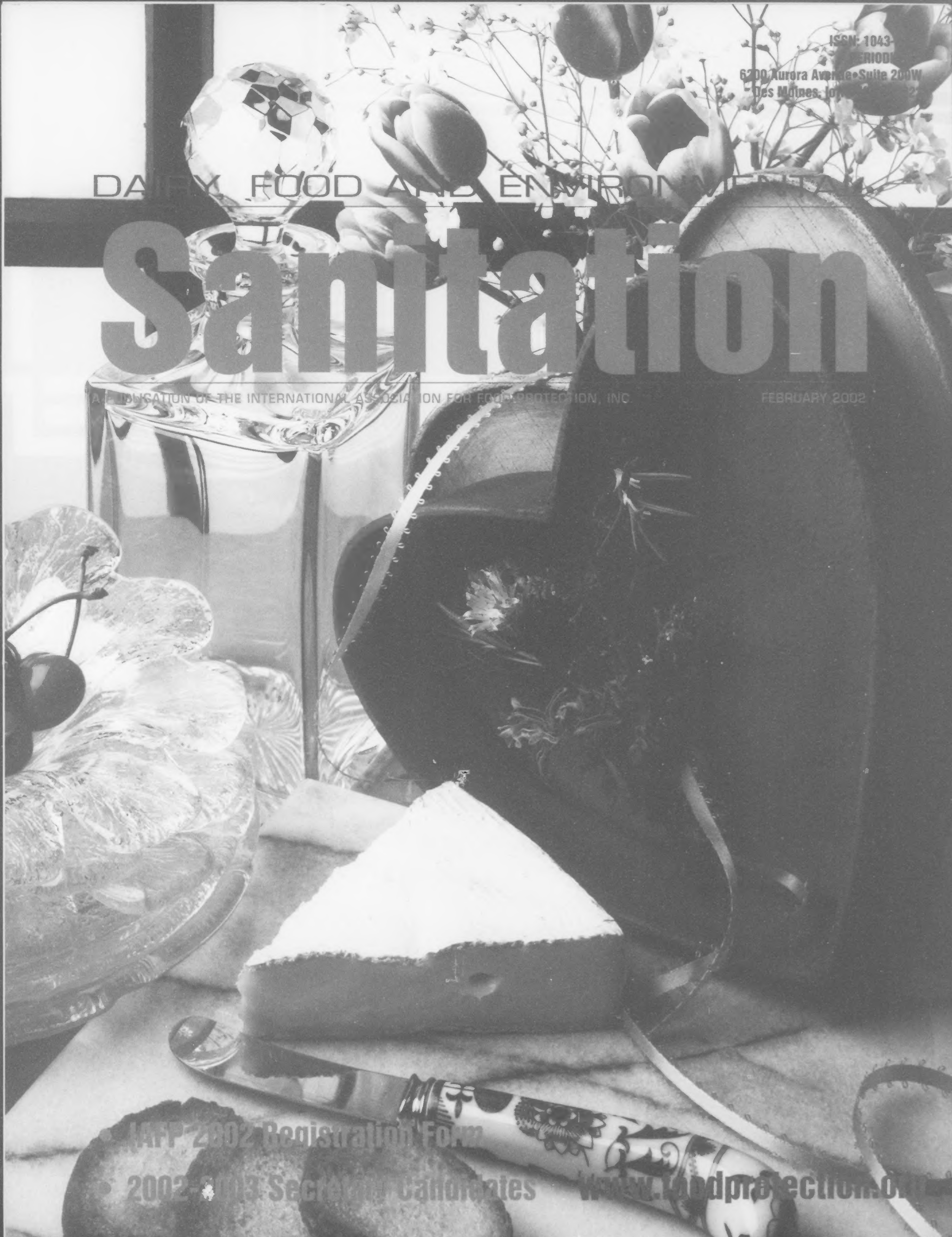
ISSN: 1043-
PERIODI
6200 Aurora Avenue•Suite 200W
Des Moines, Io

DAIRY, FOOD AND ENVIRONMENTAL
Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION, INC. FEBRUARY 2002



- IAFP 2002 Registration Form
- 2002-2003 Secretary Candidates

www.foodprotection.org

ABOUT THE COVER...

Photo courtesy of Photo Disc, The Painted Table, Signature Series 4, Volume 30.

Use of this photo does not imply endorsement of any product by the International Association for Food Protection.

DAIRY, FOOD AND ENVIRONMENTAL
Sanitation

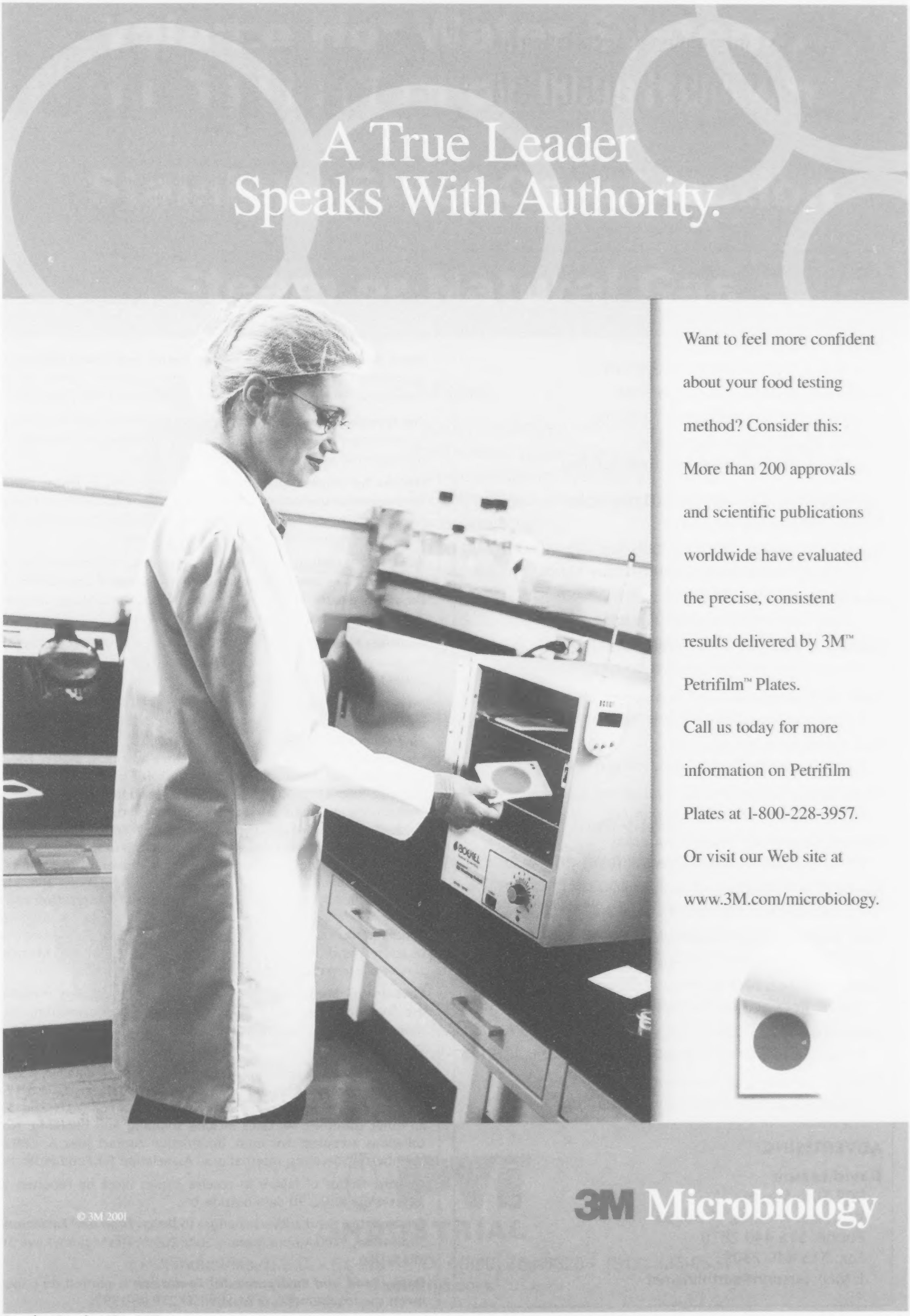
International Association for Food Protection

Articles

Association News

Departments

Extras


A True Leader
Speaks With Authority.
Want to feel more confident about your food testing method? Consider this: More than 200 approvals and scientific publications worldwide have evaluated the precise, consistent results delivered by 3M™ Petrifilm™ Plates.
Call us today for more information on Petrifilm Plates at 1-800-228-3957.
Or visit our Web site at www.3M.com/microbiology.
© 3M 2001
3M Microbiology

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

DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

Dairy, Food and Environmental Sanitation (ISSN-1043-3546) is published monthly beginning with the January number by the International Association for Food Protection, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2864, USA. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc., 911 N. Second Street, Ames, Iowa 50010, USA. Periodical Postage paid at Des Moines, Iowa 50318 and additional entry offices.

Manuscripts: Correspondence regarding manuscripts should be addressed to Donna A. Bahun, Production Editor, International Association for Food Protection.

News Releases, Updates, Coming Events and Cover Photos: Correspondence for these materials should be sent to Donna A. Bahun, Production Editor, International Association for Food Protection.

"Instructions for Authors" may be obtained from our Web site at www.foodprotection.org or from Donna A. Bahun, Production Editor, International Association for Food Protection.

Orders for Reprints: All orders should be sent to ***Dairy, Food and Environmental Sanitation***, International Association for Food Protection. Note: Single copies of reprints are not available from this address; address single copy reprint requests to principal author.

Reprint Permission: Questions regarding permission to reprint any portion of ***Dairy, Food and Environmental Sanitation*** should be addressed to: Donna A. Bahun, Production Editor, International Association for Food Protection.

Business Matters: Correspondence regarding business matters should be addressed to Lisa K. Hovey, Managing Editor, International Association for Food Protection.

Membership Dues: Membership in the Association is available to individuals. Dues include a 12-month subscription to ***Dairy, Food and Environmental Sanitation*** at a rate of \$90.00 US, \$100.00 Canada/Mexico, and \$115.00 International. Dues including ***Dairy, Food and Environmental Sanitation*** and the ***Journal of Food Protection*** are \$150.00 US, \$175.00 Canada/Mexico, and \$220.00 International. Student memberships are available with verification of student status. Student rates are \$45.00 US, \$55.00 Canada/Mexico, and \$70.00 International for ***Dairy, Food and Environmental Sanitation***; \$45.00 US, \$60.00 Canada/Mexico, and \$90.00 International for ***Journal of Food Protection***; and \$75.00 US, \$100.00 Canada/Mexico, and \$145.00 International for ***Dairy, Food and Environmental Sanitation*** and ***Journal of Food Protection***. All membership dues include shipping and handling. No cancellations accepted. Correspondence regarding changes of address and dues must be sent to Julie A. Cattanach, Membership Services, International Association for Food Protection.

Sustaining Membership: Three levels of sustaining membership are available to organizations. For more information, contact Julie A. Cattanach, Membership Services, International Association for Food Protection.

Subscription Rates: *Dairy, Food and Environmental Sanitation* is available by subscription for \$198.00 US, \$208.00 Canada/Mexico, and \$223.00 International. Single issues are available for \$26.00 US and \$35.00 all other countries. All rates include shipping and handling. No cancellations accepted. For more information contact Julie A. Cattanach, Membership Services, International Association for Food Protection.

Claims: Notice of failure to receive copies must be reported within 30 days domestic, 90 days outside US.

Postmaster: Send address changes to ***Dairy, Food and Environmental Sanitation,*** 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2864, USA.

Dairy, Food and Environmental Sanitation is printed on paper that meets the requirements of ANSI/NISO 239.48-1992.

Future Annual Meetings

IAFP 2002
June 30-July 3

Hyatt Regency
San Diego
San Diego, California

IAFP 2003
August 10-13

Hilton New Orleans Riverside
New Orleans, Louisiana

IAFP 2004
August 8-11

Marriott Desert Ridge Resort
Scottsdale, Arizona

DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

International Association for Food Protection

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

Sustaining Members

Sustaining Membership provides organizations and corporations the opportunity to ally themselves with the International Association for Food Protection in pursuit of Advancing Food Safety Worldwide. This partnership entitles companies to become Members of the leading food safety organization in the world while supporting various educational programs that might not otherwise be possible. Organizations who lead the way in new technology and development join IAFP as Sustaining Members.

Gold

Kraft Foods, Inc., Glenview, IL; 847.646.3678

Silver

F & H Food Equipment Co., Springfield, MO; 417.881.6114

Qualicon, A DuPont Subsidiary, Wilmington, DE; 302.695.2262

Silliker Laboratories Group, Inc., Homewood, IL; 708.957.7878

Weber Scientific, Hamilton, NJ; 609.584.7677

Sustaining

3-A Symbol Council, Cedar Rapids, IA; 319.286.9221

3M Microbiology Products, St. Paul, MN; 612.733.9558

ABC Research Corporation, Gainesville, FL; 352.372.0436

AgriLink Foods, Inc., Green Bay, WI; 920.435.5301

Anderson Instrument Co., Fultonville, NY; 518.922.5315

ASI Food Safety Consultants, Inc., St. Louis, MO; 314.725.2555

Audits International, Northbrook, IL; 847.480.9898

BD Diagnostic Systems, Sparks, MD; 410.316.4467

Bentley Instruments, Inc., Chaska, MN; 952.448.7600

BioControl Systems, Inc., Bellevue, WA; 425.603.1123

Biolog, Inc., Hayward, CA; 510.785.2564

bioMérieux, Inc., Hazelwood, MO; 800.638.4835

Capitol Vial, Inc., Tucson, AZ; 800.688.9515

Capitol Wholesale Meats, Chicago, IL; 773.890.0600

Celsis, Inc., Evanston, IL; 847.509.7600

Cogent Technologies, Ltd., Cincinnati, OH; 513.469.6800

DARDEN Restaurants, Inc., Orlando, FL; 407.245.5330

Dean Foods, Rockford, IL; 815.962.0647

Sustaining Members

Decagon Devices, Inc., Pullman, WA; 509.332.2756

Deibel Laboratories, Inc., Lincolnwood, IL; 847.329.9900

DiverseyLever, Sharonville, OH; 513.956.4873

DonLevy & Associates, Inc., Merrillville, IN; 219.736.0472

DSM Food Specialties, Menomonee Falls, WI; 262.255.7955

DQCI Services, Inc., Mounds View, MN; 763.785.0484

Dynal Biotech, Inc., Lake Success, NY; 800.638.9416

EM Science, Gibbstown, NJ; 856.423.6300

Ecolab, Inc., St. Paul, MN; 612.293.2364

Electrol Specialties Company, South Beloit, IL; 815.389.2291

Evergreen Packaging, Division of International Paper, Cedar Rapids, IA; 319.399.3236

FoodHandler, Inc., Westbury, NY; 800.338.4433

Food Processors Institute, Washington, D.C.; 800.355.0983

Food Safety Net Services, Ltd., San Antonio, TX; 210.384.3424

Foss North America, Inc., Eden Prairie, MN; 952.974.9892

GENE-TRAK Systems, Hopkinton, MA; 508.435.7400

IBA, Inc., Millbury, MA; 508.865.6911

International BioProducts, Inc., Bothell, WA; 425.398.7993

International Dairy Foods Association, Washington, D.C.; 202.737.4332

International Fresh-cut Produce Association, Alexandria, VA; 703.299.6282

Iowa State University Food Microbiology Group, Ames, IA; 515.294.4733

LabPlas Inc., Ste-Julie, Quebec, Canada; 450.649.7343

Marine BioProducts International, Delta, British Columbia, Canada; 604.523.2400

Matrix MicroScience Ltd., Cambridgeshire, UK; 44.1638.723110

Medallion Laboratories, Minneapolis, MN; 612.764.4453

Michelson Laboratories, Inc., Commerce, CA; 562.928.0553

Nasco International, Inc., Fort Atkinson, WI; 920.568.5536

National Food Processors Association, Washington, D.C.; 202.639.5985

Nelson-Jameson, Inc., Marshfield, WI; 715.387.1151

Neogen Corporation, Lansing, MI; 517.372.9200

Nestlé USA, Inc., Glendale, CA; 818.549.5799

NSF International, Ann Arbor, MI; 734.769.8010

Organon Teknika Corp., Durham, NC; 919.620.2000

Oxoid, Inc., Nepean, Ontario, Canada; 800.267.6391

Penn State University, University Park, PA; 814.865.7535

REMEL, Inc., Lenexa, KS; 800.255.6730

Rhodia Inc., Madison, WI; 800.356.9393

RidgeView Products, LLC, La Crosse, WI; 608.781.5946

Ross Laboratories, Columbus, OH; 614.624.3785

rtech™ laboratories, St. Paul, MN; 800.328.9687

Seiberling Associates, Inc., Dublin, OH; 614.764.2817

Seward Limited, London, United Kingdom; 44.0.181.365.4104

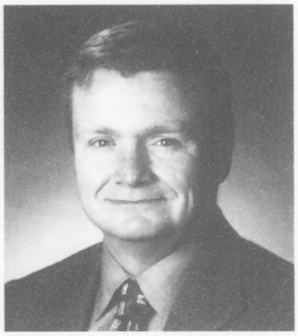
United Fresh Fruit & Vegetable Association, Alexandria, VA; 703.836.3410

Warren Analytical Laboratory, Greeley, CO; 800.945.6669

WestFarm Foods, Seattle, WA; 206.286.6772

Zep Manufacturing Company, Atlanta, GA; 404.352.1680

Postcards from Iowa



By JAMES DICKSON
President

"We should understand that what IAFP is all about is food protection"

Well, last month I asked for comments on the proposal to change the name of *Dairy, Food and Environmental Sanitation* (*DFES*) to *Applied Food Protection* (*AFP*). I have heard from few of you (just a very few) on this, and predictably the comments fell into one of two categories. Those who respond first usually have the strongest opinions. The first category could be summarized by the comment "YOU WANT TO DO WHAT!?!" This didn't surprise me, because people have very strong attachments to names, and what the names represent. I understand how some Members would think that changing the name of this Journal means that we are abandoning our commitment to dairy products, and foods and environmental issues. One Member made reference to those "darned microbiologists who think they are running everything" (he didn't say "darned" exactly, but you get the idea). Another said that we would alienate some of our Members, who would simply leave IAFP and go to NEHA. I am glad that these people did contact me with their thoughts, and I hope my response helped them to understand what the *DFES* Management Committee was thinking when they proposed the name change.

I think that we should understand that what IAFP is all about is food protection. And food protection includes everything from the sanitary design of milking equipment and milking parlors to hand washing by food service employees, and everything in between. To me, "applied food protection" includes all of this. If anything, I believe that the title *Applied Food Protection* incorporates this idea better than the title *Dairy, Food and Environmental Sanitation* does. Our intent is to be inclusive and not exclusive, and I personally believe that the proposed title accomplishes this.

I did get some comments that could best be summarized as: "Great idea!" Some of our Members who responded thought that the proposed new name for the Journal included more of the ideas of our organization. Some even said that they would be more likely to submit articles to the Journal, if we renamed it. They felt as if some of their comments would not have "fit" into *DFES*, but would fit into *AFP*. I encouraged them to submit an article to the Journal either way, as the content really isn't going to change. In many ways, it will still be the same Journal. We don't anticipate rejecting articles for publication because they don't seem to "fit" into one category or another. And along that line, I would like to encourage all of you to submit an article to the Journal, irrespective of what the name is. Bill LaGrange will be happy to have the extra work.

I do want the discussion on the proposed name change to continue. This is simply a proposal, brought forward by the *DFES* Management Committee. But I do want to reiterate what I said last month about the Management Committee being sincere and dedicated individuals, and they debated this extensively among themselves before they brought the proposal forward. Let's think about it.

And a quick note about the 2004 meeting. I know that seems like a long time off, but we really do have to work that far in advance. The meeting will be at the Marriott Desert Ridge Resort, Scottsdale, Arizona, August 8-11, 2004. This is a brand new resort property, and it should be very, very nice. And for those of you worried about the heat, bring your swimsuits and we'll meet in the pool!

Same time, next month.

$100,000

We reached our goal of $100,000 for the Foundation Fund, but we are not done yet. We want the Foundation to contine to grow and be able to support the IAFP mission. Your past support is appreciated; your future support is needed!

