
<td>50,000</td>
<td>Neg</td>
<td>50</td>
</tr>
<tr>
<td>egg white</td>
<td>C-E-230E</td>
<td>50,000</td>
<td>Neg</td>
<td>50</td>
</tr>
<tr>
<td>egg yolk</td>
<td>C-E-230E</td>
<td>50,000</td>
<td>Neg</td>
<td>50</td>
</tr>
<tr>
<td>sugared yolk</td>
<td>C-E-230E</td>
<td>50,000</td>
<td>Neg</td>
<td>50</td>
</tr>
<tr>
<td>salted yolk</td>
<td>C-E-230E</td>
<td>50,000</td>
<td>Neg</td>
<td>50</td>
</tr>
<tr>
<td>Egg mix, dehydrated</td>
<td>Mil-E-43377D</td>
<td>25,000</td>
<td>Neg</td>
<td>-</td>
</tr>
</tbody>
</table>

*aSampling plan: ANSI *(5)*.
*bAerobic plate count.
*Per 25 grams.
*Escherichia coli 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 an 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) pouches depend on low water activity, pH, potassium sorbate, and low residual oxygen. Low oxygen levels are achieved and maintained by inserting oxygen scavenging packets into the sealed pouch *(15)*. Raw oysters *(1, 26)* conform to state and federal requirements, and peanut.
<table>
<thead>
<tr>
<th>Item</th>
<th>Spec. No.</th>
<th>Maximum criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate candy</td>
<td>A-A-20177</td>
<td>Salmonellae neg/25g</td>
</tr>
<tr>
<td>Canned foods, thermostabilized</td>
<td>Various</td>
<td>Commercial sterility</td>
</tr>
<tr>
<td>Dehydrated cooked vegetables</td>
<td>Various</td>
<td>Table 1</td>
</tr>
<tr>
<td>Dehydrated oral liquid feeding products</td>
<td>Various</td>
<td>n 5, c 1, APC, m 25,000/g, M 50,000/g, E. coli negative/g, Salmonellae negative/25g</td>
</tr>
<tr>
<td>Dehydrated soups</td>
<td>Various</td>
<td>Commercial sterility</td>
</tr>
<tr>
<td>Irradiated meat and poultry, radappertized</td>
<td>Custom made for NASA</td>
<td></td>
</tr>
<tr>
<td>MRE bread, pouch, shelf stable</td>
<td>MIL-B-44360A^c</td>
<td>Table 1</td>
</tr>
<tr>
<td>MRE foods, pouch, thermostabilized</td>
<td>Various</td>
<td>Commercial sterility</td>
</tr>
<tr>
<td>Oysters, fresh, chilled and frozen, shucked</td>
<td>PP-O-956G</td>
<td>APC 500,000/g</td>
</tr>
<tr>
<td>Peanut butter for MRE</td>
<td>MIL-C-44068B</td>
<td>Fecal coliforms, 230/100g^g</td>
</tr>
<tr>
<td>Precooked frozen meals</td>
<td>A-A-20037A</td>
<td>Freeze to 0°C within 2 hours</td>
</tr>
<tr>
<td>Shortbread bar, survival</td>
<td>Mil-S-44463</td>
<td>Table 1</td>
</tr>
<tr>
<td>Topping, dessert, frozen or dehydrated</td>
<td>A-A-20196</td>
<td>APC 10,000/g, Coliforms &lt;10/g, Salmonellae neg/25g</td>
</tr>
<tr>
<td>Tray pack foods, thermostabilized</td>
<td>Various</td>
<td>Commercial sterility</td>
</tr>
<tr>
<td>Tubed foods, high altitude, thermostabilized</td>
<td>Custom made for Air Force</td>
<td>Commercial sterility</td>
</tr>
<tr>
<td>Wintergreen bar, survival</td>
<td>MIL-W-44464</td>
<td>Table 1</td>
</tr>
</tbody>
</table>

^aSampling plan: ANSI (5), except for Table 1 and dehydrated liquid feeding products.
^bAerobic plate count.
^cBacterial growth controlled by water activity and pH. Yeast and molds controlled by potassium sorbate (KS) and low oxygen content produced by oxygen scavengers (15).
^dFive-tube MPN method (26).

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.

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.

REFERENCES


ABOUT THE AUTHOR

U.S. Army Soldier Systems Command, Natick Research, Development and Engineering Center, Natick, MA 01760-5018; telephone (508) 233-4985; Fax (508) 233-5274.
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.

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
August 16-19, 1998
Nashville, TN

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. _______________________________________________
5. _______________________________________________
6. _______________________________________________

Conveners of Session — Address — Phone — Fax

_________________________________________________

Description of Audience: __________________________

Signature of Submitter: _____________________________

Submit by June 16, 1997 to: IAMFES
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2863
or Contact: Dr. Susan Sumner
Phone: (540) 231-5280 or Fax: (540) 231-9293
E-mail: sumners@vt.edu
**New Members**

**CANADA**  
Sheldon Robertson  
Hershey Canada Inc.  
Smith Falls, Ontario  
Donna Taylor  
Perth District Health Unit  
Stratford, Ontario

**ENGLAND**  
Lisa Miles  
Windsor, Berkshire

**HOLLAND**  
Maarten Bakker  
Viro Food, Leeuwarden

**JAPAN**  
Atushi Sakata  
Marudai Food Co. Ltd., Takatsuki

**UNITED STATES**

**ARIZONA**  
John R. Moore  
UA Food Science, Summers

**CALIFORNIA**  
Mark Kubinski  
Biological Sciences, San Luis Obispo  
Otis L. Stitt  
Family Health Services, San Diego

**DISTRICT OF COLUMBIA**  
Catherine Nnoka  
ILSI North America, Washington

**GEORGIA**  
Traci Sayer  
Stone Mountain

**ILLINOIS**  
James M. Burkett  
Cole-Parmer Instrument, Vernon Hills  
Fredric Carlson  
Kane Co. Health Dept., Geneva  
Shelia R. Hayes  
Village of Bridgeview, Bridgeview

**INDIANA**  
Bret D. Marsh  
Indiana State Board of Animal Health, Indianapolis

**IOWA**  
Norma A. Chance  
ConAgra Frozen Foods, Council Bluffs

**MARYLAND**  
Melvin N. Kramer  
EPI Health Associates, Baltimore

**MICHIGAN**  
Neal D. Fortin  
Michigan Dept. of Agriculture St. Joseph

**NEBRASKA**  
Anuchita Chawnua  
Lincoln

**NEW YORK**  
Ja-an A. Ho  
Cornell University, Geneva

**NORTH CAROLINA**  
Mark A. Jarvis  
Steritech Environmental Services Charlotte  
Deborah J. McNaul  
DuBois Div. of Diversey Lever Cincinnati

**OHIO**  
Rhonda L. Rambo  
T. Marzetti-Allen Div., Columbus

**PENNSYLVANIA**  
Kent K. Norman  
Zep Manufacturing, Sewickley

**TEXAS**  
Lisa Bailey  
Town of Flower Mound Flower Mound

**VIRGINIA**  
Joan C. Redder  
KFC, Blacksburg

**WASHINGTON**  
Brian J. Campbell  
DelMonte, Tappenish

**WISCONSIN**  
Irene Goltz  
Stella Foods, Inc., Green Bay  
Richard Podolak  
Chr. Hansen, Inc., West Allis

---

**New IAMFES Sustaining Members**

Peter H. X. Bui  
VICAM, L.P.  
Watertown, MA

Colleen Fegan  
Tri-Dim Filter Corp.  
Elgin, IL
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.


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, Ill., 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 Bavoito, 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, WI; 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 communication 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-CIO₂-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-CIO₂-E). 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 compounds.

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 $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 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.
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 asepetic 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

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.