- Hamza Abu-Tarboush
- Ulf Ahlin
- Tom Angstadt
- Richard K. Arsenault
- Henry V. Atherton
- Michael B. Bayoud
- Harold Bengsch
- Reginald W. Bennett
- Dane Bernard
- Darrell Bigalke
- Wafa Birbari
- Isabel C. Blackman
- Derrick Blunden
- Bill Bodenhamer
- Tom Boufford
- Robert E. Brackett
- Michael H. Brodsky
- Robert W. Brooks
- Christine Bruhn
- John C. Bruhn
- Yashodhar Burgula
- Margaret Burton
- Melissa Caliechia
- Sid Camp
- Terry Carling-Kelly
- Barbara Cassens
- C. Dee Clingman
- Dean O. Cliver
- Scott Coates
- O. D. (Pete) Cook
- Joe Cordray
- J. De Smedt
- Juan F. DeVillena
- Dennis E. Decker
- R. H. Deibel
- Mimi Derry
- Warren Dorsa
- Deborah Drake
- F. Ann Draughon
- Michael L. Dunn
- Jin-Jia Fan
- Wilbur S. Feagan
- John L. Frank, Jr.
- Joseph Frank
- David D. Fry
- Santos Garcia-Alvarado
- Jock Gibson
- Kathleen A. Glass
- Kristen A. Goodfellow-Hunt
- Ronald H. Gough
- Robert B. Gravani
- Jane M. Griffith
- Randy L. Groff
- Jack Guzewich
- Paul A. Hall
- Linda J. Harris
- Harry Haverland
- Gordon Hayburn
- Stephen J. Heim
- Virginia N. Hillers
- Richard Holley
- Archie Holliday
- Jeff Howard
- Karen D. Huether
- William Huntley
- Kenji Isshiki
- LeeAnne Jackson
- Beth M. Johnson
- Fumiko Kasuga
- Azadeh Khojasteh
- Hyun Uk. Kim
- Jeong-Weon Kim
- Joo-Sung Kim
- Thomas P. Krugman
- William LaGrange
- Anna M. Lammerding
- Gisele LaPointe
- Frank P. Leonardo
- Priscilla Levine
- Ernst Luecker
- Ricardo Fabian Luna
- Elizabeth A. MacDougall
- Robert T. Marshall
- Keith Martz
- Carolyn Mayerhauser
- Shelagh McDonagh
- Douglas McDougal
- Lynn McMullen
- Nancy E. Nagle
- Gabriela Najera-Sanchez
- M. Nazarowec-White
- Christopher B. Newcomer
- Jun Nishibu
- Servé Notermans
- Richard Obiso
- Maria T. Ortega
- Anthony T. Pavel
- Efrem Pesyna
- Helen M. Piotter
- Constantinos Piroccas
- Mark Pratt
- Charles Price
- James F. Price
- Kenneth R. Priest
- Gale Prince
- Kailash S. Purohit
- K. T. Rajkowski
- Lars B. Rasmussen
- Stuart J. Ray
- Lawrence W. Reid
- C. M. Robilliard
- Atsushi Sakata
- Elaine Santi
- Carol A. Sawyer
- Allen R. Sayler
- Joseph E. Schlesser
- Jenny Scott
- Isao Shibasaki
- Lori K. Simon
- Chris Smith
- Joseph M. Smucker
- Sue Snider
- O. Peter Snyder
- Nikolaos D. Soultos
- William H. Sperber
- D. Wayne Sprung
- Joseph Stamer
- Grace E. Steinke
- Nobumasa Tanaka
- Peter J. Taormina
- David W. Tharp
- Donald W. Thayer
- Ewen Todd
- Bruce Tompkin
- Cayce Warf
- Fred Weber
- Ronald Weiss
- Mizuo Yajima
- Ruth K. Yong
- George K. York
- Tsz-Ching J. Yuan
- Richard Ziprin
- Palmer D. Zottola

- California Association of Dairy and Milk Sanitarians
- Florida Association for Food Protection
- Georgia Association of Food and Environmental Sanitarians
- Associated Illinois Milk, Food and Environmental Sanitarians
- Ontario Food Protection Association
- Texas Association for Food Protection
- Kraft Foods, Inc.
- Walt Disney World Company

International Association for Food Protection.

The above list represents individual contributors to the Association Foundation Fund during the period Sept. 1, 2000 through Nov. 30, 2001. In addition, a portion of the Sustaining Member dues are allocated to support this Fund. Your contribution is welcome. Call the Association office at 800.369.6337 or 515.276.3344 for more information on how you can support the Foundation.

COMMENTARY

From the Executive Director

By DAVID W. THARP, CAE
Executive Director

"We look forward to seeing you at IAFP 2002"

As we progress through the winter months and look forward to spring, then summer, plans are rapidly advancing for IAFP 2002 in San Diego. We hope that you have reserved the dates June 30 to July 3 to be with us at the 89th Annual Meeting. This month, in addition to giving an update about IAFP 2002, I want to bring to your attention the Secretary election that is now underway. Let's cover the election first, and then come back to IAFP 2002.

In this issue of *DFES*, our candidates for Secretary are announced on page 118 where you will also find their biographical sketches. We have always been fortunate to attract willing Secretary candidates with the highest of ethics and dedication to the Association. This election is no exception. The candidates are J. Stan Bailey and Jeffrey M. Farber. Both Stan and Jeff have been long-time Members of IAFP and have been highly active in their support of the Association.

It may be helpful to you for me to explain the election process. Ballots were mailed to all voting Members on February 1. Your completed ballot must be received at the Association office not later than March 22 to be considered valid. Other instructions are included with the ballot so be sure to follow the instructions. The most important instruction is to carefully review the candidate's biographical information when making your voting decision.

Your sealed ballot will be forwarded to the IAFP Teller, Lloyd Bullerman for opening and counting. Election results will be announced in the May issue of *DFES* and will be available at the IAFP Web site toward the end of April. We look forward to the election of either Stan or Jeff to serve on the Executive Board and we know we can be assured that the other will continue to be active in IAFP in many ways! Best of luck to both candidates!

Now for an update on IAFP 2002. On page 156 of this issue, registration information and an attendee registration form appears. Be sure to make your hotel reservations early to be assured of a room at the host hotel, the Hyatt Regency on San Diego Bay. Also, you may take advantage of our secure, online meeting registration at the IAFP Web site.

At the time this issue went to press, we only had proposed symposium topics for your review (presented on page 153), but as always, you may check the IAFP Web site for the most up-to-date program information. By the time this issue reaches you, accepted symposia and technical presentation titles will be available at www.foodprotection.org.

The Program Committee, under the direction of Frank Yiannas from Walt Disney World, met in mid-January to review submitted technical presentations and proposed symposia. This Committee works many hours before, during and after the actual two-day Committee meeting to bring together the program content for our Annual Meeting.

This year we received a record number of technical submissions, which meant an extra burden for each Committee member. By the end of the two-day meeting, the Program Committee has reviewed all abstracts and accepted or rejected them, categorized them into similar topics for presentation, arranged program presentations for all three days, analyzed the program for possible speaker time conflicts and agreed upon the preliminary program. It is an astonishing process to watch from beginning to end and is truly what makes the IAFP Annual Meeting shine!

We owe so much to the Program Committee for their hard work and dedication. Without the commitment of these individuals and the willingness of their employers to allow them to volunteer their time, it would be impossible to put together a program for IAFP 2002. We want to say, "Thank you!" to the entire Committee.

In addition to the program planning, our staff has planned events to provide social opportunities for you at IAFP 2002. The Opening Reception will take place Sunday evening in the Exhibit Hall immediately following the Opening Session and the Ivan Parkin Lecture. On Monday evening, don't miss the Social at the World Famous, San Diego Zoo. The Zoo will be open for our exploration after enjoying dinner in a private area. This is sure to be a night to remember! Tuesday night remains open for your enjoyment followed on Wednesday with the Annual Awards Banquet.

Besides the evening events, daytime tours are planned for companions to see San Diego by land and by sea, to visit La Jolla and to see behind the scenes at the Wild Animal Park. On Saturday, we have a special tour planned to visit Temecula Valley Wine Country, so be sure to bring your spouse, your family or a friend along to enjoy these tours and the San Diego area. Our hotel, the Hyatt Regency, provides beautiful views of San Diego Bay, is adjacent to Seaport Village restaurants and shopping and is a short walk to the historic Gaslamp Quarter providing more dinning, shopping and nighttime entertainment.

Lastly, we want to point out that this year we will have a room available for retired Members to gather for conversation and games. As a result of a recommendation from the Past Presidents' Committee, there will be a room set aside for this type of social interaction. If you are a retired Member, we want you to know that you are always welcome to attend the Annual Meeting and we hope that this special room will provide another appealing benefit to your attendance at the Annual Meeting.

We look forward to seeing YOU at IAFP 2002 this summer!

Dairy, Food and Environmental Sanitation, Vol. 22, No. 2, Pages 102-108

Antimicrobial Treatment of Air Chilled Broiler Carcassses

Acidified Sodium Chlorite Antimicrobial Treatment of Air Chilled Broiler Carcasses

K. R. Schneider,[1*] G. Kere Kemp,[2] and M. L. Aldrich[2]
[1]University of Florida, Department of Food Science & Human Nutrition, Gainesville, FL 32611;
[2]Alcide Corporation, 8561 154th Avenue NE, Redmond, Washington 98052

SUMMARY

An acidified sodium chlorite (ASC) solution was investigated for its effects on air-chilled broiler carcasses. Of particular interest was the ability of ASC to reduce natural microbial load without leaving residues or altering the taste or visual appearance of the chicken before and after cooking.

Broiler carcasses were sprayed or dipped in the citric acid-activated ASC solution (1200 ppm) and then air chilled for three hours. Carcasses that were not treated with ASC prior to air chilling served as controls. ASC treatment was shown to be an effective means of reducing naturally occurring microbial contamination. The dipping technique resulted in the largest reductions in bacterial levels compared with untreated product. The ASC treated carcasses were free of chlorite-related residues and showed no significant oxidative, visual, or taste-related detrimental changes.

A peer-reviewed article.

*Author for correspondence: Phone: 352.392.1991;
Fax: 352.392.9467; E-mail: krschneider@mail.ifas.ufl.edu

INTRODUCTION

The need to reduce naturally occurring bacterial contaminants present on poultry has become a topic of concern to many in the food industry. Disinfection methods for poultry carcasses must be effective against a variety of organisms such as *Escherichia coli* (*E. coli*), *Salmonella*, *Pseudomonas*, Enterobacteriaceae, *Campylobacter*, and *Listeria*. In addition, it is imperative that treated poultry be within compliance regarding indirect food additive residues pursuant to the approval granted to acidified sodium chlorite (Sanova™. Registered trademark of Alcide Corporation, Redmond, WA) *(2)*.

In the United States, hydro cooling with chlorine sanitizers is currently used in an attempt to reduce the microbial load of processed poultry. The carcasses are hydro cooled at 4°C for approximately 90 minutes in re-circulating water tanks containing low levels of chlorine (20-50 ppm). Alternatively, in Europe and in Canada poultry may be processed by air chilling for 2 to 3 hours without the use of a sanitizer. The hydro cooling procedure alone has been reported to reduce aerobic plate counts (APC) and *E. coli* colony counts *(9)* by 0.25 and 0.59 $\log_{10}$ CFU/ml, respectively *(8)* and hydro cooling with chlorine, combined with air chilling, produced bacterial reductions of 1.0 to 1.5 $\log_{10}$ CFU/ml for *E. coli, Campylobacter*, and *Salmonella (16)*. Studies suggest that the current practice of adding chlorine to the chiller water may not be particularly effective in reducing bacterial loads. In a study by James et al. *(8)*, little difference was noted in the prevalence of bacteria on poultry carcasses at various steps in the processing cycle; the APC and *E. coli* were reduced by only 0.59 and 0.84 $\log_{10}$ CFU/ml from pre-chill to post-chill in studies where chlorine was utilized. Furthermore, original or greater bacterial titers of all three groups of microorganisms (*E. coli, Campylobacter*, and *Salmonella*) were found on the carcasses by the time of further processing later the same day. Both handling and carcass-to-carcass contact were hypothesized as the cause for pre-chill to post-chill cross-contamination.

Recently, the effectiveness of a number of other disinfection techniques to decrease bacterial loads of processed poultry has been explored. Procedures investigated include treatments with lactic acid *(7)*, hydrogen peroxide *(6)*, trisodium phosphate (TSP) *(3, 4, 12)*, Avgard® (Rhodia, Cranbury, NJ), and cetylpyridinium chloride *(17)*. Lactic acid has been demonstrated to be an effective antimicrobial agent, but only at high concentrations (i.e., 4.25%) over sustained periods of time, and these conditions may require rinsing of the meat before packaging *(8)*. Both lactic acid and hydrogen peroxide have been shown to produce deleterious color and texture changes in poultry at the levels tested *(3, 6)*. TSP is approved by the United States Department of Agriculture (USDA)/ Food Safety and Inspection Service (FSIS) as a generally regarded as safe (GRAS) antimicrobial treatment for raw poultry *(1)*. TSP has been shown to adequately remove a variety of bacteria on poultry carcasses as well as surface materials as found in poultry processing facilities *(14)*. TSP, is reported however, to be ineffectual against contamination by some species of *Salmonella (7, 8)*.

Avgard™ and cetylpyridinium chloride are effective antimicrobial agents. Both compounds act not only as inhibitors of bacterial metabolism but also as physical agents that remove lipids from the skin, thus allowing the stripping away of contaminants *(3, 17)*. However, these antimicrobials, however, have been studied only as late-stage post-chill disinfectants. In addition, the possible presence of residues following Avgard™ and cetylpyridinium chloride treatment has not been addressed in the literature. Another factor to be considered is the environmental impact of the chemical compounds being used. Recently, a trend in the poultry industry has been away from the use of phosphates, such as TSP and Avgard™, which have come under fire as tighter regulations regarding release of phosphates into the environment have been developed.

The use of acidified sodium chlorite (ASC) activated by citric acid (CA) may provide an effective alternative to other methods of bacterial decontamination of poultry carcasses. Treatment with ASC is a commercially available pre-chill procedure that intervenes early in the processing cycle to reduce microbial bio-burden and minimize the problems with cross-contamination that are commonly seen in poultry processing plants *(15)*. When applied continuously on-line as a component of a procedure for handling of fecal-and ingesta-contaminated poultry, ASC has also been shown to have a significant impact on the microbial quality of severely contaminated carcasses *(11)*.

In this study, two different types of ASC exposures, spray and immersion dip, each followed by air chilling, were tested to determine their efficacy in reducing the natural microbial load of poultry carcasses. Chlorite-related residue levels, tissue oxidation, and sensory changes in ASC-treated carcasses relative to those of untreated carcasses were also examined.

MATERIALS AND METHODS

The study was conducted at the University of Arkansas Poultry Science Center's pilot slaughter facility in Fayetteville, AR. Eviscerated broiler carcasses from 42-day-old male and female chickens were obtained from a local slaughterhouse immediately after inside-outside-bird-wash (IOBW) and before chilling. The carcasses were selected for standard size (1.5-2.0 kg) and lack of obvious defects. Collection, transport, and storage prior to treatment required a maximum of 1 hour and 45 minutes, during which time the carcasses were held at ambient room temperature, approximately 20°C. Prior to processing, the carcasses were shackled in groups of 5, 7, or 10.

Prior to the study, each carcass received a 5 s water wash by use of a hand-held hose pressurized to 60-80 psi that delivered approximately 17 l of water per min at ambient tap temperature. This wash was used to remove any serum exudate or other organic matter that may have accumulated on the interior and exterior surfaces of the carcass during collection and transport. After washing, the carcass was inverted for approximately 30 s to remove water that had accumulated within the body cavity.

ASC preparation

All ASC solutions were prepared by mixing 3.03% sodium chlorite (Vulcan, lot # DDGH2303, 80%, Tech Grade)/50.0% citric acid(Spectrum, lot # LK0212, FCC Grade) and tap water to a final concentration of 1200 ppm. Other than the minute amount of chlorine (<1 ppm) present in the hose rinse and tap water, the carcasses were not exposed to any additional antimicrobial agents.

Treatment groups

Following the preparation of the carcasses, each was randomly assigned to one of three treatment groups:

T1–control group. Carcasses in this group received no antimicrobial treatment and were air chilled for 3 hours at 2°C.

T2–sprayed treatment group. Carcasses in this group were sprayed with 150 ml of a 1200 ppm ASC solution after by a 30 s dwell time, they were air chilled for 3 hours at 2°C.

T3–dipped treatment group. Carcasses were immersed for 5 seconds in a dip consisting of 1200 ppm ASC solution. After a 30 s dwell time, and they were air chilled for 3 hours at 2°C.

Air chilling

Following treatment, the carcasses were loaded on mobile hanging racks or grill trays and placed inside a walk-in air chiller, the internal temperature of which maintained at 2°C. Air circulation was achieved inside the chiller by the continuous operation of cooling fans.

Analyses

Pre-treatment, post-chilling, and/or post-cooking rinse samples were collected from carcasses. These samples were tested for microbial load and residual levels of chlorite, chlorate and chloride. Raw and cooked meat samples were tested for oxidative and sensory changes.

Following air chilling, 40 rinse samples were obtained for microbiological analysis using the whole carcass rinse method of Cox et al. *(10)*. Each carcass was rinsed in a plastic collection bag containing 400 ml of peptone-buffered saline solution with 0.1% sodium thiosulfate (Sigma, P.O. Box 14508, St. Louis, MO 63178: lot#66H0293). Rinse samples were then transferred to sterile bottles that were placed in insulated containers containing crushed ice. The bottles remained in the insulated containers during transport and storage at the University of Arkansas microbiology laboratory prior to initiation of analysis on the same day.

All rinse samples were prepared and plated for aerobic plate count (APC), total coliform count, and *Escherichia coli* count by use of Petrifilm, (3M Center, St. Paul, MN 55144; part #6406 (total APC), part #6404 (*E. coli* and total coliforms) in accordance with the manufacturer's instructions. Qualitative *Salmonella* analyses were also conducted *(5)*.

Chemical analysis

Oxidative Changes. Thiobarbituric acid analyses (TBA) *(13)* conducted by ABC Research Corporation, (ABC Research Corporation, 3437 SW. 24th Ave., Gainesville, FL 32607) were used to determine evidence of oxidative changes in 15 raw and 15 cooked meat samples. Five raw and cooked carcasses from each treatment group were sampled. Each sample consisted of a single deboned thigh-leg quarter. The sample was ground in a commercial food processor and duplicate 3.0 g samples were used for analysis.

Residues. ABC Research Corporation, conducted analyses for chlorite, chlorate, and chloride residues (EPA method 300.1) utilizing a Dionex Ion Chromatograph with a straight conductivity detector (Dionex, 470-D Lakeside Drive, Sunnyvale, CA 94088). Five raw and cooked carcasses from each treatment group were sampled. Each carcass was placed in a 400 ml plastic bag with 100 ml distilled water and the sample was shaken for 60 s to rinse the inside and outside of the carcass. Ninety-nine ml of rinsate was transferred to a glass sample container with 1.0 ml of a 0.5% ethylenediamine solution as preservative to yield a final concentration of 50 mg/l in the final solution. This solution was then stored at 4°C prior to analysis.

Sensory. Samples from 21 poultry carcasses were evaluated for sensory changes by 10 to 12 experienced panelists. Fifteen post-air chill carcasses (5 from each group, T1, T2 and T3) were visually examined and graded for appearance and color. The 15 post-air chill carcasses and 5 carcasses from a local store were also compared after they were broiled to a minimum internal temperature of 160°F. Cooked samples were evaluated for appearance, color, odor, taste, and overall acceptability by use of a 7-point scale (6 = excellent, 0 = unacceptable).

Statistical analysis

Analysis of the microbiological data was conducted with on SAS software (Cary, NC) using a Gen-

TABLE 1. Summary of ASC antimicrobial performance ($\log_{10}$ CFU/ml)

	T1 (n=40) UNTREATED Air chilled 3 hr at 2°C	**T2** (n=18) ASC SPRAYED Air chilled 3 hr at 2°C	**T3** (n=20) ASC IMMERSION DIP Air chilled 3 hr at 2°C
Total aerobic plate count			
Pre-treatment	2.92(0.37)^{a}	NA	NA
Post-air chill	2.65(0.35)^{a}	2.04(0.27)^{b}	2.01(0.64)^{b}
Reduction vs. T1 pre-treatment	0.27	0.88	0.91
Reduction vs. T1 post air-chill	NA	0.61	0.65
Total coliform plate count			
Pre-treatment	1.22(0.48)^{a}	NA	NA
Post-air chill	1.05(0.61)^{a}	0.25(0.39)^{b}	0.09(0.15)^{b}
Reduction vs. T1 pre-treatment	0.17	0.98	1.13
Reduction vs. T1 post air-chill	NA	0.80	0.96
***E. coli* plate count**			
Pre-treatment	1.37(0.40)^{a}	NA	NA
Post-air chill	1.21(0.46)^{a}	0.69(0.35)^{b}	0.16(0.24)^{c}
Reduction vs. T1 pre-treatment	0.16	0.68	1.21
Reduction vs. T1 post air-chill	NA	0.52	1.05

NA = not applicable

^{a,b,c}Same superscripts within rows indicate no significant difference at $P<0.05$

Values in parentheses = standard deviation

eral Linear Model procedure and Duncan's Multiple Range test that controls for Type 1 comparison-wise errors but not experiment-wise errors. A $P < 0.05$ was considered significant.

RESULTS

Analysis of plate counts (table 1) from the microbiological analysis showed that both spray and immersion dip ASC treatments significantly ($P < 0.05$) reduced the natural populations of total aerobes, total coliforms, and *E. coli*, compared with levels found either pre-ASC treatment or on post-air chilled carcasses. Spraying with ASC reduced both the total aerobic plate counts and total coliforms by 0.75 $\log_{10}$ CFU/ml. The dipping technique utilizing ASC produced slightly greater reductions (approximately 1.0 $\log_{10}$ CFU/ml) for the same organisms. The final residual populations of *E. coli* recovered from the ASC carcasses were found to be 0.69 and 0.16 $\log_{10}$ CFU/ml for spray and dip applied solutions, respectively.

Post-air chill levels of total aerobics, total coliforms, and *E. coli* in the control carcasses did not differ significantly from the pre-air chill levels, indicating that chilling had no antibacterial effect, Interestingly, *Salmonella* spp. were not found in any rinse samples from either experimental or control carcasses.

TBA analyses of the post-air chill carcasses from the ASC treatment group showed evidence of an oxidative effect in the raw chicken (table 2). A slight visual change in skin color immediately post-treatment was noted in both the spray and the dip treated carcasses, al-

TABLE 2. Summary of thiobarbituric acid analyses of raw and cooked chicken

	T1 UNTREATED Air chilled 3 hr at 2°C	T2 ASC SPRAYED Air chilled 3 hr at 2°C	T3 ASC IMMERSION DIP Air chilled 3 hr at 2°C
Raw Chicken			
Mean (mg/kg)	0.2094	0.5708	0.8284
+/- SD	0.1263	0.1124	0.3340
Cooked Chicken			
Mean (mg/kg)	5.5880	5.7040	5.7300
+/- SD	0.0409	0.0503	0.1010

n=5

TABLE 3. Summary of chloride, chlorate, chlorite analyses of raw and cooked chicken

	T1 Untreated / Air chilled 3 hr at 2°C			T2 ASC Sprayed / Air chilled 3 hr at 2°C			T3 ASC Immersion / Dip Air chilled 3 hr at 2°C		
	Chloride	**Chlorate**	**Chlorite**	**Chloride**	**Chlorate**	**Chlorite**	**Chloride**	**Chlorate**	**Chlorite**
Raw Chicken									
Mean (ppm)	584.10	0.10	0.10	602.12	0.10	0.10	439.02	0.10	0.10
+/- SD	83.66	0.00	0.00	116.88	0.00	0.00	120.59	0.00	0.00
Cooked Chicken									
Mean (ppm)	531.66	0.10	0.10	523.04	0.10	0.10	529.70	0.10	0.10
+/- SD	104.08	0.00	0.00	197.27	0.00	0.00	155.67	0.00	0.00

though this effect (whitening of the skin surface) was not detectable after cooking. No morphological alterations were observed in the underlying muscle or fatty tissues of the ASC-treated carcasses during sensory testing.

Neither chlorate nor chlorite residues were detected (at a limit of detection of 0.10 ppm) in any of the treatment groups after chilling or cooking. Residual chloride levels varied between treatments for both raw and cooked carcasses. However, because the variability within each treatment group was large, chloride levels between treatments did not differ significantly.

Table 4 summarizes the appearance and color data for the sensory testing of the raw carcasses. The control carcasses scored higher (i.e., appearance was very good-to-excellent; color was good-to-very good) than did either of the ASC treatment groups. The dip-treated carcasses had lower average scores (i.e., appearance was fair-to-good; color was fair-to-good) than the spray-treated carcasses (i.e., appearance was good-to-very good; color was good-to-very good).

Table 5 shows the results of sensory evaluations of the carcasses following cooking for the three treatment groups as well as for five carcasses purchased from a local grocery. All treatment groups scored in the good-to-very good category across all the evaluation parameters. Of the four groups, the locally purchased carcasses presented the highest overall score. The ASC-treated and control groups had similiar overall scores, indicating that ASC plus air chilling did not detrimentally affect the sensory properties of the carcasses.

TABLE 4. Summary of sensory test results of raw chicken

		T1 Untreoted / Air-chilled 3 hr ot 2°C	T2 ASC Sprayed / Air-chilled 3 hr at 2°C	T3 ASC Immersion Dip / Air-chilled 3 hr at 2°C
Appearance	Mean	5.14	4.58	3.74
	+/- SD	0.23	0.31	0.13
Color	Mean	4.86	4.12	3.42
	+/- SD	0.22	0.16	0.11

n=15

Scale: 6 = excellent; 5 = very gaad; 4 = gaad; 3 = foir; 2 = poor; 1 = very paor; 0 = unocceptoble

TABLE 5. Summary of sensory test results of cooked chicken

		T1 Untreoted Air-chilled 3 hr ot 2°C	T2 ASC Sproyed Air-chilled 3 hr at 2°C	T3 ASC Immersion Dip Air-chilled 3 hr at 2°C	Gracery Store
Appearance	Meon	4.80	4.70	4.62	4.92
	+/- SD	0.24	0.23	0.25	0.13
Color	Meon	4.82	4.84	4.68	4.90
	+/- SD	0.04	0.38	0.33	0.12
Texture	Meon	4.40	4.54	4.62	4.84
	+/- SD	0.25	0.23	0.19	0.28
Aroma	Meon	4.52	4.48	4.42	4.80
	+/- SD	0.15	0.24	0.22	0.19
Flavor	Meon	4.36	4.42	4.50	4.80
	+/- SD	0.09	0.28	0.16	0.20
Overall	Meon	4.40	4.34	4.52	4.80
	+/- SD	0.19	0.33	0.08	0.10

n=15

Scole: 6 = excellent; 5 = very good; 4 = good; 3 = fair, 2 = poor; 1 = very paor; 0 = unocceptoble

DISCUSSION

A recently developed disinfecting technique utilizing acidified sodium chlorite (ASC) activated by citric acid (CA) was examined to determine its efficacy in an air-chill post-slaughter process. This study tested the efficacy of two different types of ASC exposures (spray and immersion dip) in reducing the microbial load of carcasses. Also examined were chlorite-related residue levels, tissue oxidation, and sensory changes in ASC-treated carcasses compared with untreated control carcasses.

Air chilling is the standard method for decontamination of poultry carcasses in Europe, where no disinfectants are used. In this study, the application of ASC to carcasses prior to air chilling was shown to significantly reduce ($P < 0.05$) the bio-burden of total aerobes, total coliforms, and *E. coli*. It should be noted that the microbial reductions seen in this study reflect decreases in natural microflora, not artificially inoculated laboratory cultures. The ASC effects on bacterial populations were significant ($P < 0.05$) in a setting that mimicked the actual conditions seen in an air-chilled poultry processing plant.

Poultry carcasses treated with ASC, either by spray or dip immersion, were not adversely affected. TBA analysis of the poultry following air chilling showed no evidence of oxidative changes in the cooked meat. Unlike the physical and sensory effects of treatment with chlorine, organic acids, or phosphates, the whitening effect of the acidified chlorite was shown to be both slight and transient. Sensory analysis showed that a change in poultry skin color did not correlate to a noticeable change in meat texture or aroma. Additionally, the change in skin color was not evident following oven cooking.

Little has been published regarding the presence of residual by-products of carcass decontamination. This study demonstrates that treatment with ASC results in a significant reduction of background microflora on poultry carcasses without detectable chemical residues. Post-treatment levels of chlorite, chlorate, or chloride did not vary from the same values for the control samples.

In summary, the data suggest that use of ASC may provide an alternative to current methods of bacterial decontamination for air-chilled poultry carcasses. ASC was shown to decrease cross-contamination without leaving residues or altering the taste or visual appearance of the chicken after cooking.

REFERENCES

1. Anonymous. 1996. Use of trisodium phosphate on raw, chilled poultry carcasses. Code of Federal Regulations, 9 CFR Part 381, 21 CFR 182.1778. Office of the Federal Register. U.S. Government Printing Office. Washington, D.C.
2. Anonymous. 1998. Secondary direct food additives permitted in food for human consumption—acidified sodium chlorite solutions. Code of Federal Regulations, 21CFR 173.325. Office of the Federal Register. U.S. Government Printing Office. Washington, D.C.
3. Bautista, D. A., N. Sylvester, S. Barbut, and M. W. Griffiths. 1997. The determination of efficacy of antimicrobial rinses on turkey carcasses using response surface designs. Int. J. Food Microbiol. 34:279-292.
4. Coppen, P., S. Fenner, and G. Salvat. 1998. Antimicrobial efficacy of AvGard carcass wash under industrial processing conditions. Br. Poult. Sci. 39:229-234.
5. Cox, N. A., J. E. Thomson, and J. S. Bailey, 1983. Procedure for the isolation and identification of *Salmonella* from poultry carcasses. United States Department of Agriculture, Agriculture Research Service. Washington, D.C.
6. Fletcher, D. L., S. M. Russell, J. M. Walker, and J. S. Bailey. 1993. An evaluation of a rinse procedure using sodium bicarbonate and hydrogen peroxide on the recovery of bacteria from broiler carcasses. Poultry Sci. 72:2152-2156.
7. Izat, A., M. Colberg, R. Thomas, M. Adams, and C. Driggers. 1990. Effects of lactic acid in processing waters on the incidence of *Salmonellae* on broilers. J. Food Quality 13:295-306.
8. James, W. O., R. L. Brewer, J. C. Prucha, W. O. Williams. and D. R. Parham. 1992. Effects of chlorination of chill water on bacteriologic profile of raw chicken carcasses and giblets. J. Am. Vet. Med. Assoc. 200:60-63.
9. James, W. O., W. O. Williams, Jr., J. C. Prucha, R. Johnston, and W. Christensen. 1992. Profile of selected bacterial counts and *Salmonella* prevalence on raw poultry in a poultry slaughter establishment. J. Am. Vet. Med. Assoc. 200:57-59.
10. Kemp, G. K., Aldrich, M. L., Guerra, M. L. and Schneider K. R. 2001. Continuous online processing of fecal- and ingesta-contaminated poultry carcasses using an acidified sodium chlorite antimicrobial intervention. J. Food Prot. 64:807-812.
11. Kemp, G. K., M. L. Aldrich, and A. L. Waldroup. 2000. Acidified sodium chlorite antimicrobial treatment of broiler carcasses. J. Food Prot. 63:1087-1092.
12. Morrison, G. J., and G. H. Fleet. 1985. Reduction of *Salmonella* on chicken carcasses by immersion treatments. J. Food Prot. 48:939-943.
13. Rose, B. E. 1998. Isolation and identification of *Salmonella* from meat, poultry, and egg products, 3rd ed., chap. 4 in USDA Microbiological Laboratory Guidebook.
14. Somers, E. B., J. L. Schoeni, and A. C. Wong. 1994. Effect of trisodium phosphate on biofilm and planktonic cells of *Campylobacter jejuni*, *Escherichia coli* O157:H7, *Listeria monocytogenes* and *Salmonella* typhimurium. Int. J. Food Microbiol. 22:269-276.
15. Turner, E. W., W. D. Paynter, E.J. Montie, M. W. Bessert, G. M. Struck, and F. C. Olson. 1954. Use of 2-Thiobarbituric Acid Reagent to Measure Rancidity in Frozen Pork. Food Technol. 8:326-330.
16. Waldroup, A. 1999. University of Arkansas, Department of Poultry Science, Fayetteville, Arkansas 72701. (personal communication).
17. Yang, Z., Y. Li, and M. Slavik. 1998. Use of antimicrobial spray applied with an inside-outside birdwasher to reduce bacterial contamination on prechilled chicken carcasses. J. Food Prot. 61:829-832.

This is Florida Agricultural Experiment Station Journal Series Number R-08239.

Dairy, Food and Environmental Sanitation, Vol. 22, No. 2, Pages 109-116

Modified Atmosphere Packaging of Cooked Rice and Its Standard Plate Count

Anne C. Chu,[1] Ramses B. Toma,[1]* Wendy Reiboldt,[1] and TeY. Sheu[2]
[1]California State University, Long Beach, Dept. Food Science, 1250 Bellflower Blvd., Long Beach, CA 90840, USA
[2]6655 S. Garfield Ave., Bell Gardens, CA 90201, USA

SUMMARY

This study investigated the effect of modified atmosphere packaging (MAP) on standard plate counts (SPC) of a cooked rice product (with added cooked eggs, carrots, peas and spices) stored at two temperatures (2° and 9°C). Gaseous atmospheres of five different compositions (100% air, 100% CO_2, 80% N_2 + 20% CO_2, 50% N_2 + 50% CO_2, and 100% N_2) were flushed into packages. Microbiological and chemical analyses were conducted over eight storage periods (0, 5, 9, 12, 14, 17, 19, and 21 days).

Storage temperature and gaseous atmosphere composition were important factors in suppressing microbial growth. In samples stored for the same period of time, SPC was significantly increased by an increase in storage temperature and was altered by changes in gaseous atmosphere composition. Early signs of spoilage occurred in samples stored at the higher temperature (9°C) for each gaseous composition.

The inhibitory effect of CO_2 on SPC was more pronounced at 9°C than at 2°C. CO_2 levels above 20% were effective in controlling microbial growth. During storage, SPC increased as the environment became more acidic.

The success of MAP in delaying spoilage of the rice product relied on proper storage temperature and gaseous atmosphere. Samples packaged in 80% N_2 + 20% CO_2 and stored at 2°C were the last to spoil.

A peer-reviewed article.

*Author for correspondence: Phone: 562.985.4497; Fax: 562.985.4414; E-mail: rtoma@csulb.edu

TABLE 1. Various MAP gas compositions in cooked rice* products

Treatment	Gas Composition	Storage Temperature**
1	100% air	2°C
2	100% N_2	2°C
3	80% N_2 : 20% CO_2	2°C
4	50% N_2 : 50% CO_2	2°C
5	100% CO_2	2°C
6	100% air	9°C
7	100% N_2	9°C
8	80% N_2 : 20% CO_2	9°C
9	50% N_2 : 50% CO_2	9°C
10	100% CO_2	9°C

* Gas treatment of 20% N_2 : 80% CO_2 was not included in this study because it was not commercially available at the time of the experiment.

** 2°C represented normal refrigeration during the storage period, while 9°C simulated poor refrigeration.

INTRODUCTION

Modified atmosphere packaging (MAP) uses gas-packaging concepts to preserve the quality of food products by controlling biochemical and microbial activities to decrease food deterioration and extend shelf life.

MAP is being used to extend shelf life of various food commodities, such as Tilapia fish filets *(26)*, lamb chops *(23)*, chicken broilers *(2)*, cured meat *(9)*, processed meat *(18)*, chicken *(6)*, and produce *(17)*. However, this technique has not commonly been applied to commercial cooked rice products.

When preservation methods other than MAP are used, characteristics of cooked rice are altered, either by extreme hot or cold temperatures or by processing techniques. Frequently, MAP food products are preserved at the "freshest" possible state by use of common gases such as nitrogen (N_2), carbon dioxide (CO_2), oxygen (O_2) or a combination of these gases. Each gas has an advantage over the others, especially when used for specific products *(14)*. For example, when whey cheese was stored at 4°C with use of 100% CO_2 MAP, shelf life was extended for 15 days *(24)*.

In addition to gaseous atmosphere composition, time and temperature are other important factors that influence microbial growth *(12)*. For example, apple browning, blackheart in potatoes, and rot spotting on lettuce can all be inhibited if storage temperature as well as gaseous composition is controlled for a specific length of time *(14, 18, 28, 29)*.

Packaging film also plays an important role in MAP, varying as to its composition, thickness *(11)*, and degree of permeability. The composition of the gaseous atmosphere within the package is assumed to change constantly through diffusion of gases across the film, and these changes affect the microbial load and shelf life of food products *(5, 8, 22, 29)*.

Few reports are available on the effects of gas combinations on cooked rice products. The objectives of this research were to investigate the effects of modified atmosphere packaging (MAP) with different gas compositions on precooked rice containing cooked scrambled eggs, carrots, peas, and spices, with regard to standard plate counts (SPC) over time and with two different storage temperatures (2°C and 9°C).

MATERIALS AND METHODS

Samples

A total of 40 samples, obtained directly from a local manufacturer in Southern California, were used in this experiment.

The main sample component, rice, was first cooked and seasoned with a mixture of soy sauce, salt, sesame oil, soybean oil, and pepper. A mixture of frozen scrambled eggs, carrots, peas, and spices was then added to the cooked rice. The weight of each sample was 11 oz.

Samples were placed on polypropylene food trays (manufactured by American Paper Co., Huntington Park, CA). The food trays were filled and gas flushed, covered with laminated polyester / low density polyethylene plastic film (manufactured by All Package Enterprises Co., Taipei, Taiwan, R.O.C.), and thermally sealed using the INPACK™ system (model #3180 Ross Industries Inc., Midland, VA). Finally,

TABLE 2. Comparison of standard plate count, pH, and moisture content among 10 treatments

	Treatment	Standard Plate Count	pH	Moisture Content (%)
	1	2.0238[a]	6.42[c,d]	63.08
	2	3.2125[a,b,c]	6.37[d]	63.38
2°C	3	1.9225[a]	6.37[c,d]	62.49
	4	2.3713[a,b]	6.34[c,d]	63.86
	5	3.600[a,b]	6.28[b,c,d]	64.67
	6	5.9617[d]	5.64[a,b,c]	63.08
	7	5.4333[c,d]	5.62[a,b,c]	63.62
9°C	8	5.3200[c,d]	5.50[a]	62.61
	9	4.8717[b,c,d]	5.54[a,b]	63.73
	10	4.3883[a,b,c,d]	5.21[a]	64.45
	$\underline{F}$	0.0094	0.0060	0.9716

Note. Standard plate caunts, pH, and moisture content values were each analyzed in a separate ANOVA using LSD past hac analysis. Standard plate caunt is expressed in lag units ta the base 10.

Gases for treatments: 1 & 6 = air, 2 & 7 = 100% N_2, 3 & 8 = 80% N_2 + 20% CO_2, 4 & 9 = 50% N_2 + 50% CO_2, 5 & 10 = 100% CO_2

[a,b,c,d] Figures with the same superscript letter in the same column were nat significantly different at the $P < .05$ level.

samples were frozen to an internal temperature of minus 3.9°C. Film selection criteria included a relatively low oxygen transmission rate and relatively high moisture barrier characteristics.

The gas transmission rates of the polyester plastic covering film were 46.5-62, 11-15.5, and 232-387 $cm^3/m^2/25.4$ micron thickness/24 h/atm at 25°C for oxygen, nitrogen, and carbon dioxide, respectively. The moisture diffusion rate was 1.0 g/mil/100 sq. in./day *(27)*.

Gas treatments

Food packages were randomly assigned to one of the treatments listed in Table 1. All samples were stored in designated refrigerators until duplicate analyses were performed.

Microbial and chemical analyses

Samples were blended in sterilized blenders and diluted to $1{:}10^5$. The pour plate technique was used and standard plate counts were performed according to a standard method *(21)*.

Moisture contents and pH values were determined according to A.O.A.C. methods *(1, 21)* across 8 storage periods (day 0, 5, 9, 12, 14, 17, 19 and 21 days). Sampling was discontinued when tangible signs of spoilage such as off-odor, altered color or appearance, or an SPC > 10^6 CFU/g were observed.

Data analyses

Because SPCs ranged from very high to very low numbers, logarithms were used in the calculations to make the distributions more symmetric *(10, 16)*. The effects of treatment and storage time on SPC, pH, and moisture content were evaluated with use of a one-way ANOVA. The post-hoc least significant difference (LSD) test was used to determine significant differences between groups.

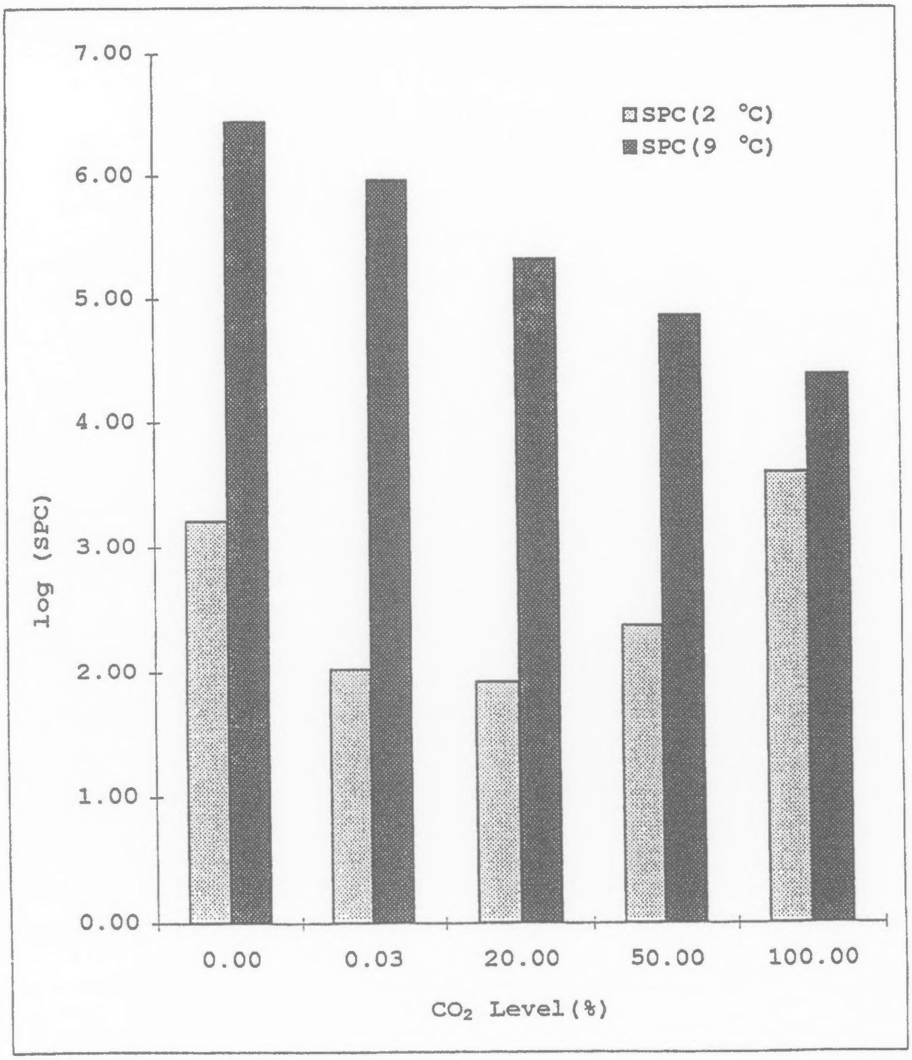
Multiple regression analysis was used to estimate individual and interactive effects of gaseous atmosphere composition, storage temperature, and storage time on SPC, and to determine the strength of the relationships *(15)*.

RESULTS & DISCUSSION

Temperature, gaseous atmosphere compositions, and time are all important in controlling foodborne pathogens in a prepared food and consequently in improving the estimation of its shelf life *(7)*. It is expected that SPC in cooked rice will increase with increased time and temperature of storage. However, the inhibitory effect of gaseous atmosphere composition on microbial growth is also important, as different gaseous compositions affect microbial growth differently in different types of food products.