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

The publishers do not warrant, either expressly or by implication, the factual accuracy of the products or descriptions herein, nor do they so warrant any views or opinions offered by the manufacturer of said articles and products.
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

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

Blender for Giardia and Cryptosporidium Isolation

The Stomacher® Lab Blender 3500W, from Tekmar-Dohrmann has been designed for isolation of Giardia cysts and Cryptosporidium oocysts 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 manual 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
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.,

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

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

Sellers Cleaning Systems

Reader Service No. 359

Reader Service No. 361
Chromogenic Medium Differentiates \textit{E. coli} and Other Coliforms from Background Flora

The new Oxoid Chromogenic \textit{E. coli}/Coliform Medium (CM956) enables simple differentiation of \textit{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 \textit{E. coli} and coliforms after only 18 hours.

\textit{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.

The medium contains two chromogens. One is targeted towards 8-glucuronidase (incorporating a blue chromophore) and the other (incorporating a pink chromophore) is targeted towards 8-galactosidase. 8-glucuronidase is produced by \textit{E. coli} alone, but 8-galactosidase is produced by both \textit{E. coli} and other coliforms.

Oxoid Inc., Nepean, Ontario Canada

New Somatic Cell Counters

\textit{F}oss Food Technology announces a new range of Somatic Cell Counters for Central Laboratory milk analysis. These instruments can handle up to 500 samples per hour and a wide range of models is available. Unique benefits include the latest Foss Flow Cytometry Technology, prepackaged reagents, extremely low maintenance and major advances in both operator and environmental safety.

High level intelligence allows you to preprogram for optimum performance at critical ranges, advanced diagnostics and online modem communications facilitate trouble shooting and minimize downtime.

These units are fully compatible with the new Infra Red milk composition analyzers and can be integrated into a single high speed Combi system. Integrated systems can also measure fat, protein, lactose, solids, milk urea nitrogen, citric acid, and freezing point depression.

\textit{F}oss Food Technology Corp., Eden Prairie, MN

WESTAGRO®

When you provide the highest value chemical sanitation products and services in the industry, YOU GROW!

\textbf{Service Sets The Standard}

A Member of the World Wide Tetra Laval group

Make a change for the BEST!

As a customer of ours, I’ll personally see to it that you get the quality and service you have every right to expect!

Tom Fahey, Vice President Industrial Sales Group 816-891-1558

PLANT SANITATION CHEMICAL SALES

Reader Service No. 191

Reader Service No. 362

Reader Service No. 363

Reader Service No. 191

236 Dairy, Food and Environmental Sanitation — APRIL 1997
**For Sale:**

**BACTOMETER**

Model 128 – Dual Capacity

Great working order

This model currently sells for $90,000,

We are asking $54,000

Please call 1-800-245-5615

Reader Service No. 241

---

**SALES POSITION**

Food Specialist with experience in plant sanitation. Working for major chemical manufacturer. Salary, expenses and commissions. Resume to:

R. F. P.
P.O. Box 2015
Atlanta, GA 30301

Reader Service No. 153

---

**The CDT™ Test Device***

For testing all differential controls on H.T.S.T. pasteurizers

**Model III ss x now shipping!**

New adapters** connect directly to HTST’s sanitary pressure sensors

© The Crombie Company

521 Cowles Ave., Joliet, IL 60435-6043

815-726-1683 (Voice & FAX)

**Adapters may be ordered separately - fit all previous models.

Reader Service No. 124

---

**GOSSELIN & BLANCHET**

Butter-Making Equipment

New and Used

Sales. Service. Parts.

**B & J REPAIR SERVICE**

• 4818 N. Bailey Rd. •

Coral, MI 49322

(616) 354-6629

Reader Service No. 111

---

**ADVERTISE**

YOUR PRODUCT

OR SERVICE HERE!

For rates or information, contact:

Rick McAtee

Advertising Mgr.