In this study, SPC ranged from 1.92 log units (for samples with 80% N_2 + 20% CO_2, stored at 2°C) to 5.96 log units (for those with 100% air, stored at 9°C). Overall, samples stored at 2°C, regardless of the gas

Figure 1. Comparison of standard plate count (SPC) in relation to CO_2 level at two storage temperatures

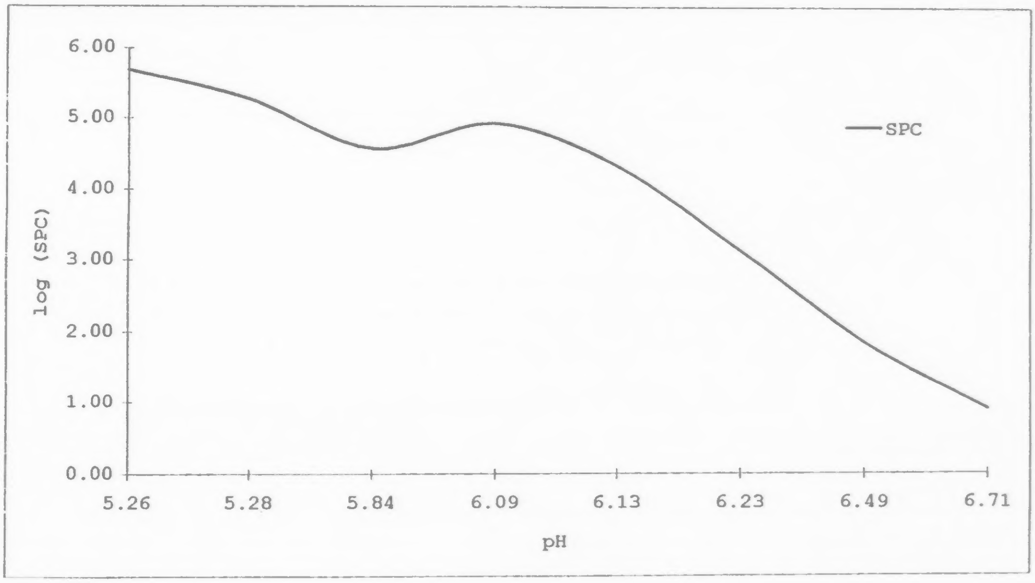


composition, had much lower plate counts than samples stored at 9°C (Table 2). Lower storage temperatures suppressed growth by extending the lag phase and retarding the growth phase of the microbial growth cycle. This is in agreement with results of a similar study *(4)*, in which MAP chicken meat stored at lower temperatures had lower microbial counts. Microbial populations increased significantly at storage temperatures above 7°C *(19)*.

Unlike the controlled atmosphere packaging (CAP) technique, in which products are continuously exposed to a constant mixture of gases, a gas mixture is injected only once in modified atmosphere packaging. Over time, the composition of the gaseous atmosphere in CAP remains constant; in contrast, the atmosphere with modified atmospheric packaging changes with time as the result of microbial metabolism and gas exchange through the packaging film, and microorganisms are believed to respond quickly to such atmospheric changes. Significant SPC differences were detected among samples with different gaseous treatments at the same storage temperature (Table 2).

Multiple regression analysis of the three factors (temperature, storage time, and gas composition) in MAP showed that storage temperature had the greatest impact on SPC ($P < .024$). Both the storage temperature/storage time and storage temperature/gaseous atmosphere composition interactions had significant effects on SPC, further indicating the importance of storage temperature. The influences of storage time and gas composition

Figure 2. Relationship between standard plate count (SPC) and pH



on SPC were compounded by storage temperature. In samples stored for the same period of time, SPC was significantly affected by increased storage temperature and by changes in gaseous composition. As shown in Fig. 1, SPC was significantly higher in samples stored at the higher temperature, whereas SPC was lower in samples packaged with elevated CO_2 levels at 9°C throughout the storage period.

In this experiment, the effect of CO_2 on bacterial growth was significantly different at the two storage temperatures (2°C and 9°C). The inhibitory effect of increased CO_2 concentrations was observed only in samples stored at the higher temperature. Plate counts were significantly decreased in samples packed with higher levels of CO_2 and stored at 9°C. However, at the lower temperature, the inhibitory effect of CO_2 decreased as the CO_2 level increased; overall, at a temperature of 2°C, the inhibitory effect of CO_2 was greatest at a CO_2 concentration of 20%.

The inhibitory effect of CO_2 was more pronounced when the atmosphere contained 20% or more CO_2 and the samples were stored at the higher temperature (9°C). The results are partially in agreement with those of another study *(13)*, in which atmosphere containing 20% or more CO_2 inhibited the growth of pseudomonas at a lower temperature (5°C) and of a study in which the shelf life of ground chicken was extended when the atmosphere contained 20% or more CO_2 *(3)*.

In addition, SPC was shown to be highly correlated with pH; the relationship between SPC and pH followed a decreasing curve, in which plate counts were inversely proportional to pH (Fig. 2).

In MAP trout samples, pH decreased over time because of CO_2 dissolution and growth of lactic acid bacteria *(5, 25)*. In the present study, pH values were significantly different among the 10 treatments (Table 2); pH values decreased over time in all samples, particularly in samples stored at higher temperatures. Food stored at the higher temperature (9°C) appeared to spoil at a faster rate than food stored at the lower temperature (2°C). Storage temperature was shown to have a greater effect than gaseous composition on pH (Table 3).

Although the number of microorganisms is reduced through cooking and freezing processes, some of these microorganisms survive these processes and are still capable of germination, causing spoilage of the food during storage *(20)*.

Gram staining was performed on all samples throughout the study period to help identify dominating microorganisms. This identification may further assist the study of flavored rice. However, in this study, most of the microorganisms may have been subject to injury during the freezing process; perhaps as a consequence of such injury, colonies were very small in size and difficult to identify. Most of the microorganisms picked from larger surface colonies were cocci and were Gram negative.

Spoilage of the samples was determined by visual observation, odor, and microbial plate counts. Samples were considered spoiled when any of these conditions were detected: (a) altered physical appearance, (b) off-odor, or (c) standard plate count of 1,000,000 CFU/g or above. In this study, samples packaged in 80% N_2 + 20% CO_2 and stored at 2°C were not spoiled until Day 21, whereas samples pack-

TABLE 3. Comparison of standard plate count, pH, and moisture content at two storage temperatures

Temperature	Standard Plate Count	pH	Moisture content (%)
2°C	2.6260	6.35	63.50
9°C	5.1950	5.50	63.50
F	0.0000	0.00	0.998

Note. Data for Standard plate counts, pH, and moisture content were each run in a separate ANOVA, using LSD post hoc analysis. Standard plate count is expressed in log units to the base 10.

TABLE 4. Comparison of standard plate count among 10 treatments in 8 storage periods

	Treatment	Day 0	Day 5	Day 9	Day 12	Day 14	Day 17	Day 19	Day 21
	1	1.30	1.00	1.48	0.00	1.60	3.13	3.57	4.11
	2	0.00	1.48	2.74	1.70	3.03	5.20	5.32	6.23
2°C	3	1.30	1.48	0.00	1.00	1.95	2.20	3.60	3.85
	4	1.00	1.30	2.26	1.78	2.98	2.26	3.39	4.00
	5	1.00	0.00	0.00	4.94	5.19	5.39	5.79	6.49
	6	1.30	3.56	7.34	7.63	7.89	8.05		
	7	0.00	3.31	5.66	7.78	7.86	7.99		
9°C	8	1.30	1.48	5.32	7.85	7.92	8.05		
	9	1.00	2.51	3.06	7.47	7.52	7.67		
	10	1.00	2.49	3.58	5.63	6.72	6.91		

Note. Standard plate counts were each analyzed in a separate ANOVA using LSD post hoc analysis.

Standard plate count is expressed in log units to the base 10.

Gases for treatments: 1 & 6= air, 2 & 7 = 100% N_2, 3 & 8 = 80% N_2 + 20% CO_2, 4 & 9 = 50% N_2 + 50% CO_2, 5 & 10 = 100% CO_2.

[a,b,c,d]Figures with the same superscript letter in the same column were not significantly different at the $P < .05$ level.

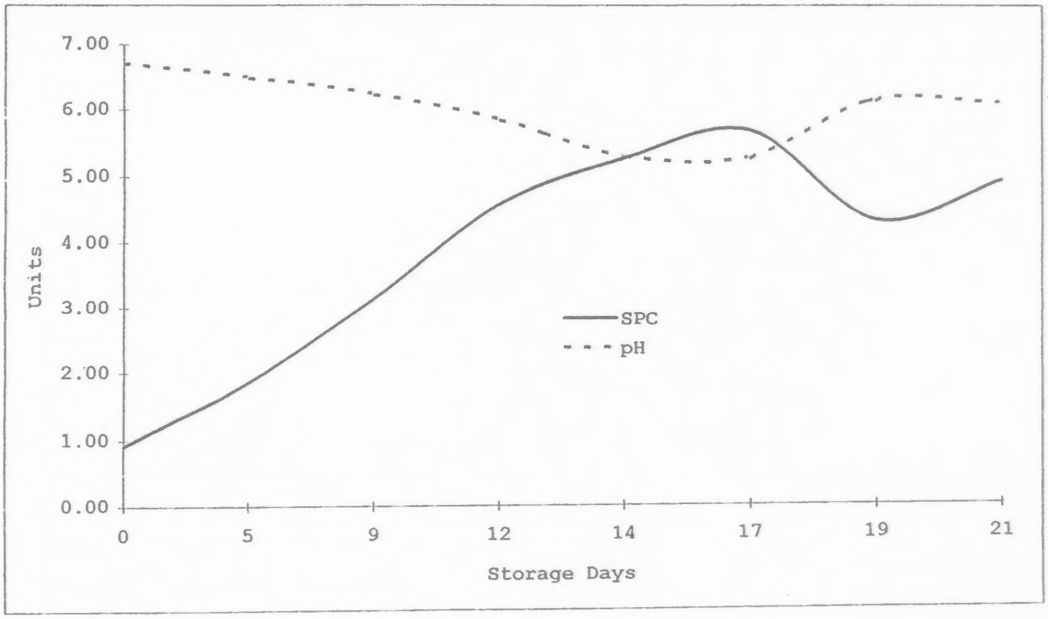
aged in 100% air and stored at 9°C were the first to show signs of spoilage, on Day 9 (Table 4).

All samples stored at 9°C were relatively watery and became slimy and developed a putrid odor on Day 9. In contrast, products stored at 2°C remained relatively intact throughout the study with the exception of those that received 100% CO_2 treatment, which had a watery appearance after Day 14. All food trays of the products treated with 100% CO_2 were found collapsed on Day 5 because of decreased internal vacuum from CO_2 dissolution and carbonic acid formation. The dissolved CO_2 may have contributed to decreased pH and thus to quicker spoilage.

CONCLUSIONS

This study demonstrated that storage temperature and atmospheric CO_2 levels inside packaging are important factors in controlling microbial growth of MAP cooked rice. A higher storage temperature (9°C) accelerated microbial growth and consequently led to early food spoilage. Samples stored at a lower

Figure 3. Interrelationship of standard plate count (SPC) and pH over time



temperature (2°C) had significantly lower plate counts and took longer to spoil. The growth of microorganisms in food media caused a decrease in food pH, and could serve as an indicator of food spoilage. The inhibitory effect of CO_2 was more pronounced at the higher storage temperature. The inhibitory effect also increased when CO_2 concentrations were 20% or more.

The ability of MAP alone to prolong the shelf life of the rice product seems to be slight; only small differences were detected among gaseous atmosphere variations in this study. A combination of MAP and proper temperature control is required to gain better control over microbial growth and, in turn, to attain a longer shelf life. The samples with the longest shelf life (21 days) in this study were packaged in a gas composition of 80% N_2 + 20% CO_2 and stored at 2°C, in contrast to the ones with the shortest shelf life (9 days), which were packaged in 100% air and stored at 9°C.

Because few research studies on the effect of MAP on precooked frozen food products have been conducted, more studies are needed with the aim of extending shelf life and evaluating the growth of *Bacillus cereus*, because of this organism as a possible cause of food poisoning, in cooked rice.

REFERENCES

1. Association of Official Analytical Chemists. 15th ed. 1990. Official methods of analysis, K. Helrich, ed. p. 777. Arlington, VA.
2. Bailey, J. S., J. O. Reagan, J. A. Carpenter, and G. A. Schuler. 1979. Microbiological condition of broilers as influenced by vacuum and carbon dioxide in bulk shipping packs. J. Food Sci. 44:134–137.
3. Baker, R. C., J. H. Hotchkiss, and R. A. Qureshi. 1985. Elevated carbon dioxide atmospheres for packaging poultry. I. Effects on ground chicken. Poultry Sci. 64:328–332.
4. Baker, R. C., R. A. Qureshi, and J. H. Hotchkiss. 1986. Effect of an elevated level of carbon dioxide containing atmosphere on the growth of spoilage and pathogenic bacteria. Poultry Sci. 65:729–737.
5. Barnett, H. J., J. W. Conrad, and R. W. Nelson. 1987. Use of laminated high and low density polyethylene flexible packaging to store trout (*Salmo gairdneri*) in a modified atmosphere. J. Food Prot. 50:645–651.
6. Beuchat, L. R. 1987. Efficacy of some methods and media for detecting and enumerating *Campylobacter jejuni* in frozen chicken meat. J. Appl. Bact. 62:217–221.
7. Bhaduri, S., R. L. Buchanan, and J. G. Phillips. 1995. Expended response surface model for predicting the effects of temperature, pH, sodium chloride contents and sodium nitrite concentrations on the growth of *Yersinia enterocolitica*. J. Appl. Bact. 79:163–170.
8. Brody, A. L. 1996. Integrating aseptic and modified atmosphere packaging to fulfill a vision of tomorrow. Food Technol. 50:56–66.
9. Christiansen, L. N. and E. M. Foster. 1965. Effect of vacuum packaging on growth of *Clostridium botulinum* and *Staphylococcus aureus* in cured meats. Appl. Microbiol. 13:1023–1025.
10. Devore, J., and R. Peck. 1986. Statistics: The exploration and analysis of data. West Publ. Co., St. Paul, MN.

11. Dubsky, D. L. H. 1993. Packaging, modified. Baking & Snack 49:51-52.
12. Eklund, T., and T. Jarmund. 1983. Microculture model studies on the effect of various gas atmospheres on microbial growth at different temperatures. J. Appl. Bacteriol. 55: 119-125.
13. Eyles, M. J., C. J. Moir, and J. A. Avey. 1993. The effects of modified atmospheres on the growth of psychotropic pseudomonads on a surface in a model system. Internat. J. Food Microbiol. 20:97-107.
14. Faber, J. M. 1991. Microbiological aspects of modified-atmosphere packaging technology: A review. J. Food Prot. 54:58-70.
15. Hassard, T. H. 1991. Understanding biostatistics. Mosby Publishing. St. Louis, MO.
16. Kachigan, S. K. 1991. Multivariate statistical analysis: A conceptual introduction. 2nd ed. Radius Press, N.Y.
17. Kader, A. A., D. Zagory, and E. L. Kerbel. 1989. Modified atmosphere packaging of fruits and vegetables. Crit. Rev. Food Sci. Nut. 28:1-30.
18. Kautter, D. A., R. K. Lynt, T. Lilly Jr., and H. M. Solomon. 1981. Evaluation of the botulism hazard from nitrogen-packed sandwiches. J. Food Prot. 44:59-61.
19. McMullen, L. M., and M. E. Stiles. 1993. Microbial ecology of fresh pork stored under modified atmosphere at -1, 4.4 and 10°C. Internat. J. Food Microbiol. 18:1-14.
20. Mendonca, A. F., and S. J. Knabel. 1994. A novel strictly anaerobic recovery and enrichment system incorporating Lithium for detection of heat-injured *Listeria monocytogenes* in pasteurized milk containing background micro flora. Appl. Environ. Microbiol. 60:4001-4008.
21. Messer, J. W., J. T. Peeler, and J. E. Gilchrist. 1984. FDA Bacteriological Analytical Manual, 6th ed. Association of Official Analytical Chemists. Arlington, VA.
22. Morales-Castro, J., M. A. Rao, J. H. Hotchkiss and D. L. Downing. 1994. Modified atmosphere packaging of sweet corn on cob. J. Food Process. Preserv. 18:279, 295.
23. Newton, K. G., J. C. L. Harrison, and K. M. Smith. 1977. The effect of storage in various gaseous atmospheres on the micro flora of lamb chops held at -1°C. J. Appl. Bact. 43:53-59.
24. Pintado, M. E., and X. Malacata. 2000. The effect of modified atmosphere packaging on the microbial ecology in Requejao, a Portuguese whey cheese. J. Food Proc. Preserv. 24:107-124.
25. Randell, K., R. Ahvenainen, K. Latva-Kala., E. Jurme, T. Matilla-Sandholm, and L. Hyvonen. 1995. Modified atmosphere-packed marinated chicken breast and rainbow trout quality as affected by package leakage. J. Food Sci. 60: 667-672, 682.
26. Reddy, N. R., C. L. Schreiber, K. S. Buzard, G. E. Skinner, and D. J. Armstrong. 1994. Shelf life of fresh Tilapia fillets packaged in high barrier film with modified atmospheres. J. Food Sci. 59:260-264.
27. Sacharow, S. and R. C. Griffin. 1980. Principles of food packaging. 2nd ed. AVI. Westport, CT.
28. Talasila, P. C., K. V. Chau, and J. K. Brecht. 1995. Design of rigid modified atmosphere packages for fresh fruits and vegetables. J. Food Sci. 60:758-761, 769.
29. Zagory, D., and A. A. Kader. 1988. Modified atmosphere packaging of fresh produce. Food Technol. 42:70-77.

Workshop on Biological and Chemical Agents of Terrorism in Food

Report by Anna Lammerding, Health Canada and Paul Hall, Kraft Foods

On December 12 and 13, 2001, an important session was convened in Washington, D.C., on *Biological and Chemical Agents of Terrorism in Food*. In collaboration with IAFP, this workshop was organized by the International Life Sciences Institute North America (ILSI N.A.), the ILSI N.A. Technical Committee on Food Microbiology and the ILSI N.A. Technical Committee on Food Toxicology & Safety Assessment. Other contributing organizations to the meeting were the U.S. Centers for Disease Control and Prevention (CDC), Food and Drug Administration (FDA), National Institutes of Health (NIH) and the U.S. Department of Agriculture (USDA).

Through the joint efforts of ILSI N.A. and IAFP, this critical forum for information exchange and discussion was planned and executed in rapid response to the unfortunate events that occurred in the preceding months. We extend our appreciation to the slate of top-ranking experts who made themselves available to present the fundamental issues relevant to ensuring safe and secure food and water supplies. Speakers from federal agencies and research institutions discussed the scientific and logistic aspects of the types of agents that might be used in terrorist or warfare attacks, surveillance, detection, deterrence and prevention, and containment.

David Satcher, M.D, Ph.D., former CDC Director and currently Surgeon General of the US Health and Human Services, described some of the lessons learned in recent months while dealing with the anthrax incidents. He noted that the strengths of the US public health system include high calibre laboratories, well-trained epidemiologists, and a mobile stockpile of medical supplies and treatments that, along with trained personnel, can be rapidly deployed anywhere in the country within hours. However, Dr. Satcher also pointed out that it is essential to devote resources to maintain and further develop the capabilities and expertise of the public health infrastructure in this country. This extends to ensuring local, regional and national preparedness in situations of not only intentional threats to public health but also non-deliberate events of contamination. Front-line health care providers must become informed and motivated, and recognize that their roles are critical in early detection of widespread contamination of foods or water supplies, whether through deliberate sabotage, or accidental contamination.

Beyond the scientific information presented, the key messages delivered by many of the speakers included: the importance of public-private partnerships to identify vulnerabilities and risk management strategies in the food and water industries; the need for increased support for public health infrastructures at all levels to ensure the capability of rapid response to any deliberate threats to food and water security; the need for advancing research to assess the stability of microbes and microbial/plant/algal toxins in food and water, determine their amenability to be "weaponized", and/or to be widely distributed. Clearly, there is always the requirement for effective strategies to communicate with the public to help alleviate panic and mistrust.

Dr. Margaret Glavin, Acting Administrator, Food Safety and Inspection Service, USDA, in closing remarks, emphasized the importance of forging new partnerships among all agencies with mandates to protect public health, at all levels of government, and with industry and consumers. She indicated that, while USDA is well poised to address the challenges confronting the safety of the food products regulated by FSIS, such partnerships are essential to providing the broadest protection to our consumers and our food supply.

This highly successful workshop had over 150 attendees from industry and government participating in the two-day discussion.

2002–2003
Secretary Election

The following page contains biographical information for the 2002-2003 Secretary candidates. Review the information carefully as you make your voting decision. Ballots were mailed to all International Association for Food Protection Members during the first week of February. Completed ballots are due back to the Association office by March 22, 2002. Sealed ballot envelopes are forwarded to the Tellers Committee for opening and counting. Watch for the election results in the May issue of *Dairy, Food and Environmental Sanitation*.

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

The Candidates

J. Stan Bailey

Jeffrey M. Farber

International Association for Food Protection®

Biographical Information

J. Stan Bailey

J. Stan Bailey is a Lead Scientist and Research Microbiologist for the US Department of Agriculture, Agricultural Research Service where he is responsible for research directed toward monitoring, controlling, reducing and ultimately eliminating contamination of live poultry by human enteric pathogens. During his 28 year career, Dr. Bailey has authored or co-authored over 450 scientific publications in the area of food microbiology, concentrating on controlling *Salmonella* in poultry production and processing, *Salmonella* methodology, *Listeria* methodology, and rapid methods of identification.