(800) 369-6337

or (515) 276-3344

e-mail: rmcatee@iamfes.org

Reader Service No. 143

---

**Reader Service No. 241**

---

**Reader Service No. 153**

---

**Reader Service No. 124**

---

**Reader Service No. 111**

---

**Reader Service No. 143**

---
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
- 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

Quantitative Microbial Risk Assessment
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

- 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. Ticci, 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
- Genetic Characterization of *Shewanella putrefaciens* and *Pseudomonas* spp. Isolated from Fish Processing and Spoilage Using Automated Ribototyping—AMY MCCARDELL, S. Gudmundsdottir, B. Gudbjomsdottir, 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

- 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
- 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, Degradation by Flavobacterium aurantiacum in Corn—LALIT BOHRA, S. Reuger, R. Phebus, J. Smith, and D. Griege, Kansas State University, Manhattan, KS
- Occurrence of Molds and Levels of Aflatoxins and Fumonisins in Venezuelan Corn—R.M. RAYBAUDI and A. Martinez, Universidad Central de Venezuela, Caracas, Venezuela
- Enumeration and Characterization of Aeromonas sp. in Vegetable Products from Venezuela—R.V. DÍAZ, A. Martinez, R. Raybaudi, D. Brión, C. Rodríguez, and R. Ortiz, Universidad Central de Venezuela, Caracas, Venezuela
- Inhibition of Microbial Growth and Toxin Production in Honey—HASSAN GOUREMA, 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 PULLEDA, C. 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 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, Acetati and Stainless Steel by Scanning Electron Microscopy—RICK KANE, P. Hildebrandt, G. Braun, and J. Feirtag, University of Minnesota, St. Paul, MN
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

**Technical Session—General Food Microbiology**

- 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 TSAI 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
- 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
- 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—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. García, 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. Uorca, North Carolina State University, Raleigh, NC

• Control of *L. monocytogenes* by Use of Lysozyme, Lactoferricin-B and EDTA—YIBEI ZHANG, S. Lewis, D. Kamau, and A. Dessai, Tuskegee University, Tuskegee, AL

• Antimicrobial Activities of Lysozyme and Lactoferricin-B 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, CINAD, 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. Díaz, 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. Fancelli, 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 WHITTING and L. Bagi, USDA-ARS-ERRC, Wyndmoor, PA

• Updated Models for the Effects of Temperature, pH, NaCl, and NaNO₃ 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
Future Trends and Considerations in Sanitation

- FSIS Pathogen Reduction/HACCP Rules and Implications for Sanitation—JANET COLLINS, American Meat Institute, Arlington, VA
- 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 Entero-hemorrhagic _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

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


• 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


• Computer-Based Educational Tools—ROBERT GRAVANI, Cornell University, Ithaca, NY

• Computer-Based HACCP Tools—GEORGE EVANCHO, Campbell Soup Co., Camden, NJ

• Disease Surveillance Using Computer-Based Tools (Salm-Net)—IAN FISHER, Communicable Disease Surveillance Center, London, UK

Members Only!

Get the latest information on food safety training and MORE through the IAMFES AUDIO VISUAL LIBRARY. Our extensive selection of industry videos is available on a lending basis EXCLUSIVELY for IAMFES members!

The Audio Visual Library is just one of the MANY benefits of becoming a member of IAMFES, so don’t waste anymore time. Join now!

For MORE INFORMATION on the Audio Visual Library, or becoming a member, contact IAMFES at (800) 369-6337, or (515) 276-3344.
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) 569-6337 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-flyng 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)

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 #

Credit Card payments may be sent via Fax today!
(515) 276-8655

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

REGISTRATION:
Registration (Banquet included) MEMBERS
Student Member $220 ($270 late)*
One Day Registration (Circle: Mon/Tues/Wed) $35 ($45 late)*
Spouse/Companion (Name): $110 ($135 late)*
Children (14 & Under, Names): $35 ($35 late)*

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:
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:
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.

Credit Card Payments: Please Circle: VISA/MASTERCARD/AMERICAN EXPRESS

Card # ___________________ Exp. Date ___________ Name on Card ___________________ Signature _______________________

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.

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

I A M F E S

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

I A M F E S

84th Annual Meeting
Orlando, Florida
July 6 - July 9

MAIL DIRECTLY TO:

HYATT REGENCY GRAND CYPRESS
C/O RESERVATIONS
1 GRAND CYPRESS BLVD.
ORLANDO, FL 32836-6734

APRIL 1997 - Dairy, Food and Environmental Sciences

249

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

Please check accommodation requested:  □ Single (1 person)  □ Triple (3 persons)  □ King Bed
□ Double (2 persons)  □ Quad (4 persons)  □ 2 Double Beds

Bed type:

Special Requests ____________________________________________

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

NAME ______________________________________________________

SHARING WITH (Name) ________________________________________

COMPANY NAME _____________________________________________

ADDRESS __________________________________________________

_________________________________________  CITY  ______________

STATE/PROVINCE  COUNTRY  ZIP

TELEPHONE ____________________________

ARRIVAL DATE _________________________ (Check-In Time is after 4 p.m.)

DEPARTURE DATE _______________________ (Check-out Time is 11 a.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.

TYPE OF

CREDIT CARD # ___________________________ CREDIT CARD ___________________________

EXPIRATION DATE _______________________

CARDHOLDER'S SIGNATURE _______________________________________

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

For Reservations Call: (800) 233-1234 or (407) 239-1234
Or FAX: (407) 239-3800
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
(612) 733-0942  Fax (612) 737-7678

ABC Research Corporation
3437 SW 24th Avenue
Gainesville, FL 32607
(352) 372-0456  Fax (352) 378-6483

Advanced Instruments, Inc.
Two Technology Way
Norwood, MA 02062
(800) 348-0202  Fax (617) 320-8181

Applied Research Institute
P.O. Box 810
Newtown, CT 06470
(888) 324-7900  Fax (888) 324-7911

Aquionics, Inc.
P.O. Box 18395
Erlanger, KY 41018
(606) 341-0710  Fax (606) 341-2302

Atkins Technical, Inc.
3401 SW 40 Boulevard
Gainesville, FL 32608
(352) 378-5555  Fax (352) 335-6736

Becton Dickinson Microbiology Systems
7 Loveton Circle
Sparks, MD 21152
(410) 316-4472  Fax (410) 316-4906

BioControl Systems, Inc.
19805 North Creek Parkway
Bothell, WA 98011
(206) 487-2055  Fax (206) 487-1476

BioMerieux Vitek
595 Angelum Drive
Hazelwood, MO 63042
(314) 731-8500  Fax (314) 731-8678

Bioscience International, Inc.
11607 Magruder Lane
Rockville, MD 20852
(301) 230-0072  Fax (301) 230-1418

Biosynth International, Inc.
1665 West Quincy Avenue, Suite 155
Naperville, IL 60540
(630) 305-8400  Fax (630) 305-8420

Capitol Vial, Inc.
P.O. Box 446
Fultonville, NY 12072
(518) 853-3377  Fax (518) 853-3409

Charm Sciences, Inc.
36 Franklin Street
Malden, MA 02148
(617) 322-1523  Fax (617) 322-3141

Chemunex Inc.
1 Deer Park Drive, Suite H-2
Monmouth Junction, NJ 08852
(908) 329-1153  Fax (908) 329-1192

Copesan Services
3490 North 127th Street
Brookfield WI 53005
(800) 267-3726  Fax (414) 783-6267

Decagon Devices
P.O. Box 835
Pullman, WA 99163
(509) 332-2756  Fax (509) 332-5158

DQCI Services, Inc.
5205 Quincy Street
Mounds View, MN 55112
(612) 785-0484  Fax (612) 785-0584

DYNAL, Inc.
5 Delaware Drive
Lake Success, NY 11042
(516) 326-3270, ext. 224  Fax (516) 326-3298
Send your news, updates, and coming events to:
Donna Bahun
Publications Specialist
_Dairy, Food and Environmental Sanitation_
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2863
ATTEND THE
1997
IAMFES
ANNUAL MEETING

JULY 6-9, 1997
HYATT REGENCY
GRAND CYPRESS
IN ORLANDO, FL

For more information, contact IAMFES at (800) 369-6337; (515) 276-3344; Fax (515) 276-8655; e-mail iamfes@dwx.com.