Dr. Bailey's professional stature is recognized both nationally and internationally as is seen in: (1) election to the position of Chairman of the food microbiology division of the American Society for Microbiology in 1992; (2) serving as Secretary of the Microbiological Methods Committee of the AOAC (Association of Official Analytical Chemists) from 1990-95; (3) appointment to the position of Adjunct Professor in the Poultry Science Department at the University of Georgia, 1994; (4) national and international invitations to speak, teach, participate in committees, and symposia including appointment as Expert Consultant on Animal Feeding and Food Safety by the Food and Agriculture Organization of the United Nations; (5) serving as faculty for 18 years at the "Rapid Methods and Automation in Microbiology Workshop" taught at Kansas State University educating over 900 scientists from 50 countries; (6) being named Fellow of the American Academy of Microbiology, 1994; (7) appointment as technical advisor on poultry production to the National Advisory Committee on Microbiological Criteria in Foods, 1995; (8) appointment as scientific advisor to the International Life Sciences Institute, 1997 to present; (9) winning the ARS Technology Transfer Award and Federal Laboratory Consortium Award for technology transfer; (10) being awarded 7 US Patents; and (11) receiving 14 USDA Certificates of Merit.

Dr. Bailey has been an active Member of IAFP since 1987. His involvement includes organizing and convening numerous symposia, serving as a member of the Program Committee from 1997 to 2001 and serving as Chairperson of this committee in 2001. Dr. Bailey also served as Chairperson of the Poultry Safety and Quality Professional Development Group from 1993-95 and has served on the Editorial Board of the *Journal of Food Protection* since 1997.

Dr. Bailey has a B.S. in Environmental Health Sciences, a M.S. in Food Science and a Ph.D. in Poultry Science all from the University of Georgia. Other professional affiliations for Dr. Bailey include serving on the Editorial Boards of *Poultry Science*, *Journal of Rapid Methods and Automation in Microbiology* and *Journal of Applied Poultry Research* and membership in; Southern Poultry Science Society, Worlds Poultry Science, American Society for Microbiology, American Academy of Microbiology, Poultry Science Society, Georgia Association of Food and Environmental Sanitarians, and AOAC.

Jeffrey M. Farber

Jeffrey M. Farber is currently Director of the Bureau of Microbial Hazards, for the Food Directorate of Health Canada, where he is responsible for the management of research and policy development in the area of microbiological food safety. Prior to assuming the Director's position, Dr. Farber was a Research Scientist in the Bureau of Microbial Hazards for 17 years after completing an NSERC post-doctoral fellowship at Health Canada in 1983. He became Acting Chief of the Microbiology Research Division in 1998, and Associate Director in 2000.

During his 19-year career, Dr. Farber has published over 100 papers in refereed journals, 6 book chapters, edited 2 books, has been, and continues to be an invited lecturer on food microbiology and food safety, internationally. His main areas of expertise are *Listeria monocytogenes*, modified atmosphere packaging, fresh-cut produce, *Enterobacter sakazakii*, and molecular typing of foodborne pathogens. He currently also holds International Life Sciences Institute (ILSI) and Biotechnology grants for work on the virulence, molecular typing and biochip detection of *L. monocytogenes* in foods. In 1999, Dr. Farber was awarded the Seafood Technology Division, Divisional Lecturer award and also received 2 Food Directorate Team Awards in 2001.

Since joining the International Association for Food Protection (IAFP) in 1986, Dr. Farber served on the Program Committee for close to six years, the last year of which he was the Chairperson. Dr. Farber has also given many invited talks, as well as organized numerous symposia at the IAFP Annual Meetings, and has been involved with a number of the Professional Development Groups (PDGs). He has also been a member of the Nominating Committee, Chairperson of the Developing Scientist Award Committee, and actually started the very successful Fruit and Vegetable Safety and Quality PDG, of which he is still a member.

Dr. Farber is currently a member and Treasurer of the International Commission on Microbiological Specifications for Foods (ICMSF). In terms of editorial work, Dr. Farber is currently the Editor of the *International Journal of Food Microbiology* and on the Editorial Board of the *Journal of Food Protection* and the *Italian Journal of Food Science*, as well as being on the *Journal of Food Protection* Management Committee. He has served on Expert Committees for the WHO, FAO and IFT, as well as Scientific and Technical Panels for recent IFT Task Force efforts.

Locally, Dr. Farber has been an Adjunct Professor of Microbiology at the University of Ottawa since 1992, and currently supervises two graduate students.

Dr. Farber obtained his B.Sc. and M.Sc.(A) degrees in Applied Microbiology and Immunology from McGill University in Montreal and his Ph.D. from Food Microbiology, McGill University in Ste. Anne de Bellevue, Quebec.

THE BLACK PEARL AWARD

RECOGNITION FOR CORPORATE EXCELLENCE IN FOOD SAFETY AND QUALITY

NOMINATE TODAY!

The Black Pearl Award is presented annually at the International Association for Food Protection Annual Meeting.

The Black Pearl Award, sponsored by Wilbur Feagan and F&H Food Equipment Company, was first presented in 1994. The Black Pearl Award was established to recognize a company for outstanding commitment to and achievement in corporate excellence in food protection. For more information and to receive nomination criteria, go to the Association Web site at **www.foodprotection.org** or contact the International Association for Food Protection office at 800.369.6337 or 515.276.3344; Fax: 515.276.8655; E-mail: info@foodprotection.org.

New Members

CANADA

Denis G. Allard
Canadian Food Inspection
Agency, Nepean, Ontario

Debbie Avery
Community Health Dept.
Waterloo, Ontario

D. S. Wood
University of Guelph
Guelph, Ontario

UNITED STATES

California

H. Jack Galadjian
Galko Food, Inc.
City of Industry

Anthony C. Huntley
SourceGuard LLC
West Covina

Colorado

Michelle L. Rossman
Castle Rock

Connecticut

John Reilly
Daymon Associates, Inc.
Stamford

District of Columbia

Jill Hollingsworth
Food Marketing Institute
Washington

Florida

Andy Lehrmann
Ryan Foods Co.
Jacksonville

Kathy K. Nyhof
Publix Super Markets
Lakeland

Georgia

Isabel C. Blackman
University of Georgia
Athens

Illinois

Christine E. Boisrobert
Air Liquide America Corp.
Countryside

Cindy Jiang
McDonald's Corporation
Oak Brook

Kansas

Matt Osborn
Excel Corporation
Wichita

Deanna D. Retzlaff
STERIS FoodLabs, Inc.
St. George

Louisiana

Kenneth Janes
McIlhenny Co.
Avery Island

Maryland

Janet Graab-Miller
McCormick & Company, Inc.
Hunt Valley

Minnesota

Richard J. Christianson
Hormel Foods LLC
Austin

Barry R. Eschbach
Land O'Lakes, Inc.
St. Paul

William Ludwil
Schwan's
Marshall

James E. Schmitz
Ecolab Inc.
Savage

New York

Jeremy D. Clarke
ROJW, Wallkill

Michael P. Piatko
Rich Products Corporation
Buffalo

Ohio

Hong Liang Luo
Ohio State University
Columbus

Texas

Julie L. Butner
LSG Sky Chefs
Arlington

Mangesh P. Palekar
Texas A&M University
College Station

Cynthia Sheffield
USDA-ARS-SPARC
College Station

Virginia

Joan C. Redder
KFC, Blacksburg

International Association for Food Protection

NEWS

Scientists Plan Multi-Pronged Attack on *E. coli* 0157:H7

New techniques are on the horizon to control the *E. coli* O157:H7 bacterium in beef and dairy cattle, which could help the beef industry fight the food safety and environmental contamination threat, an *E. coli* researcher told attendees at the recent National Beef Science Seminar in Lethbridge, Alberta. "Currently, *E. coli* O157:H7 outbreaks and beef product recalls are a significant threat to the Canadian beef industry," said Dr. Tim McAllister, a Lethbridge Research Centre ruminant nutritionist and microbiologist.

Since cattle are the major reservoir of the bacterium, it is vital to develop control measures that reduce the risk of transmitting *E. coli* O157:H7 to humans. Effective control of the pathogen requires reducing the frequency and intensity of shedding in cattle, he said. Controls range from environmental strategies to vaccines.

McAllister is examining environmental controls for the bacterium. "Studies have shown that *E. coli* O157:H7 can survive for weeks and months in livestock production environments, which may enable the organism to be transmitted back to cattle through contaminated feed or water," he said. This creates a cycle of infection that permits the pathogen to survive in cattle herds.

"Minimizing contamination of water troughs and feed bunks together with proper management will help reduce the spread of *E. coli* to cattle, crops, water sources and ultimately humans," McAllister said.

Composting is another solid on-farm control measure. If managed properly, the heat inside the compost pile kills pathogens such as *E. coli* O157:H7. However, proper control measures at the farm and feedlot level are not enough.

"Since we are talking about a cycle, controlling *E. coli* O157:H7 requires suppression at each point in the cycle," McAllister said. He expects the approaches under study at the Centre will complement those being developed by other Canadian and international researchers.

"Probiotics" is a new approach, McAllister said. Probiotics, the administering of beneficial microorganisms, may improve an animal's intestinal microbial balance, preventing the growth of pathogenic organisms. Probiotic bacteria have proven effective for reducing the length of time the rumen harbors *E. coli* O157:H7.

'Bacteriophages,' viruses that attack bacteria, are another option. "Bacteriophages infect and kill *E. coli* O157:H7," he explained. However, further research is required to make this method consistently effective and viable. Still another technique may be vaccination. A vaccine developed by the University of British Columbia and Veterinary Infectious Disease Organization (VIDO) is currently being field tested. "It reduces the level of the bacteria harbored in cattle intestines, but it doesn't reduce it to zero," McAllister said.

Dietary controls could be an option, but conflicting studies about the effect of the diet on *E. coli* control means more research needs to be done, he said. At the packer level, irradiation, which kills bacteria, is under consideration.

From a scientific perspective, McAllister said this fight against *E. coli* O157:H7, a relatively new strain of *E. coli* first identified in 1982, could prove beneficial. "It may provide valuable lessons for battling new bacterial threats that may evolve in the future. While researchers try to find methods of controlling *E. coli* O157:H7," McAllister said more emphasis should be placed on proper food handling and cooking protocols. "We will never completely eliminate *E. coli* O157:H7. There is no such thing as zero risk," he cautioned.

Consumers Give Good Grades to US Food Safety

Consumers give the United States food supply a B-plus for safety, according to a national consumer poll conducted on behalf of the Cattlemen's Beef Board by the National Cattlemen's Beef Association (NCBA). That's the same grade received by beef steaks and roasts, according to the poll. US consumers are, however, moderately concerned about the food supply's vulnerability to terrorist attack, the checkoff-funded poll found. Americans gave the highest grades to the safety of vegetables and fruits; both earned a grade of A-minus with 88 percent of respondents giving each a grade of A or B. Next on the list for confidence in safety was beef steaks and roasts which earned a B-plus with 80 percent of consumers grading an A or a B.

The safety report card survey found that 38 percent of Americans gave food in the United States an A for being safe to eat and another 39 percent graded it a B. Only 3 percent of Americans gave US food a grade of D, while 2 percent graded it an F.

Consumers gave an average safety grade of B to pork chops

(72% A/B), fish (68% A/B), chicken (69% A/B), ground beef (64% A/B) and ground pork (57% A/B).

The survey also found consumers' top three food safety concerns were bacteria (39% extremely concerned) pesticides (38%), and chemical additives (33%). Other food safety concerns were hormones (30% extremely concerned), genetically modified foods (26%), antibiotics (23%) and irradiated foods (21%).

When asked to choose the food about which they had the highest food safety concern, the largest percent of consumers (26%) said fish, followed by chicken (22%) and pre-prepared foods (21%). Fewer consumers were most concerned about beef (14%), pork (12%) and fruits and vegetables (4%). When asked how concerned they are about certain foods being vulnerable to a terrorist attack to contaminate them, consumers were moderately concerned about all foods. There was no significant difference in consumers' levels of concern for beef, chicken, pork, fish & seafood, milk, fruits and vegetables. On average, 18 percent of respondents said they were extremely concerned about the vulnerability of all these foods while an average of 27% said they were not at all concerned.

The checkoff-funded survey was conducted November 16-18 by IPSOS-Reid US Public Affairs and has a margin of error of plus/minus 3.2 percentage points.

Survey Uncovers Added Water in Restaurant and Take-Away Chicken

Some restaurants and take-aways may be serving chicken that only contains 54% chicken, despite labeling that claims a higher meat content, according to a Food Standards Agency investigation (FSA). The investigation was carried out jointly with 22 local authorities into chicken sold to the catering trade. It found that 35 out of 68 samples were mislabeled.

The five-month nationwide investigation has led to the publication of a survey that reveals the true levels of meat content in chicken breasts sold to the catering trade. Two of the chicken breasts were found to contain pork DNA, indicating the presence of material derived from pork. The survey tested 68 samples taken from wholesalers and cash and carry stores from around the United Kingdom that supply the catering trade. The samples came from processors mainly in The Netherlands but also Belgium, the United Kingdom and Spain. In most cases the chicken breasts came from third countries, such as Brazil and Thailand.

When the chicken breasts arrive in Europe they are processed to add water, salts, sugars, flavorings and, in some cases, hydrolyzed protein before packaging and refreezing. In some cases, these combinations are used to bulk up the chicken breasts and increase their weight. These combinations can also have the effect of retaining the added water in the chicken breast when it is cooked. For example, in the worst case a 100g portion of chicken breast would become 182g through these additions. The FSA received information from local authorities and some parts of the trade earlier this year that suggested hydrolyzed protein was being used to bulk up chicken breasts.

The standard test for water in chicken does not detect water added using this technique. The FSA obtained samples of hydrolyzed protein and, working with the Laboratory of the Government Chemist, clarified which testing methods would uncover water added with the use of these proteins and techniques.

The labeling on the catering packs was misleading in that: nearly half, 46% of the samples had a meat content of between 5% and 26% less than that declared on the packaging, 12% had incorrect quality descriptions, ones which should only be used for products without added ingredients, 16 of the samples used hydrolyzed proteins, but only two were labeled as such.

Food Standards Agency chairman Sir John Krebs said, "Consumers eating out don't expect their chickens to contain large amounts of added water, nor do they expect their chicken to contain material derived from pork. Customers rely on restaurateurs, who in turn rely on wholesalers and importers to know exactly what it is they are buying and selling. 'British importers and wholesalers have a responsibility to be vigilant on behalf of the UK consumer. Local authorities have shown that they are able to prosecute where there is evidence of the law being broken'. This joint investigation has already shaken this market with some suppliers withdrawing their products and changing their production processes. This survey used good science to crack a difficult investigation. There will be those who will seek to mislead consumers. They need to know that the FSA will work with the relevant authorities throughout Europe to expose them."

The Food Standards Agency has written to the relevant enforcement bodies in The Netherlands and Belgium with the findings of this survey. The Agency has also informed the Consumer Protection Director General of the European Commission, to draw the EC's attention to the findings. Added water is not in itself necessarily illegal, if the meat and other ingredients are accurately labeled. However, the survey reveals that the labeling is often not correct and there is less meat than claimed in many products. In other cases hydrolyzed protein was simply not declared.

All these practices contravene European labeling law. As none of the samples taken for this survey listed any ingredients derived from pork, the Food Standards Agency also believes that this too is inaccurate labeling.

This survey was a follow-up to a survey last year of supermarket and retail chicken and chicken parts. This work has been taken forward by the Food Standards Agency and the 22 local authorities who participated in the survey, in cooperation with the Trading Standards Institute.

Fight Bac!™ and the Partnership for Food Safety Education Win CDC/ATSDR Horizon Award

Congratulations to Fight Bac!™ and the Partnership for Food Safety Education which received the CDC/ATSDR (Agency for Toxic Substance and Disease Registry) Horizon Award at CDC's Health Education Day. The Horizon Award is awarded to a program developed by CDC or in collaboration with partners, which has been in existence for 2 to 4 years and which exhibits significant potential to substantially and positively affect the practice of health education. Visit Web site www.cdc.gov/foodsafety – for a food safety checklist.

Online Food Safety Training Manuals and Programs for Food Service

Everyone knows that training is one of the most critical elements for implementing any food safety program. After all, any plan is only as good as the people that execute it. But what good is training without the proper tools and resources? The Food Safety Training and Education Alliance (FSTEA) has put together a list of training manuals and programs located at the address listed below. Always check with your local, regional or state regulatory agency for all applicable laws and regulations. Visit Web site www.fstea.org/resources/manuals/html, or visit the USDA/FDA Foodborne Illness Education Center's Web site for more food safety information at www.nal.usda.gov/foodborne.

Variant Creutzfeldt-Jakob Disease (VCJD) Update on the Hazard of Transmission by Blood and Blood Products

As of the end of September 2001, the number of vCJD cases diagnosed worldwide stood at 117, with 111 people in the United Kingdom, four in France and one each in Ireland and Hong Kong Special Administrative Region of China. To date, no epidemiological evidence suggests that vCJD has ever been transmitted by blood transfusion or the use of plasma derivatives. A number of studies in animals, however, have indicated that there is infectivity in the blood in transmissible spongiform encephalopathy (TSE) disease models, suggesting the theoretical possibility of a vCJD risk from human blood products.

The most recent report on this issue described the precautionary measures implemented by a number of countries. These precautionary measures included deferring blood donors from countries with a bovine spongiform encephalopathy (BSE)/vCJD risk. As evidence accrued of BSE contamination in the food chain in other countries, the possible extension of this policy was envisaged. With the increase in BSE cases in several European countries recorded in 2000-2001, the United States Food and Drug Administration has proposed measures to strengthen the criteria for deferral from 6 to 3 months spent in the United Kingdom. Furthermore, other European countries are being considered in the proposed revision for the deferral policies of the United States.

The potential exclusion of plasma donors from European countries will have substantial implications for the world supply of plasma products. It is therefore encouraging that the growing level of evidence suggests that plasma fractionation clears TSE strains, including that associated with vCJD, from final products. The United States considered both of these factors in exempting source plasma donors with history of residence or travel in Europe from the exclusion requirement of the draft guidance. BSE has now been reported in countries outside of the European Community (i.e. Czech Republic, Japan, Slovakia, Slovenia). This highlights the need to assess the origins of the BSE epidemic, which is clearly associated with the use of BSE-contaminated meat and bone meal and the recycling of infected animals into the animal feed chain. More BSE cases may therefore be expected from the wide range of countries that imported and used potentially contaminated meat and bone meal from the United Kingdom, or that imported cattle. Therefore, deferring blood donors on the basis of potential exposure to BSE may result in endangering the supply of blood and blood products.

The need to balance known risks and product-supply requirements against the possible risk of blood-transmitted vCJD should be considered, as recommended in this article. It is unlikely that there will be a blood test for vCJD in the near future. Measures to avoid this theoretical risk in the blood supply will therefore continue to be based on donor deferral. It is of particular concern that in the developed world where geographically based deferrals have been implemented, the latter may have preferentially excluded repeat blood donors. While it is still too early to assess the long-term effects it has been shown that losing a small number of such repeat donors can have a very substantial effect on the overall blood supply.

In the meantime, blood services should continue to focus their efforts on providing adequate amounts of blood which is as safe as possible regarding recognized risks of transfusion. In many areas of the world, implementation of precautionary deferral measures for BSE /vCJD is likely to decrease the number of dedicated and low-risk voluntary non-remunerated blood donors, and thus increase the risk of transmission of known infections. Unless more evidence accrues to the contrary, except in areas where the loss of safe donors can safely be offset, blood services should focus their efforts on known transfusion-transmitted pathogens by providing the appropriate donor selection and screening measures, which will contribute most effectively to making blood safe.

Consumer Group Asks FDA to Test Foods for Undeclared Allergens, as Canada Does; FDA "Eyeballs" Factories Instead of Testing Products

The Center for Science in the Public Interest (CSPI) has charged that the Food and Drug Administration (FDA) is endangering people with food allergies by not using modern methods to detect allergy-causing contaminants in foods. Contamination with peanut, egg, soy, and other common food allergens could be life-threatening.

The FDA does not test foods for undeclared allergens – it only occasionally relies on visual inspection of manufacturing plants – even though its own study two years ago found that numerous candy, ice cream, and bakery products contained undeclared peanut or egg allergens.

In contrast, for several years the Canadian government has routinely conducted tests for certain allergens – peanuts, soy, egg, and milk – in foods bought at grocery stores. The Canadian government uses the results of those tests to help decide whether to warn consumers of undeclared allergens.

"The millions of Americans who have food allergies are entitled to the same protection from the FDA that the Canadian government now gives to its citizens. It is astonishing that the FDA insists on only 'eye-balling' manufacturing facilities – on the rare occasions when they inspect for undeclared allergens – instead of using modern tests. Meanwhile, the US Department of Agriculture has been switching from 'poke and sniff' to detect dangerous germs in meat using laboratory tests," said Michael F. Jacobson, CSPI's Executive Director.

In a letter sent to FDA acting deputy principal commissioner Bernard Schwetz, CSPI called on the FDA to begin testing processed foods for allergenic ingredients not listed on labels. Approximately four million Americans, including up to six percent of children, are allergic to one type of food or another. Each year an estimated 29,000 Americans are rushed to emergency rooms because of allergic reactions to food, and an estimated 150 people die of such allergic reactions.

On October 4, CSPI petitioned the FDA to require food labels to disclose common allergens and to set manufacturing standards to prevent the inadvertent contamination of non-allergenic foods with allergens. The FDA has taken no action on that petition, on a similar one filed in May 2000 by the Attorneys General of nine states (and supported by 22 other Attorneys General), or on CSPI's July 26, 2001, petition to improve the legibility of ingredient lists on all food packages.