*Registration forms are available on pages 248 and 249.*
INTRODUCING RAINBOW AGAR O157™

...a new selective culture medium that is much more specific for E. coli O157:H7 than MacConkey Sorbitol Agar. In addition to its use with O157:H7, Rainbow Agar O157™ is also useful for aiding isolation of other VTEC (verotoxin-producing E. coli) strains.

On this medium, O157:H7 strains have a unique and distinctive black coloration, typical non-O157 VTEC strains are blue or purple, and most non-VTEC E. coli strains are magenta or red. Other species are either inhibited on this medium or grow as white or cream-colored colonies.

Rainbow Agar O157™ is available internationally from Biolog and its distributors.

For additional information contact
Biolog, Inc., 3938 Trust Way, Hayward, CA, USA, phone: 510-785-2591, fax: 510-782-4639
We don't care how you get it here...

but we do care if we get it!

Affiliates are an important part of IAMFES, and that's why we need you, our Affiliate Associations and Affiliate Members, to let us know what is going on in your organizations. Keep us abreast of meetings, activities, seminars and other events by sending us minutes, announcements or just a quick update. In return, we'll publish it in our next issue of Dairy, Food and Environmental Sanitation. All we ask is that you please send information regarding upcoming events at least two months in advance.

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.
Coming Events

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: gfcc@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 expectations. For further 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 Register, 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, Crystalization in Foods, New Brunswick, NJ. The principles of crystalization 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 Yue 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.
validations, and quality assurance in at the University of Wisconsin - River Falls, River Falls, WI. The course consists of lectures, case studies and laboratory work to accomplish training in 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.
**CALL FOR PAPERS**

**PANAMERICAN CONGRESS ON MASTITIS CONTROL AND MILK QUALITY**

**Deadline May 31, 1997**

**Merida, Yucatan, Mexico**

**March 23–27, 1998**

For Information Contact:
Dr. W. Nelson Philpot
P.O. Box 120
Homer, LA 71040
Telephone: (318) 927-2388
Fax: (318) 927-3133

---

### Advertising Index

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC Research Corporation</td>
<td>252</td>
</tr>
<tr>
<td>Applied Research Institute</td>
<td>215</td>
</tr>
<tr>
<td>B &amp; J Repair</td>
<td>237</td>
</tr>
<tr>
<td>Biolog Inc.</td>
<td>205, 254</td>
</tr>
<tr>
<td>Capitol Vial, Inc.</td>
<td>201</td>
</tr>
<tr>
<td>Copesan Services, Inc.</td>
<td>199</td>
</tr>
<tr>
<td>Crombie Company, The</td>
<td>237</td>
</tr>
<tr>
<td>DQCI Services, Inc.</td>
<td>215</td>
</tr>
<tr>
<td>Dynal, Inc.</td>
<td>258</td>
</tr>
<tr>
<td>Educational Foundation of the National Restaurant Association</td>
<td>197</td>
</tr>
<tr>
<td>Gist-brocades</td>
<td>Inside Front Cover</td>
</tr>
<tr>
<td>Ingman Labs, Inc.</td>
<td>237</td>
</tr>
<tr>
<td>Medallion Laboratories</td>
<td>237</td>
</tr>
<tr>
<td>Nelson-Jameson, Inc.</td>
<td>201</td>
</tr>
<tr>
<td>Organon Teknika Corp.</td>
<td>207</td>
</tr>
<tr>
<td>Oxoid</td>
<td>209</td>
</tr>
<tr>
<td>Qualicon™ - A DuPont Subsidiary</td>
<td>Back Cover</td>
</tr>
<tr>
<td>Warren Analytical Laboratory</td>
<td>200</td>
</tr>
<tr>
<td>WestAgro</td>
<td>236</td>
</tr>
<tr>
<td>Zep Mfg.</td>
<td>257</td>
</tr>
</tbody>
</table>