FDA Releases 2001 Domestic Produce Sampling Survey Results

The US Food and Drug Administration (FDA) recently issued its 2001 domestic survey results for its microbiological sampling program for certain fresh fruits and vegetables that began in May of this year. Of the eight different commodities chosen for this program, cantaloupe, celery, cilantro, green onions, lettuce, parsley, strawberries, and tomatoes, 98.7% of all samples indicated no contamination. Of the total 959 samples collected and analyzed, 12 produce items had tested positive for either *Salmonella* or *Shigella* spp. None of the celery, strawberry and tomato samples tested positive for pathogens. "These results indicate a low incidence rate for certain pathogens and are very encouraging. The proactive food safety measures to reduce microbial hazards that the produce industry has taken in the past several years possibly contributed to these findings," said United Fresh Fruit and Vegetable Association Vice President for Scientific and Technical Affairs, Dr. Donna Garren.

Industry Products

Rocky Mountain Resource Labs

Rocky Mountain Resource Lab's Hand-held Vacuum Finds Hidden Pathogens, Helps Thwart Food Poisoning and Bioterrorism

Preventing bioterrorism and foodborne illness is on everyone's mind these days, and for good reason: it's hard to attack an enemy that's almost invisible. That's why the US Army Natick Soldier Center of Boston, MA, and Rocky Mountain Resource Labs (RMR) of Jerome, ID, are deploying the latest technology to find pathogens hidden in food. Under a recently signed agreement, they will jointly evaluate a novel hand-held vacuum developed by RMR that can collect microscopic bacteria in very small quantities from any source to enable rapid testing.

The Natick Soldier Center (NSC) is a unit of the US Army Soldier Biological Chemical Command, which is responsible for developing, testing, and evaluating new technologies that help support the quality of life and mission of US soldiers. The research agreement, brokered by the MSU TechLink Center of Bozeman, MT, and the Natick Business Development office, will give NSC an opportunity to test RMR Labs' novel Microbial-VacT (M-VacT) in the laboratory. If the lab tests are successful, the M-VacT may be field-tested by the US Army Veterinary Command, which has food safety inspection authority for military bases worldwide.

Because we all eat, food is an obvious vehicle for direct contamination. "An analysis of past CB documented incidents by Batelle showed that food or water was used in more than 60 percent of all occurrences as a means of infecting the target," said Dr. Andre Senecal of NSC. Pathogens such as bacteria and viruses cause foodborne illness, which has potentially costly and even deadly consequences for military and civilian populations.

The Natick Soldier Center is evaluating different types of food pathogen samplers and rapid detection technology as part of the Biosensors for Rapid Detection of Food Quality and Safety program. Natick is interested in the M-VacT as a device that can be used efficiently for sampling food pathogens under a variety of conditions. The small hand-held device operates like a wet vacuum on food, food preparation surfaces, and a range of other materials. The operator first applies a sterile rinse solution onto the suspect area with the M-VacT. The fluid helps detach and lift microorganisms from cracks and crevices in the suspect area, and then is vacuumed into the collection unit.

"This is an opportunity for RMR Labs to work in-house with some of the leading researchers in the world," said the inventor, Dr. Bruce Bradley, of RMR Labs. "The M-Vac method is highly effective for collecting organisms and allowing more accurate microbial counts, which are important for determining the type and extent of contamination. Traditional sponge and cotton swab techniques can smear organisms across the surface of the suspect area and push them deeper into cracks and crevices thus only collecting a portion of the total microbes present on a specific site," he said.

Rocky Mountain Resource Labs, Jerome, ID

Reader Service No. 348

Lonza Group Receives EPA Approval for Its Second Series of Disinfectants

Continuing its leadership role in bringing new claims to the formulators of disinfectants and sanitizers, Lonza Group is pleased to offer its HWS Neutral formulation series for supplemental registration with the Hepatitis B virus (HBV) claim. The HWS Neutral formulation series is one of several formulations that now carries the combination of HBV and HIV (AIDS virus) and is part of Lonza's extensive portfolio of EPA-registered disinfectants and sanitizers that are available for immediate supplemental registration.

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.

The addition of the HBV claim to the HWS Neutral series of formulations, is an important step forward for Lonza in the Healthcare market. The HWS series is now compliant with the Occupational Safety and Health Administration's (OSHA) Bloodborne Pathogen Standard, making the product suitable for use in disinfecting hard surfaces after being exposed to contact with blood or other body fluids.

The approval of HBV claim for the HWS formulations is also an important step for the antimicrobials industry. This is the first HBV claim approved by EPA for Neutral formulations where the testing was conducted in accordance with the EPA's new protocol as announced in the Federal Register on August 25, 2000.

Lonza Group, Fair Lawn, NJ

Reader Service No. 349

Haynes® New Synthetic Food-Grade Grease Extends Lubrication Life

Haynes® has introduced a new synthetic food-grade lubricant, Haynes® 500 Plus, specially formulated with a high drop point (500 degrees) that reduces maintenance costs by extending lubrication life and eliminating the need to frequently apply lubricants.

Haynes® 500 Plus has superior properties and performs exceptionally well in extreme load-bearing, high speed and high temperature environments. It is recommended for use in a wide variety of high and low temperature food equipment applications.

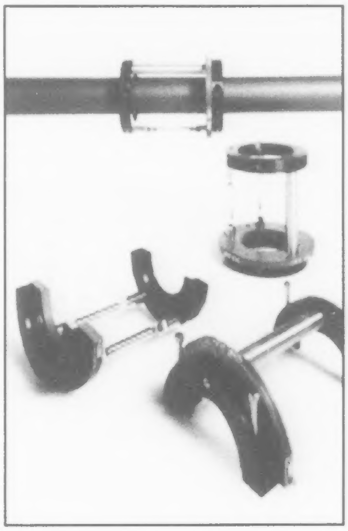
It is ideal for lubricating bearings, packings, universal joints, valves and ball joints. It is recommended for use with pumps, high load bearing equipment, ovens, meat processing and many other food, processing equipment applications.

This product has a clean color, a smooth texture, an NLGI1 rating and, like all Haynes® lubricants, is NSF accepted (rated H1) for incidental food contact. Haynes® 500 Plus is compatible with virtually all, elastomers and works extremely well even when contaminants are present. It has excellent resistance to water washout, steam, and chemical attack.

Technical data includes a dropping point of 500°F or 260°C (ASTM D2265); four ball wear test 40Kg 1200 RPM 167°F 1 h, average wear scar diameter 0.50mm (ASTM D4172); water % spray off 96 (ASTM D4049); and water washout @ 175°F of 2.5% washout (ASTM D1264).

Haynes® Manufacturing Company, Westlake, OH

Reader Service No. 350



Sensotec Corporation

Sensotec's Clamp-On Torque Sensor Converts Your Shaft Into a Rotary Torque Sensor in 15 Minutes

This unique 1650B System avoids the need to break into the drive train to install an in-line torque cell, it eliminates the need for skilled personnel to cement strain gauges onto the shaft, and does not require the installation of maintenance-intensive slip rings.

The 1650B clamp on sensor assembly comes pre-calibrated. Installation only requires the user to clamp on the two halves of the sensor shell, position the antenna and connect the wireless receiver. There is nothing to wear out, and maintenance is virtually eliminated.

This rotary torque transducer is ideal for proving trials or commissioning of driver/driven transmission trains to ensure design criteria are met or that drive trains are not overloaded. The 1650B Rotary Torque Sensor can be used for temporary or permanent installations. It is immune to oil, dirt and water, making it ideal for most industrial applications. The unit is available for shaft diameters from 2.5 inches to 15 inches and can be used at shaft speeds up to 2500 rpm.

Sensotec Corporation, Columbus, OH

Reader Service No. 351

S&S Biopath's Innovative, New Dilution Bottles Stand Alone

Companies looking for an easier and quicker way to perform serial dilutions and product extraction using 90mL or 99mL volumes will find it all from one source: S&S Biopath's dilution bottles.

Featuring a 45mm wide-mouth opening that allows addition of bulky or viscous samples, S&S Biopath's dilution bottles are color-coded for ease of identification and labeled with the corresponding lot number and expiration. Also, the improved design permits one-handed operation of the bottles and is free standing.

The S&S Biopath dilution bottles are available in two formulations: a Butterfields Phosphate Buffer for food and dairy testing (according to APHA, FDA, AOAC or USP methods), and a phosphate buffer with magnesium chloride for water and waste water testing (according to EPA to APHA methods).

In addition S&S Biopath's dilution bottles have a unique package design to prevent leakage in transport. S&S Biopath dilution bottles are packed 72 per case in an egg-type box that constricts any flexing of the package during shipping, hence, alleviating any leakage.

A Certificate of Analysis is provided with each case for quality assurance records.

S & S Biopath, West Palm Beach, FL

Reader Service No. 352

Zistos Corporation

Zistos Corporation Industrial Robust Video Inspection Systems

Now available from Zistos Corporation, two new types of industrial robust video inspection systems. Different but somewhat related to traditional pipe cameras, Zistos offers a self - illuminating camera on the end of a telescoping pole or on the end of a flexible, semi-rigid coil. Either camera system is powered by an easy viewing 15-inch color LCD/ receiver, all battery powered with a remote transmitter option.

The Telescoping Flex'N Stay is the pole, ideal for straight-line access and its short Flex'N Stay arm allows the camera to bend over or around obstructions. For example, inspecting tanks blocked by baffles or maneuvering the camera into manholes and entering underground pipe branches. The Flex'N Stay coil will bend but remains rigid and self-supporting or can be shaped to look backwards or sideways.

The "back-end" is a portable/ self-powered big 15-inch LCD screen, rugged, in carry case useable. Move it anywhere, open the lid and its integrated battery shows a hi res image via its wireless receiver, selectable VGA or component video, or NTSC composite, TV tuner and audio signals.

The "smart" option is the industrial "Prove It" image & data recorder. No bigger than a paperback book, completely portable and powered by the LCD battery, it can digitally freeze/store images-with time/date or GPS data, print a photo on-the-spot or lets you download to PCs for instant global status reporting.

Zistos Corporation, Wantagh, NY

Reader Service No. 353

CEA Instruments' New IAQ Unit Monitors CO_2 Plus More

The newly expanded GD-444 Series of personal-size, infrared carbon dioxide analyzers can now also measure and display temperature and relative humidity levels. Other gas sensors such as carbon monoxide (CO) or oxygen (O_2) can also be added. Carbon Dioxide full ranges up to 1%, 10%, or 100% are available with autoranging or single range resolution.

Weighing less than a pound, the GD-444 Series includes an internal sample pump, backlight, adjustable alarms, digital display, outputs, and numerous push button options. Standard accessories include a battery charger, AC power supply, tubing, and manual. Carrying cases, calibration kits, and a built-in datalogger with cable and software are some of the optional accessories available.

The GD-444 Series is applicable for use in office ventilation systems, cooling systems, hazardous environments, laboratory and research projects, food related industries, breweries, mushroom growing, greenhouse horticulture, welding, and various other applications where carbon dioxide or IAQ levels need monitoring.

CEA Instruments, Inc., Emerson, NJ

Reader Service No. 354

Labconco's New Protector® ClassMate™ Laboratory Fume Hoods Offer Enhanced Visibility for Chemistry Demonstrations and Student Work Observations

Labconco Corporation presents the new Protector ClassMate Laboratory Fume Hoods. These fully-featured by-pass hoods are designed to meet the needs of instructional laboratories. A large usable interior working depth of 26" and height of 48" provide ample space to conduct experiments. The clear, tempered safety glass back, sides and taller front viewing window provide enhanced visibility for conducting chemistry demonstrations or to observe students using the hood.

Features include a unique, ergonomic, 5° angled vertical-rising sash which may be raised from closed to 29" for easy loading and cleaning. A sash stop limits the working height of the sash to 18" to help conserve energy.

The hoods have a low profile trough below the air toil to contain spills. Interior cover plates and lift-away front panel provide easy access to plumbing lines, electricical wiring, sash weights and lighting fixtures. The low-mounted, factory-wired light and blower switches are ADA compliant.

All hoods are factory-prepared for up to 8 service fixtures (four controlled from the front of the hood and four from the base cabinet). Up to two duplex receptacles are factory-wired to the hood junction box.

The ClassMate Laboratory Fume Hoods are available in 4', 5' and 6'. HOPEC IV models with combination A-Style sashes are also available.

Labconco Corporation, Kansas City, MO

Reader Service No. 355

PBI Dansensor Food Processors Provide 100% Map Package Guarantee with On-line Point-of-Sealing Inspection System

The fully automatic, TGC in-line oxygen analyzer available from PBI Dansensor helps processors capture consumer appeal for MAP foods with 100% monitoring of every package to determine oxygen or oxygen and carbon dioxide content. Packaging, processing, quality control, distribution and marketing functions gain the assurance needed for preserving optimal flavor, color, vitamins, and sensory appeal of ESL (extended shelf life) food products.

The PBI Dansensor line of gas analyzers easily integrate with automated form/fill/seal, tray packing, and flow-wrapping machinery to provide a fast, efficient, non-destructive gas measurement at the point where the sealing jaws create the package seal. The 50 millisecond measurement time is barely noticeable and does not delay or impede packaging line output.

The user-defined, proportional electronic mixer (optional)/flow control automatically blends and maintains the desired oxygen level. Settings are entered into a pre-set program and assigned a name for easy identification and recall. Once selected, the program automatically sets blending ratios, achieving higher reliability with less operator dependent fault. An optional gas flush and gas mixing feature provides optimum accuracy and cost savings in the packaging process where supply gas and/or mixed gases, are mixed and dispensed as needed at the point of sealing, on a controlled basis.

Total package conformance is achieved with 100% package monitoring. An automatic alarm and start/stop function assures packaging line integrity. In addition, standard outputs are provided for continuous data-logging.

A convenient random spot test feature facilitates the initial set-up and can be used for spot testing on completed packages. Activation of the spot test mode is easily achieved without interrupting the packaging process.

PBI Dansensor America Inc., Glen Rock, NJ

Reader Service No. 356

Creation of New 3-A Entity Progresses

The 3-A Entity Organizing Committee met in early December to further consider development of an organizational structure that will incorporate all phases of the 3-A Standards program (development of 3-A standards, authorization of symbol use, etc.) Further details of the Entity program will be forthcoming. Existing standards writing and symbol authorizations programs are anticipated to remain unchanged under the new entity.

Founding members of the new 3-A entity include the International Association of Food Industry Suppliers (IAFIS), the International Association for Food Protection (IAFP), the International Dairy Foods Association (IDFA), American Dairy Products Institute (ADPI), and the 3-A Sanitary Standards Symbol Administrative Council.

Comments and questions may be directed to the following individuals: Charlie Bray, IAFIS, 703.761.2600; cbray@iafis.org; David Tharp, IAFP, 515.276.3344; dtharp@foodprotection.org; E. Linwood Tipton, IDFA, 202.737.4332; etipton@idfa.org; Warren S. Clark, Jr., ADPI, 312.782.4888; adpi@flash.net; and Vince Mills, Symbol Council; 319.286.9221; aaasansb@ia.net.

Dairy, Food and Environmental Sanitation, Vol. 22, No. 2, Pages 130-136

3-A® Sanitary Standards for Air Driven Sonic Horns for Dry Products, Number 49-01

Formulated by
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
United States Department of Agriculture – Dairy Programs (USDA)

It is the purpose of the IAFIS, IAFP, USPHS, DIC, and USDA in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Air-driven sonic horns specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAFIS, IAFP, USPHS, DIC and USDA at any time. The 3-A Sanitary Standards and 3-A Accepted Practices provide hygienic criteria applicable to equipment and systems used to produce, process, and package milk, milk products, and other perishable foods or comestibles. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A SCOPE

A1 These standards cover the sanitary aspects of air-driven sonic horns that dislodge particulates, enhance atomization, augment fluidization or are used in other ways to enhance the drying and/or recovery of dry products. Sonic horns shall begin at the downstream face of the filter element located at the compressed air connection of the driver and terminate at the discharge of the acoustic bell.

A2 In order to conform to these 3-A Sanitary Standards, sonic horns shall comply with the following design, material, and fabrication criteria.[1]

B DEFINITIONS

B1 *Product:* Shall mean dry milk, dry milk products, or other dry comestibles.

B2 *Sonic Horns:* Shall mean compressed air driven equipment that includes a driver, diaphragm, and bell which produces and directs acoustic energy.

B2.1 *Driver:* Shall mean that part of the sonic horn that houses the diaphragm, compressed air connections, vents and compressed air reservoir cavities.

B2.2 *Diaphragm:* Shall mean a flat, circular plate that is housed in the driver, and is vibrated between two metal seats by compressed air to produce the sound.

B2.3 *Bell or Horn:* Shall mean the hollow cone or tube protruding from the driver which amplifies the sound created by the diaphragm.

B3 Surfaces

B3.1 *Product Contact Surface:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids and/or solids may drain, drop, diffuse, or be drawn into the product.

B3.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

[1] Use current revisions or editions of all referenced documents cited herein.

B4 **Cleaning**

B4.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall denote cleaning, solely by circulation and/or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned, by mechanical means in equipment specifically designed for this purpose.

B4.2 *Manual (COP) Cleaning:* Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

B5 **Coating**

B5.1 *Engineering Plating:* Shall mean plated to specific dimensions or processed to specific dimensions after plating.[2]

B6 *Bond*: Shall mean the adhesive or cohesive forces holding materials together. This definition excludes press and shrink fits.

B7 *Corrosion Resistant:* Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use, including expected contact with product and cleaning, sanitizing, or sterilization compounds or solutions.

B8 *Easily or Readily Accessible:* Shall mean a location which can be safely reached by personnel from a floor, platform, or other permanent work area.

B9 *Easily or Readily Removable:* Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B10 *Nontoxic Materials:* Shall mean those substances which under the conditions of their use are in compliance with applicable requirements of the Food, Drug, and Cosmetic Act of 1938, as amended.

B11 *Simple Hand Tools:* Shall mean implements such as a screwdriver, wrench, or mallet normally used by operating and cleaning personnel.

[2]Federal Specification #QQ-C-320B for Chromium Plating (Electrodeposited) with Amendment 4. Federal Specification #QQ-N-290A for Nickel Plating (Electrodeposited). Available from the General Services Administration, Federal Supply Services Bureau, Specification Section, 470 East L'Enfant Plaza, Suite 8100, Washington, DC 20407 (202) 755-0325.

[3]The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-1. Available from the American Iron and Steel Society, 186 Thorn Hill Road, Warrendale, PA 15086 (724) 776-1535.

C **MATERIALS**

C1 Metals

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[3] (excluding 301, and 302) or corresponding Alloy Cast Institute (ACI) types[4] (See Appendix, Section E), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C1.1.1 Driver parts may be covered with an engineering plating of chromium or nickel.

C2 **Nonmetals**

C2.1 Rubber and rubber-like materials may be used for O-rings, and parts having the same functional purposes.

C2.1.1 Rubber and rubber-like materials when used for the above-specified application(s) shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C2.2 Plastic materials may be used for O-rings and parts having the same functional purposes.

C.2.2.1 Plastic materials when used for the above-specified application(s) shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C2.3 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C2.4 The adhesive, if used on bonded rubber and rubber-like materials and bonded plastic materials, shall be nontoxic.[5]

C3 **Nonproduct Contact Surface**

C3.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. Nonproduct contact surfaces

[4]Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

[5]Adhesives shall comply with 21 CFR 175 - Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 512-1800.

shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D FABRICATION

D1 **Surface Texture**

D1.1 All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds, and crevices in the final fabricated form. (See Appendix, Section F.)

D2 **Permanent Joints**

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded.

D2.1.1 Welding shall produce product contact surfaces which are at least as smooth as a No. 4 ground finish on stainless steel sheets and which are free of imperfections such as pits, folds, and crevices.

D3 **Bonded Materials**

D3.1 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D4 **Coatings**

D4.1 Coatings, if used, shall be free from surface delamination, pitting, flaking, spalling, blistering, and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

D4.2 The minimum thickness of electrodeposited coatings shall not be less than 0.0002 in. (0.005 mm) for all product contact surfaces.

D5 **Cleaning and Inspectability**

D5.1 Sonic horns that are to be mechanically cleaned shall be designed so that the product contact surfaces of the sonic horns and all nonremoved appurtenances thereto can be mechanically cleaned and are easily accessible, readily removable, and inspectable.

D5.2 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible for cleaning and inspection either when in an installed position or when removed. Demountable parts shall be readily removable.

D6 **Draining**

D6.1 All product contact surfaces shall be self-draining except for normal clingage.

D7 **Fittings**

D7.1 All sanitary fittings and connections shall conform to applicable provisions of 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D8 **Sanitary Tubing**

D8.1 Metal tubing shall conform to the provisions for welded sanitary product pipelines found in Section G of the 3-A Accepted Practices, Number 605-[6] and to the 3-A Sanitary Standards, Number 33-.

D9 **Gaskets**

D9.1 Gaskets having a product contact surface shall be removable or bonded.

D9.2 Grooves in gaskets shall be no deeper than their width, unless the gasket is readily removable and reversible for cleaning.

D9.3 Gasket grooves or gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm) and those provided for in D7.1.

D10 **Radii**

D10.1 All internal angles of less than 135° on product contact surfaces shall have radii of not less than 1/4 in. (6.35 mm), except that:

D10.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those on intricately machined parts of the acoustical chamber. In no case shall such radii be less than 1/32 in. (0.794 mm).

D10.1.2 The radii in grooves in gaskets or gasket retaining grooves shall be not less than 1/8 in. (3.18 mm),

---

[6]Criteria for hygienic welds may be found in AWS/ANSI D18.1 – *Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications*. Available from the American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, phone: (305) 443-9353, fax: (305) 443-7559, e-mail: info@amweld.org; and EHEDG Doc. 9 – Welding Stainless Steel to Meet Hygienic Requirements. Available from the European Hygienic Equipment Design Group, Ellen Moens, Avenue Grand Champ 148, 1150 Brussels, Belgium.

except for those for standard 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in Section D7.1.

D10.1.3 Radii in standard O-ring grooves shall be as specified in Appendix, Section H.

D10.1.4 Radii in nonstandard O-ring grooves shall be those radii closest to a standard O-ring as specified in Appendix, Section H.

D10.1.5 When the thickness of one or both parts joined is less than 3/16 in. (4.76 mm), the minimum radii for fillets of welds on product contact surfaces shall be not less than 1/8 in. (3.18 mm).

D11 **Threads**

D11.1 There shall be no threads on product contact surfaces.

D12 **Pressurized Air**

D12.1 Equipment for producing air under pressure and/or piping which is supplied as an integral part of the air driven sonic horn shall comply with the applicable provisions of the 3-A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products, and Product Contact Surfaces, Number 604-, except that:

D12.1.1 A sanitary check valve is not required, and

D12.1.2 A disposable media filter is not required close to the point of air application if corrosion resistant piping, such as stainless steel tubing or flexible plastic tubing, is used to conduct the air from an upstream-located pipeline filter which meets the requirements of Section C2.2 of 3-A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products, and Product Contact Surfaces, Number 604-.

D13 **INSTALLATION CRITERIA**

D13.1 The method of installation of the sonic horn to the equipment shall allow all or part of the sonic horn to be easily removed from the equipment and mounting apparatus for complete inspection and cleaning.

D13.2 The mounting apparatus shall be of such design and construction that the inner surfaces drain into the equipment and if the equipment is designed for mechanical cleaning, the inner surface of the mounting apparatus shall be relatively flush with the inner surface of the equipment.

D13.3 The exterior flare shall be pitched so that liquids cannot accumulate.

D14 **Nonproduct Contact Surfaces**

D14.1 Nonproduct contact surfaces shall have a relatively smooth finish, be readily cleanable and those surfaces to be coated shall be effectively prepared for coating. Nonproduct contact surfaces shall be free of cracks and crevices.

APPENDIX

E STAINLESS STEEL MATERIALS

E1 Stainless steel conforming to the applicable composition ranges established by AISI[3] for wrought products, or by ACI[4] for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding

TABLE 1

WROUGHT PRODUCTS TYPICALLY USED			
UNS #	**ASTM[7]**	**AISI/SAE[3]**	**Properties**
S30300	A-582	303	Free-Machining S.S.; Austenitic
S30400	A-276 A-666	304	Austenitic S.S.
S30403	A-276 A-666	304L	Low Carbon Austenitic S.S.
S31600	A-276 A-666	316	Austenitic S.S. plus Mo*
S31603	A-276 A-666	316L	Low Carbon Austenitic S.S. plus Mo*

*Molybdenum

TABLE 2

CAST PRODUCTS			
UNS #	**ASTM[7]**	**ACI[4]**	**Common Names**
J92500	A-351 A-743 A-744	CF-3	Cast 304L
J92800	A-351 A-743 A-744	CF-3M	Cast 316L
J92600	A-351 A-743 A-744	CF-8	Cast 304
J92900	A-351 A-743 A-744	CF-8M	Cast 316
J92180	A-747	CB7 Cu — 1	Cast 17-4 PH
J92110	A-747	CB7 Cu —2	Cast 15-5 PH
N26055	A-494	CY5Sn BiM	Alloy 88
J92701	A-743	CF-16F	Free Machining Austenitic S.S.

[7]Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Phone: (610) 832-9500.

TABLE 3 - OPTIONAL METAL ALLOY

Optional metal alloys having the following compositions are examples considered in compliance with Section C herein. (Percentages are maximum unless range is given.)

	UNS N08367	UNS S21800	UNS S20161	UNS N26055	UNS N26455	UNS S17400	UNS S15500	UNS S32900	UNS R20500	UNS R50400
	ASTM A743 Grade CN-3MN	ASTM A743 Grade CF-10 SMnN		ASTM A494 Grade CY5SnBIM	ASTM A494 Grade CW-2M	ASTM A747 Grade CB7Cu-1	ASTM A747 Grade CB7Cu-2		ASTM A560 Grade 50Cr-50Ni	ASTM B67 Grade C-2
C	0.03	0.10	0.15	0.05	0.02	0.07	0.07	0.20	0.10	0.10
Mn	2.00	7.00-9.00	4.00-6.00	1.5	1.00	0.70	0.70	1.00	0.30	
Si	1.00	3.50-4.50	3.00-4.00	0.5	0.80	1.00	1.00	0.75	1.00	
P	0.040	0.040	0.040	0.03	0.03	0.035	0.035	0.040	0.02	
S	0.010	0.030	0.040	0.03	0.03	0.03	0.03	0.030	0.02	
Cr	20.0-22.0	16.00-18.00	15.0-18.0	11.0-14.0	15.0-17.5	5.50-17.7	14.0-15.50	23.0-28.0	48.0-52.0	
Ni	23.5-25.5	8.00-9.00	4.00-6.00	Balance	Balance	3.60-4.60	4.50-5.50	2.50-5.00	Balance	
Mo	6.0-7.0			2.0-3.5	15.0-17.5			1.00-2.00		
Cb						0.15-0.35	0.15-0.35			
Cu	0.75					2.50-3.20	2.50-3.20			
N	0.18-0.26	0.08-0.18	0.08-0.20			0.05	0.05		0.30	
Fe	Balance	Balance	Balance	2.00	2.00	Balance	Balance	Balance	1.00	0.30
Sn				3.0-5.0						
Bi				3.0-5.0						
W					1.0					
Ti									0.50	Balance
Al									0.25	
Other										H = 0.015 N = 0.03 O = 0.25

E2 Metal alloys or metals other than the above may be as corrosion resistant as 300 Series Stainless steel. This may be shown when metal alloys or metals are tested in accordance with ASTM G31 Laboratory Immersion Corrosion Testing of Metals and have a corrosion rate of less than 10 mil per year. The test parameters such as the type of chemical(s), their concentration(s), and temperature(s) should be representative of cleaning and sanitizing conditions used in dairy equipment. Alloys containing lead, leachable copper, or other toxic metals should not be used.

is involved, the carbon content of the stainless steel should not exceed 0.08 percent.

F **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum R_a of 32 µin. (0.80 µm), when measured according to the recommendations in American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)[8] B46.1 – *Surface Texture*, is considered to be equivalent to a No. 4 finish.

G **RECOMMENDATIONS FOR CLEANING SONIC HORNS**

G1 **Dry Cleaning Program**

G1.1 Remove driver from the bell and dry clean and thoroughly vacuum all product contact surfaces.

G1.2 Thoroughly clean all external parts of the sonic horn.

G2 **WET CLEANING PROGRAM**

G2.1 Remove the driver and dry clean as described in G1.1. Remove all loose dry product and hand wash or mechanically clean the bell.

G2.2 Allow all parts to air dry completely prior to reassembly.

G3 **GENERAL**

G3.1 Provide means to prevent operation of the horn during cleaning.

G3.2 Vacuum cleaning is preferred to brush cleaning or cleaning with air under pressure as it decreases dust drift to other parts of the plant.

G3.3 Brushes or vacuum cleaner fittings used for cleaning product contact surfaces should not be used for cleaning nonproduct contact surfaces or for other uses which might result in contamination. Such tools should be made of materials that can be cleaned and sanitized and should not have wooden parts nor be of mild steel or other iron products that will rust. Such brushes and special fittings should be stored in an enclosed cabinet when not in use. For protection and housekeeping considerations, such cabinets should be of non-wood construction and should have open mesh metal shelving.

TABLE 4 — Minimum Groove Radii Dimensions for Standard O-Rings

O-Ring Cross Section, Nominal (AS 568[9])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[10])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

H O-RING GROOVE RADII

I ENGINEERING DESIGN AND TECHNICAL CONSTRUCTION FILE

The following is an example of an engineering design and technical construction file (EDTCF) to be maintained by the fabricator as evidence of complying with 3-A Sanitary Standards or 3-A Accepted Practices. (The file may contain more or less information as applicable to the equipment or system.)

I1 Purpose

I1.1 To establish and document the material, fabrication, and installation (where appropriate) requirements for the engineering design and technical construction files for all products, assemblies, and sub-assemblies supplied by the manufacturer thereof to be in compliance with the sanitary criteria found in 3-A Sanitary Standards or 3-A Accepted Practices. It is recommended that the engineering and construction file or files be submitted with applications for 3-A Symbol use authorization.

I2 Scope

I2.1 This EDTCF applies to equipment specified by:

I2.1.1 3-A Sanitary Standards for Air Driven Sonic Horns for Dry Products, Number 49-01.

I2.1.2 List all applicable 3-A Sanitary Standards and 3-A Accepted Practices.

I3 Responsibilities

I3.1 This EDTCF is maintained by: The Engineering Manager (or other company official) **{name and title of responsible official}** is responsible for maintaining, publishing, and distributing this EDTCF.

I3.2 Implementation: All divisions, specifically development engineering, standards engineering, sales engineering, and product departments are responsible for implementing this EDTCF.

I4 Applicability

I4.1 The 3-A Sanitary Standards and 3-A Accepted Practices are voluntarily applied as suitable sanitary criteria for dairy and food processing equipment. 3-A Sanitary Standards are referenced in the Grade A Pasteurized Milk Ordinance: "Equipment manufactured in conformity with 3-A Sanitary Standards complies with the sanitary design and construction standards of this Ordinance."

I5 References

I5.1 List any additional regulations that apply to the equipment or system covered by this EDTCF.

I5.2 Date of conformity or 3-A Symbol Authorization and certificate number, if authorized.

I6 Design and Technical Construction File

I6.1 The Engineering Design and Technical Construction File may consist of the following:

a. an overall drawing of the subject equipment;
b. full detailed drawings, accompanied by any

[8]Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392 (212) 705-7722.

[9]The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15086 (412-776-4970).

[10]The document establishing these standard dimensions is ISO 3601-1: published by the International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 58, CH 1 1211, Geneva, Switzerland (41-22-734-1240).

calculations, notes, test results, etc. required to check the conformity of the equipment with the 3-A Standards or 3-A Practices;

c. a list of:

(1) the essential requirements of the standards or practices;

(2) other technical specifications, which were used when the equipment was designed;

d. a description of methods adopted;

e. if essential, any technical report or certificate obtained from a competent testing body or laboratory;

f. any technical report giving the results of tests carried out internally by Engineering or others;

g. documentation and test reports on any research or tests on components, assemblies and/or the complete product to determine and demonstrate that by its design and construction the product is capable of being installed, put into service, and operated in a sanitary manner (optional);

h. a determination of the foreseeable lifetime of the product (optional);

i. a copy of the instructions for the product (Instruction Manuals/Instruction Books);

j. for serial manufacturing, the internal measures that will be implemented to insure that the equipment will continue to be manufactured in conformity with the provisions of the 3-A Sanitary Standards or 3-A Accepted Practices;

k. engineering reports;

l. laboratory reports;

m. bills of material;

n. wiring diagrams, if applicable;

o. sales order engineering files;

p. hazard evaluation committee reports, if executed;

q. change records;

r. customer specifications;

s. any notified body technical reports and certification tests;

t. copy of the 3-A Symbol authorization, if applicable.

I6.2 The file does not have to include detailed plans or any other specific information regarding the sub-assemblies, tooling, or fixtures used for the manufacture of the product unless a knowledge of them is essential for verification of conformity with the basic sanitary requirements found in 3-A documents.

I6.3 The documentation referred to in I6.1 above need not permanently exist in a material manner in the EDTCF, but it must be possible to assemble them and make them available within a period of time commensurate with its importance (one week is considered reasonable time). As a minimum, each product EDTCF must physically contain an index of the applicable document of I6.1 above.

I6.4 The EDTCF may be in hard copy or software form.

I7 **Confidentiality**

I7.1 The EDTCF is the property of the manufacturer and is shown at their discretion, except that all or part of this file will be available to the 3-A Symbol Council or a regulatory agency for cause and upon request.

I8 **File Location**

I8.1 The EDTCF shall be maintained at **{location}**.

I9 **File Retention**

I9.1 The EDTCF (including all documentation referred to in I6.1) shall be retained and kept available for 12 years following the date of placing the product in use or from the last unit produced in the case of series manufacture.

These standards are effective November 20, 2001.

Dairy, Food and Environmental Sanitation, Vol. 22, No. 2, Pages 137-143

3-A® Sanitary Standards for Level Sensing Devices for Dry Products, Number 50-01

Formulated by
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
United States Department of Agriculture – Dairy Program (USDA)

It is the purpose of the IAFIS, IAFP, USPHS, DIC, and USDA in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Dry product level sensing device specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAFIS, IAFP, USPHS, DIC, and USDA at any time. The 3-A Sanitary Standards and 3-A Accepted Practices provide hygienic criteria applicable to equipment and systems used to produce, process, and package milk, milk products, and other perishable foods or comestibles. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A **SCOPE**

A1 These standards cover the sanitary aspects of devices, excluding load cells, which have product contact surfaces and are used on dry products, storage vessels or equipment for sensing product level.

A2 In order to conform to these 3-A Sanitary Standards, dry product level sensing devices shall comply with the following design, material, and fabrication criteria.[1]

B **DEFINITIONS**

B1 *Product:* Shall mean dry milk, dry milk products, or other dry comestibles.

B2 **Surfaces**

B2.1 *Product Contact Surfaces:* Shall mean all surfaces that are exposed to the product and surfaces from which product may drain, drop, diffuse, or be drawn into the product.

B2.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B3 **Cleaning**

B3.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall mean soil removal by impingement, circulation, or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means in equipment or systems specifically designed for this purpose.

B3.2 *Manual (COP) Cleaning:* Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

B4 *Bond*: Shall mean the adhesive or cohesive forces holding materials together. This definition excludes press and shrink fits.

B5 *Corrosion Resistant:* Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use, including expected contact with product and cleaning, sanitizing, or sterilization compounds or solutions.

B6 *Easily or Readily Accessible:* Shall mean a location which can be safely reached by personnel from a floor, platform, or other permanent work area.

[1]Use current revisions or editions of all referenced documents cited herein.

B7 **Surface Modification**[2]

B7.1 *Coatings:* Shall mean the results of a process where a different material is deposited to create a new surface. There is appreciable, typically more than 1 μm, build-up of new material. The coating material does not alter the physical properties of the substrate.

B7.1.1 Coating processes include:

1. Engineering Plating (e.g., Electrodeposition,[3] gold plating).

B8 *Easily or Readily Removable:* Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B9 *Inspectable*: Shall mean all product contact surfaces can be made available for close visual observation.

B10 *Nontoxic Materials*: Shall mean those substances which under the conditions of their use are in compliance with the applicable requirements of the Food, Drug and Cosmetic Act of 1938, as amended.

B11 *Simple Hand Tools:* Shall mean implements, such as a screwdriver, wrench, or mallet normally used by operating and cleaning personnel.

C **MATERIALS**

C1 **Metals**

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series,[4] (except 301 and 302) or corresponding Alloy Cast Institute (ACI)[5] types (See Appendix, Section E), aluminum alloys conforming to the Aluminum Association designations 5052 and 6061[6], or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C1.2 Product contact surfaces made of materials provided for in C1.1 may be covered with an engineering plating of chromium.[3]

C2 **Nonmetals**

C2.1 Rubber and rubber-like materials may be used for gaskets, diaphragms, bonded coatings and coverings, and parts having the same functional purposes.

C2.1.1 Rubber and rubber-like materials when used for the above-specified applications shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C2.2 Plastic materials may be used for bearings, bushings, connecting rods, gaskets, bonded coatings and coverings, and parts having the same functional purposes.

C2.2.1 Plastic materials, when used for the above-specified application(s), shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C2.3 Rubber and rubber-like materials and plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C2.4 The adhesive, if used on bonded rubber and rubber-like materials and bonded plastic materials, shall be nontoxic.[7]

C2.5 Where materials having certain inherent functional purposes are required for specific applications, such as rotary seals, carbon and/or ceramic materials may be used. Carbon tungsten carbide and/or ceramic materials shall be inert, nonporous, nontoxic, nonabsorbent, insoluble, resistant to scratching, scoring, and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C3 **Nonproduct Contact Surfaces**

C3.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating

[2]Additional information on surface modification is contained in *Advanced Materials and Processes*, Volume 137(1), "Coatings and Coating Practices" by H. Herman, "Surface Modification" by F. A. Smidt, p. 61. ASM International, Materials Park, OH 44073 (216) 338-5151.

[3]Federal Specification #QQ-C-320B for Chromium Plating (Electrodeposited), with Amendment 4. Federal Specification #QQ-N-290A for Nickel Plating (Electrodeposited. Available from the General Services Administration, Federal Supply Services Bureau, Specification Section, 470 East L'Enfant Plaza, Suite 8100, Washington, DC 20407 (202) 755-0325.

[4]The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-1. Available from the American Iron and Steel Society186 Thorn Hill Rd., Warrendale, PA 15086 (724) 776-1535.

[5]Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

[6]Aluminum Association, 900 19th St., NW, Suite 300, Washington, DC 20006. Phone: 202-862-5100; Fax: 202-862-5164.

used shall adhere. All nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D FABRICATION

D1 Surface Texture

D1.1 All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds, and crevices in the final fabricated form. (See Appendix, Section F.)

D2 Permanent Joints

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded.

D2.1.1 Welding shall produce product contact surfaces which are at least as smooth as a No. 4 ground finish on stainless steel sheets and which are free of imperfections such as pits, folds, and crevices.

D3 Bonded Materials

D3.1 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound, so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D4 Coatings

D4.1 Coatings, if used, shall be free from surface delamination, pitting, flaking, spalling, blistering, and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

D4.2 The minimum thickness of electrodeposited coatings shall not be less than 0.0002 in. (0.005 mm) for all product contact surfaces.

D5 Cleaning and Inspectability

D5.1 Sensing devices that are to be mechanically cleaned shall be designed so that the product contact surfaces of the sensing device can be mechanically cleaned, and all nonremoved appurtenances thereto can be mechanically cleaned and are readily accessible for inspection.

[7]Adhesives shall comply with 21 CFR 175 – Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 512-1800.

D5.2 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible for cleaning and inspection either when in an installed position or when removed. Demountable parts shall be readily removable.

D6 Draining

D6.1 Product contact surfaces shall be self-draining except for normal clingage.

D7 Fittings

D7.1 All sanitary fittings and connections shall conform to the applicable provisions of 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D8 Instrument Connections

D8.1 All instrument connections having product contact surfaces shall conform to the applicable provisions of the 3-A Sanitary Standards for Sensors and Sensor Fittings and Connections Used on Milk and Milk Products Equipment, Number 74-.

D9 Gaskets

D9.1 Gaskets having a product contact surface shall be removable or bonded.

D9.2 Grooves in gaskets shall be no deeper than their width, unless the gasket is readily removable and reversible for cleaning.

D9.3 Gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm), and those provided for in 3-A Sanitary Standards referenced in Section D7.1 and D8.1.

D10 Radii

D10.1 All internal angles of less than 135° on product contact surfaces shall have radii of not less than 1/4 in. (6.35 mm), except that:

D10.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those in rotary seals. In no case shall such radii be less than 1/32 in. (0.793 mm).

D10.1.2 The radii in grooves in gaskets or gasket retaining grooves shall be not less than 1/16 in. (1.59 mm), except for those for standard 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in 3-A Sanitary Standard referenced in Section D7.1 and D8.1.

D10.1.3 Radii in standard O-ring grooves shall be as specified in Appendix H.

D10.1.4 Radii in nonstandard O-ring grooves shall be those radii closest to a standard O-ring as specified in Appendix H.

D10.1.5 When the thickness of one or both parts joined is less than 3/16 in. (4.76 mm), the minimum radii for fillets of welds on product contact surfaces shall be not less than 1/8 in. (3.18 mm).

D11 **Threads**

D11.1 There shall be no threads on product contact surfaces.

D12 **Springs**

D12.1 Coil springs shall be made from round stock. Any coil spring having product contact surfaces shall have at least 3/32 in. (2.38 mm) openings between coils, including the ends, when the spring is in the free position, and shall not have flattened ends.

D13 **Cable**

D13.1 Braided or twisted cable shall not be used as product or nonproduct contact surfaces.

D14 **Shafts and Bearings**

D14.1 Shafts of level sensors shall have a seal that is of a packless type and is sanitary in design, and shall be readily accessible and inspectable.

D14.2 Bearings having product contact surfaces shall be of a nonlubricated type.

D14.3 Where a shaft passes through a product contact surface, the portion of the opening surrounding the shaft shall be protected to prevent the entrance of contaminants.

D14.4 Lubricated bearings, including the permanently sealed type, shall be located outside the product contact surface with at least 1 in. (25.4 mm) of clearance, open for inspection, between the bearing and any product contact surface.

D15 **Pressurized Air**

D15.1 Equipment for producing air under pressure and/or piping which is supplied as an integral part of the sensing equipment shall comply with the applicable provisions of the 3-A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products, and Product Contact Surfaces, Number 604-, except that:

D15.1.1 A sanitary check valve is not required, and

D15.1.2 A disposable media filter is not required close to the point of air application if corrosion resistant piping, such as stainless steel tubing or flexible plastic tubing, is used to conduct the air from an upstream-located pipeline filter which meets the requirements of Section C2 of 3-A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products, and Product Contact Surfaces, Number 604-.