---

### ATTENTION FOOD MICROBIOLOGISTS

**Why Settle for Presumptive Results? Get Rapid Results with Culture Confirmation**

**ImmunoMagnetic Separation (IMS) with Dynabeads® uses antibody coated magnetic beads to capture and isolate food pathogens**

- Isolated colonies within 48 hours from receipt of sample, (24 hours for *E. coli* O157)
- Simple IMS protocol – 30 minutes from start to finish
- The most sensitive isolation procedure for *Salmonella*, *Listeria* and *E. coli* O157

Contact Dynal, Inc. at 800 638 9416 for details on IMS for *Salmonella*, *Listeria* and *E. coli* O157

---

Reader Service No. 195
IAMFES Sustaining Member
1997 IAMFES Exhibitor

---

DYNAL, INC. 5 Delaware Drive, Lake Success, NY 11042
E-mail: techserv@dynalna.atmail.com, Internet: http://dynal.no

DYNAL® The Alternative Culture in Microbiology

---

258 Dairy, Food and Environmental Sanitation – APRIL 1997
### IAMFES Booklets

<table>
<thead>
<tr>
<th>Description</th>
<th>Member or Gov't Price</th>
<th>Non-Member Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures to Investigate Waterborne Illness—2nd Edition</td>
<td>$8.00</td>
<td>$16.00</td>
<td></td>
</tr>
<tr>
<td>Procedures to Investigate Foodborne Illness—4th Edition</td>
<td>6.00</td>
<td>12.00</td>
<td></td>
</tr>
<tr>
<td>Procedures to Investigate Arthropod-borne and Rodent-borne Illness</td>
<td>6.00</td>
<td>12.00</td>
<td></td>
</tr>
<tr>
<td>Procedures to Implement the Hazard Analysis Critical Control Point System</td>
<td>6.00</td>
<td>12.00</td>
<td></td>
</tr>
<tr>
<td>Pocket Guide to Dairy Sanitation (minimum order of 10)</td>
<td>.50</td>
<td>.75</td>
<td></td>
</tr>
</tbody>
</table>

Multiple copies available at reduced prices. Phone our order desk for pricing information on quantities of 25 or more.

### 3-A Sanitary Standards

<table>
<thead>
<tr>
<th>Description</th>
<th>Member or Gov't Price</th>
<th>Non-Member Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Set 3-A Dairy &amp; Egg Standards</td>
<td>$60.00</td>
<td>$120.00</td>
<td></td>
</tr>
<tr>
<td>Five-year Update Service on 3-A Dairy &amp; Egg Standards</td>
<td>80.00</td>
<td>160.00</td>
<td></td>
</tr>
</tbody>
</table>

### Method of Payment

- [ ] CHECK OR MONEY ORDER ENCLOSED
- [ ] MASTERCARD
- [ ] VISA
- [ ] AMERICAN EXPRESS

Exp. Date __________
SIGNATURE __________

PAYMENT MUST BE ENCLOSED FOR ORDER TO BE PROCESSED

* U.S. FUNDS ON U.S. BANK *

### Shipping and Handling

**IAMFES booklets**
- **Within U.S.**
  - First booklet ____________________________ $2.00
  - Each additional booklet ___________________ $1.00
  - Pocket Guide to Dairy Sanitation—per 10... $2.50
- **Outside U.S.**
  - First booklet ____________________________ $4.00
  - Each additional booklet ___________________ $1.00
  - Pocket Guide to Dairy Sanitation—per 10... $3.50

**3-A Sanitary Standards**
- **Within U.S.** (each item) ___________________ $6.25
- **Outside U.S.** (each item) __________________ $10.25

Prices effective through August 31, 1997
International Association of Milk, Food and Environmental Sanitarians

MEMBERSHIP

☐ Membership with JFP and DFES $120.00
   (12 issues of the Journal of Food Protection
   and Dairy, Food and Environmental Sanitation)

☐ Membership with DFES $75.00
   (12 issues of Dairy, Food and Environmental Sanitation)

☐ Check here if you are interested in information on joining your state/
   province chapter of IAMFES

SUSTAINING MEMBERSHIP

☐ Membership with BOTH journals $485.00
   (Includes exhibit discount, Annual Meeting issue advertising discount,
   company monthly listing in both journals and more)

STUDENT MEMBERSHIP*

☐ Membership with JFP and DFES $60.00
☐ Membership with Journal of Food Protection $37.50
☐ Membership with Dairy, Food and Environmental Sanitation $37.50

*FULL-TIME STUDENT VERIFICATION MUST ACCOMPANY THIS FORM

Shipping Charges: Outside U.S. _______ Surface ($22.50 per journal) _______ AIRMAIL ($95.00 per journal)

PLEASE TYPE...ALL AREAS MUST BE COMPLETED FOR ORDER TO BE PROCESSED

Name ____________________________ M.I. ____________________________ Last Name ____________________________

Company Name ____________________________ Job Title ____________________________

Address ____________________________________________________________

City ____________________________ State or Province ____________________________

Country ____________________________ Postal/Zip +4 ____________________________

Office Telephone # ____________________________ Fax # ____________________________

E-mail # ____________________________

Membership: ____ New _____ Renewal

Mail Entire Form to:
IAMFES
6200 Aurora Ave, Suite 200W
Des Moines, IA 50322-2863

OR Use Your Charge Card:
(800) 369-6337 (U.S. & Canada)
(515) 276-3344
(515) 276-8655 Fax

Method of Payment

☐ CHECK OR MONEY ORDER ENCLOSED

☐ MASTERCARD ☐ VISA ☐ AMERICAN EXPRESS

Exp. Date ____________

SIGNATURE ____________________________

Prices effective through August 31, 1997
This publication is available in microform.

University Microfilms International reproduces this publication in microform: microfiche and 16mm or 35mm film. For information about this publication or any of the more than 13,000 titles we offer, complete and mail the coupon to: University Microfilms International, 300 N. Zeeb Road, Ann Arbor, MI 48106. Call us toll-free for an immediate response: 800-521-3044. Or call collect in Michigan, Alaska and Hawaii: 313-761-4700.

University Microfilms International
Has your assay been tested on real-world contamination levels?

The BAX™ systems perform consistently at levels that challenge even culture methods. The high sensitivity of polymerase chain reaction (PCR) makes it possible.

How does your assay handle atypical organisms?

The BAX™ systems detect based on a segment of DNA unique to the target organism, not phenotypic expression, so atypical organisms are found as easily as typical ones.

How many false negatives do you have to accept to complete testing in 24 hours?

With the BAX™ systems you get next-day results, and give up nothing. In published independent test results, BAX™ has demonstrated 0% false negatives.

Is your assay HACCP-ready?

With their definitive results, competitive cost, minimal hands-on time, and simple sample prep, the BAX™ systems are the ideal products for implementing a HACCP program in your plant.

The BAX™ Pathogen Detection Systems. Accurate results without compromise.

BAX™ for Screening/Salmonella
BAX™ for Screening/E. coli O157:H7
BAX™ for Screening/Listeria monocytogenes—NOW AVAILABLE!

Qualicon™
A DuPont Subsidiary
Route 141 and Henry Clay Road
PO Box 80357
Wilmington DE 19880-0357
1.800.863.6842
+1.302.451.9714 (outside the US)
This product is sold under licensing arrangement with F. Hoffmann-LaRoche, Ltd., Roche Molecular Systems, Inc. and the Perkin-Elmer Corporation.

The next generation of microbiology products.

Call for test results and more information about the most accurate pathogen screeners you can buy.
1.800.863.6842
Visit our web site at: www.qualiconweb.com

This product is sold under licensing arrangement with F. Hoffmann-LaRoche, Ltd., Roche Molecular Systems, Inc. and the Perkin-Elmer Corporation.