D16 **Nonproduct Contact Surfaces**

D16.1 Nonproduct contact surfaces shall have a smooth finish, be relatively free of pockets and crevices and be readily cleanable and those to be coated shall be effectively prepared for coating.

APPENDIX

E **STAINLESS STEEL MATERIALS**

E1 Stainless steel conforming to the applicable composition ranges established by AISI[4] for wrought products, or by ACI[5] for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08 percent.

TABLE 1

WROUGHT PRODUCTS TYPICALLY USED			
UNS #	ASTM[8]	AISI/SAE[4]	Properties
S30300	A-582	303	Free-Machining S.S.; Austenitic
S30400	A-276 A-666	304	Austenitic S.S.
S30403	A-276 A-666	304L	Low Carbon Austenitic S.S.
S31600	A-276 A-666	316	Austenitic S.S. plus Mo*
S31603	A-276 A-666	316L	Low Carbon Austenitic S.S. plus Mo*

*Molybdenum

TABLE 2

CAST PRODUCTS			
UNS #	ASTM[8]	ACI[5]	Common Names
J92500	A-351 A-743 A-744	CF-3	Cast 304L
J92800	A-351 A-743 A-744	CF-3M	Cast 316L
J92600	A-351 A-743 A-744	CF-8	Cast 304
J92900	A-351 A-743 A-744	CF-8M	Cast 316
J92180	A-747	CB7 Cu — 1	Cast 17-4 PH
J92110	A-747	CB7 Cu —2	Cast 15-5 PH
N26055	A-494	CY5Sn BiM	Alloy 88
J92701	A-743	CF-16F	Free Machining Austenitic S.S.

[8]Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Phone: (610) 832-9500.

TABLE 3 - OPTIONAL METAL ALLOY

Optional metal alloys having the following compositions are examples considered in compliance with Section C herein. (Percentages are maximum unless range is given.)

	UNS N08367	UNS S21800	UNS S20161	UNS N26055	UNS N26455	UNS S17400	UNS S15500	UNS S32900	UNS R20500	UNS R50400
	ASTM A743 Grade CN-3MN	ASTM A743 Grade CF-10 SMnN		ASTM A494 Grade CY5SnBiM	ASTM A494 Grade CW-2M	ASTM A747 Grade CB7Cu-1	ASTM A747 Grade CB7Cu-2		ASTM A560 Grade 50Cr-50Ni	ASTM B67 Grade C-2
C	0.03	0.10	0.15	0.05	0.02	0.07	0.07	0.20	0.10	0.10
Mn	2.00	7.00-9.00	4.00-6.00	1.5	1.00	0.70	0.70	1.00	0.30	
Si	1.00	3.50-4.50	3.00-4.00	0.5	0.80	1.00	1.00	0.75	1.00	
P	0.040	0.040	0.040	0.03	0.03	0.035	0.035	0.040	0.02	
S	0.010	0.030	0.040	0.03	0.03	0.03	0.03	0.030	0.02	
Cr	20.0-22.0	16.00-18.00	15.0-18.0	11.0-14.0	15.0-17.5	5.50-17.7	14.0-15.50	23.0-28.0	48.0-52.0	
Ni	23.5-25.5	8.00-9.00	4.00-6.00	Balance	Balance	3.60-4.60	4.50-5.50	2.50-5.00	Balance	
Mo	6.0-7.0			2.0-3.5	15.0-17.5			1.00-2.00		
Cb						0.15-0.35	0.15-0.35			
Cu	0.75					2.50-3.20	2.50-3.20			
N	0.18-0.26	0.08-0.18	0.08-0.20			0.05	0.05		0.30	
Fe	Balance	Balance	Balance	2.00	2.00	Balance	Balance	Balance	1.00	0.30
Sn				3.0-5.0						
Bi				3.0-5.0						
W					1.0					
Ti									0.50	Balance
Al									0.25	
Other										H = 0.015 N = 0.03 O = 0.25

E2 Metal alloys or metals other than the above may be as corrosion resistant as 300 Series Stainless steel. This may be shown when metal alloys or metals are tested in accordance with ASTM G31 Laboratory Immersion Corrosion Testing of Metals and have a corrosion rate of less than 10 mil per year. The test parameters such as the type of chemical(s), their concentration(s), and temperature(s) should be representative of cleaning and sanitizing conditions used in dairy equipment. Alloys containing lead, leachable copper, or other toxic metals should not be used.

F PRODUCT CONTACT SURFACE FINISH

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum R_a of 32 µin. (0.80 µm), when measured according to the recommendations in American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)[9] B46.1 – *Surface Texture*, is considered to be equivalent to a No. 4 finish.

G LOCATION OF LEVEL SENSING DEVICES

The installer of level-sensing devices should locate them to allow easy access from adjacent floor levels or catwalks so the devices can be easily dismantled for manual cleaning and/or inspection.

H O-RING GROOVE RADII

TABLE 4 — Minimum Groove Radii Dimensions for Standard O-Rings

O-Ring Cross Section, Nominal (AS 568[10])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[11])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

I **ENGINEERING DESIGN AND TECHNICAL CONSTRUCTION FILE**

The following is an example of an engineering design and technical construction file (EDTCF) to be maintained by the fabricator as evidence of complying with 3-A Sanitary Standards or 3-A Accepted Practices. (The file may contain more or less information as applicable to the equipment or system.)

I1 **Purpose**

I1.1 To establish and document the material, fabrication, and installation (where appropriate) requirements for the engineering design and technical construction files for all products, assemblies, and sub-assemblies supplied by the manufacturer thereof to be in compliance with the sanitary criteria found in 3-A Sanitary Standards or 3-A Accepted Practices. It is recommended that the engineering and construction file or files be submitted with applications for 3-A Symbol use authorization.

I2 **Scope**

I2.1 This EDTCF applies to equipment specified by:

I2.1.1 3-A Sanitary Standards for Level Sensing Devices for Dry Products, Number 50-01.

I2.1.2 List all applicable 3-A Sanitary Standards and 3-A Accepted Practices.

I3 **Responsibilities**

I3.1 This EDTCF is maintained by: The Engineering Manager (or other company official) **{name and title of responsible official}** is responsible for maintaining, publishing, and distributing this EDTCF.

I3.2 Implementation: All divisions, specifically development engineering, standards engineering, sales engineering, and product departments are responsible for implementing this EDTCF.

I4 **Applicability**

I4.1 The 3-A Sanitary Standards and 3-A Accepted Practices are voluntarily applied as suitable sanitary criteria for dairy and food processing equipment. 3-A Sanitary Standards are referenced in the Grade A Pasteurized Milk Ordinance: "Equipment manufactured in conformity to 3-A Sanitary Standards complies with the sanitary design and construction standards of this Ordinance."

I5 **References**

I5.1 List any additional regulations that apply to the equipment or system covered by this EDTCF.

I5.2 Date of conformity or 3-A Symbol Authorization and certificate number, if authorized.

I6 **Design and Technical Construction File**

I6.1 The Engineering Design and Technical Construction File may consist of the following:

a. an overall drawing of the subject equipment;
b. full detailed drawings, accompanied by any calculations, notes, test results, etc. required to check the conformity of the equipment with the 3-A Standards or 3-A Practices;
c. a list of:
   (1) the essential requirements of the standards or practices;
   (2) other technical specifications, which were used when the equipment was designed;
d. a description of methods adopted;
e. if essential, any technical report or certificate obtained from a competent testing body or laboratory;
f. any technical report giving the results of tests carried out internally by Engineering or others;
g. documentation and test reports on any research or tests on components, assemblies and/or the complete product to determine and demonstrate that by its design and construction the product is capable of being installed, put into service, and operated in a sanitary manner (optional);
h. a determination of the foreseeable lifetime of the product (optional);
i. a copy of the instructions for the product (Instruction Manuals/Instruction Books);
j. for serial manufacturing, the internal measures that will be implemented to insure that the equipment will continue to be manufactured in conformity to the provisions of the 3-A Sanitary Standards or 3-A Accepted Practices;

[9]Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392 (212) 705-7722.

[10]The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15086 (412-776-4970).

[11]The document establishing these standard dimensions is ISO 3601-1: published by the International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 58, CH 1 1211, Geneva, Switzerland (41-22-734-1240).

k. engineering reports;
l. laboratory reports;
m. bills of material;
n. wiring diagrams, if applicable;
o. sales order engineering files;
p. hazard evaluation committee reports, if executed;
q. change records;
r. customer specifications;
s. any notified body technical reports and certification tests;
t. copy of the 3-A Symbol authorization, if applicable.

I6.2 The file does not have to include detailed plans or any other specific information regarding the sub-assemblies, tooling, or fixtures used for the manufacture of the product unless a knowledge of them is essential for verification of conformity to the basic sanitary requirements found in 3-A documents.

I6.3 The documentation referred to in I6.1 above need not permanently exist in a material manner in the EDTCF, but it must be possible to assemble them and make them available within a period of time commensurate with its importance (one week is considered reasonable time). As a minimum, each product EDTCF must physically contain an index of the applicable document of I6.1 above.

I6.4 The EDTCF may be in hard copy or software form.

I7 **Confidentiality**

I7.1 The EDTCF is the property of the manufacturer and is shown at their discretion, except that all or part of this file will be available to the 3-A Symbol Council or a regulatory agency for cause and upon request.

I8 **File Location**

I8.1 The EDTCF shall be maintained at {**location**}.

I9 **File Retention**

I9.1 The EDTCF (including all documentation referred to in I6.1) shall be retained and kept available for 12 years following the date of placing the product in use or from the last unit produced in the case of series manufacture.

These standards are effective November 20, 2001.

Dairy, Food and Environmental Sanitation, Vol. 22, No. 2, Pages 144-150

3-A® Accepted Practices for Instantizing Systems, Number 608-02

Formulated by
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
United States Department of Agriculture – Dairy Programs (USDA)

It is the purpose of the IAFIS, IAFP, USPHS, DIC, and USDA in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Instantizing systems specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAFIS, IAFP, USPHS, DIC, and USDA at any time. The 3-A Sanitary Standards and 3-A Accepted Practices provide hygienic criteria applicable to equipment and systems used to produce, process, and package milk, milk products, and other perishable foods or comestibles. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A SCOPE

A1 These 3-A Accepted Practices shall pertain to the sanitary aspects of equipment in instantizing systems and include all equipment necessary for instantizing dry milk and dry milk products beginning with the equipment which receives the product to be instantized and terminating at the point the product is discharged to either the packaging system or storage. The instantizing systems include equipment used for moving and cleaning the air, heating and/or cooling air, conveying the product, moistening the product, additional drying of the product, removing the instantized product from the air and cooling the product.

A2 In order to conform to these 3-A Accepted Practices, equipment in instantizing systems shall comply with the following criteria for design, material, fabrication, processing air and moistening medium.[1]

B DEFINITIONS

B1 *Product:* Shall mean dry milk, dry milk products and fluid milk products.

B2 *Instantizing:* Shall mean the processes whereby dry milk and dry milk products are moistened, redried and cooled in such a manner to substantially improve its dispersion and reliquifying characteristics.

B3 *Moistening Medium:* Shall mean the moisture from steam or water or fluid milk or fluid milk product used to moisten the dry milk or dry milk product during the instantizing process.

B4 *Safe Water:* Shall mean water from a supply properly located, protected and operated and shall be of a safe sanitary quality. The water shall meet the standards prescribed in the National Interim Primary Drinking Water Regulations of the Environmental Protection Agency Office of Water Supply-EPA-570/9-76-3.

B5 *Processing Air:* Shall mean air prepared by filtration which is intended to be used in contact with the product for such purposes as heating, cooling, drying or conveying or will be used for sealing a bearing or similar purposes.

[1]Use current revisions or editions of all referenced documents cited herein.

B6 *Air to be Heated and Heated Air:* Shall mean processing air to be heated or which has been heated to at least 240°F (116°C).

B7 *Air not to be Heated:* Shall mean processing air which either will not be heated or will be heated to a temperature less than 240°F (116°C).

B8 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids and/or solids may drain, drop, or be drawn into the product.

B9 *Air Contact Surfaces:*

B9.1 Air contact surfaces, for air to be heated, shall mean all surfaces prior to coming in contact with the product, commencing at the discharge of the final air inlet filter(s) and ending at the first downstream product contact surface.

B9.2 Air contact surfaces for air not to be heated shall mean all surfaces prior to coming in contact with the product, commencing at the discharge of the final air filter(s) and ending at the first downstream product contact surface.

B9.3 Exhaust air contact surfaces shall mean the surfaces of the air ducts, plenum chamber(s), if provided, and appurtenances from the final product contact surface through the exhaust system.

B10 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B11 *Mechanical Cleaning or Mechanically Cleaned:* Shall denote cleaning, solely by circulation and/or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned, by mechanical means.

C MATERIALS

C1 The materials of product contact surfaces of equipment included in the instantizing system for which there are 3-A Sanitary Standards or 3-A Accepted Practices shall comply with the material criteria of the applicable Standards or Accepted Practices.

C2 All other product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[2] or corresponding Alloy Cast Institute (ACI) types[3] (See Appendix, Section G1), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C2.1 Plastic materials may be used for sight and/or light glasses, bearings, bushings, supports, short pieces of transparent tubing for observation purposes, short flexible connectors, scraper blades and sealing applications. These materials shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C2.2 Rubber and rubber-like materials may be used for scraper blades, short flexible connectors and sealing applications. These materials shall comply with 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C2.3 Cotton, wool, linen, silk or synthetic fibers may be used for filtering and/or screening surfaces or entrainment separators, and for short flexible connectors in dry product areas. These materials shall be nontoxic, relatively insoluble in water, easily cleanable, and shall not impart particulate matter or flavor to the product.

C2.4 Welded areas and the deposited weld material shall be substantially as corrosion-resistant as the parent material.

C2.5 Aluminum alloys conforming to the Aluminum Association[4] designated 5052 and 6061 may be used as product contact surfaces for dry product in vibrating trays in after-dryers.

C2.6 Product contact surfaces for dry product in dust collecting equipment shall conform to the applicable provisions of the 3-A Sanitary Standards for Bag Collectors for Dry Milk and Dry Milk Products, Number 40-.

C2.7 Heat resistant glass[5] may be used in sight and/or light ports.

[2]The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-1. Available from the American Iron and Steel Society, 186 Thorn Hill Road, Warrendale, PA 15086 (724) 776-1535.

[3]Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

[4]Aluminum Association, 900 19th St., NW, Suite 300, Washington, DC 20006. Phone: 202-862-5100; Fax: 202-862-5164.

[5]Glass of a borosilicate type with a coefficient of expansion between 30°C and 300°C between 3.0 and 3.5 parts per million per degree Celsius.

C3 Air contact surfaces for air to be heated, except for those of flexible connectors, heating coils, fans, burners and dampers, shall be of a corrosion-resistant metal that maintains its original surface characteristics under the environment of intended use, or is rendered corrosion resistant by a coating of corrosion-resistant material other than paint. If the portion of the plenum chamber at the inlet to the instantizing chamber is subject to washing, it shall be made of stainless steel.

C4 Air contact surfaces for air not to be heated shall meet the material requirements of a product contact surface.

C5 Filter media for intake air shall consist of one or more of the following: fiberglass with a downstream backing dense enough to prevent fiberglass break off from passing through, cotton flannel, wool flannel, spun metal, activated carbon, activated alumina, nonwoven fabric, absorbent cotton fiber, or other suitable materials, which under conditions of intended use, are nontoxic and nonshedding and which do not release toxic volatiles or other contaminants to the air, or volatiles which may impart any flavor or odor to the product. Chemical bonding materials contained in the media shall be nontoxic, nonvolatile and insoluble under all conditions of use. Disposable media shall not be cleaned and re-used. Note: Electronic air cleaners use electrostatic precipitation principles to collect particulate matter and therefore are not included in the preceding list of acceptable filter media. This does not preclude their use in instantizing systems upstream from the filter.

C6 Nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. Nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D FABRICATION

D1 The fabrication criteria of equipment included in the instantizing system for which there are 3-A Sanitary Standards or 3-A Accepted Practices shall be those of the applicable Standards or Accepted Practices.

D2 All other equipment shall conform to the following fabrication criteria.

D2.1 All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds, and crevices in the final fabricated form. (See Appendix, Section H.) Seam welds shall be smooth and pit free. Where grinding and polishing are required, such areas shall be at least as smooth as a ground finish obtained with 80 grit silicon carbide. Intricate fabricated and/or machined components shall be as smooth as a ground finish obtained with 80 grit silicon carbide, with welds pit free. If stainless steel sheets with a No. 2B finish are used, they shall be selected so as to be free of imperfections such as pits, folds and crevices in the fabricated form. Joints shall be smooth and shall be fabricated in a manner that the product contact surface is self-draining or self-purging. Permanent joints in metallic product contact surfaces shall be continuously welded.

D2.2 Product contact surfaces shall be easily accessible for thorough cleaning, either when in an assembled position or when removed. Parts that must be removed for cleaning shall be readily removable and easily dismantled, except (1) that high pressure liquid product lines and such parts as fan wheels, air lock valves, fluidizer valves, conveying mechanisms, and similar parts need only be readily accessible for cleaning, and (2) centrifugal atomizers and air dispenser cones need only be removable for cleaning.

D2.2.1 If no other means of easy access for cleaning is available, panels or doors shall be provided. They shall be constructed in a manner that will prevent the entrance of unfiltered air, and shall use hinges, wing nuts, latches and similar easy opening devices to allow easy access without special tools.

D2.3 Product contact surfaces intended for regular wet cleaning shall be self-draining or self-purging except for normal clingage, and except where self-draining is not feasible, other drying methods, including air drying, may be used.

D2.4 Internal angles of less than 135° on product contact surfaces shall have minimum radii of 1/4 in. (6.35 mm) except:

D2.4.1 Smaller radii may be used when they are required for essential functional reasons such as those in internal parts of mechanical collectors, collector systems, air lock blades, air distribution devices, filter frames, and rotary airlock endplates. In no case shall such radii be less than 1/32 in. (0.794 mm).

D2.4.2 The radii in grooves in gaskets or gasket retaining grooves shall be not less than 1/8 in. (3.18 mm) except for those for standard 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in Sections D2.4.6, D2.4.7 and D2.6.

D2.4.3 Radii in standard O-ring grooves shall be as specified in Appendix, Section O.

D2.4.4 Radii in nonstandard O-ring grooves shall be those radii closest to a standard O-ring as specified in Appendix, Section O.

D2.4.5 When the thickness of one or both parts joined is less than 3/16 in. (4.76 mm), the minimum radii for fillets of welds on product contact surfaces shall be not less than 1/8 in. (3.18 mm).

D2.4.6 Radii on atomizing devices may be less than 1/32 in. (0.794 mm). When the radius is less than 1/32 in. (0.794 mm), this internal angle must be readily accessible for cleaning and inspection.

D2.4.7 Minimum radii are not applicable in perforations of fluid bed screens that are slot-shaped, crescent-shaped, or that are round in shape and less than 1/16 in. (1.59 mm) diameter.

D2.5 Lapped joints in metallic product contact surfaces, except those in fluid beds, may be used for reasons of strength or fit provided that the finished joints are welded, ground and polished to meet the surface texture requirements of Section D 2.1, and the radii requirements of Section D 2.4.5 and are cleanable and free draining in the installed position.

D2.6 **Fluid Bed Perforations**

D2.6.1 Round perforations shall be not less than 0.012 in. (0.3048 mm) in diameter.

D2.6.2 Slot-shaped perforations shall be at least 0.0060 in. (0.1524 mm) wide, and at least 0.020 in. (0.508 mm) long.

D2.6.3 Crescent-shaped perforations shall be at least 0.004 in. (0.1016 mm) wide at the widest part of the opening and the perforations shall be at least 0.020 in. (0.508 mm) long. Internal angles of the perforations shall be well defined and free of crevices. One side of the screen may have indentations around the perforations. The other side may have projections around the perforations, together with shallow open grooves between the rows of perforations.

D2.6.4 Fluid bed screens shall be designed and equipped for mechanical cleaning.

D2.6.5 All perforations shall be free of burrs.

D2.6.6 Fluid bed screens shall be accessible for cleaning and inspection.

D2.7 There shall be no exposed threads or crevices on product contact surfaces except where required for functional and safety reasons such as high pressure liquid product lines, atomizing devices, air distribution devices, fire extinguishing nozzles, fan wheels, air lock valves, fluidizer valves and conveying mechanisms. The parts for which an exception is made that have exposed threads or crevices on product contact surfaces shall be designed to be mechanically cleaned or shall be readily accessible for cleaning.

D2.8 Flexible connections having product contact surfaces shall have straight sides without corrugations.

D3 Processing air contact surfaces shall be accessible and readily cleanable. If no other means of easy access for cleaning is available, panels or doors shall be provided. They shall be constructed in a manner that will prevent the entrance of unfiltered air, and shall use external hinges, wing nuts, latches and similar easy opening devices to allow easy access without special tools.

D4 Processing air contact surfaces for air not to be heated shall have continuous welds, with heat discoloration removed and shall be smooth, snag free, and pit-free. All surfaces shall be designed to be mechanically cleaned or shall be readily accessible for cleaning and inspection.

D5 The construction of the portions of the instantizing system having air contact surfaces such as sheet metal work, air heating equipment, filtering equipment and exhaust system shall be so constructed as to prevent the entrance of unfiltered air.

D6 When a fan is installed on the downstream side of the intake air filter, it shall be designed and installed in a manner to preclude entrance of contaminants to processing air.

D7 Fans of the air foil type shall be constructed with blade cavities sealed.

D8 Sanitary tubing and fittings shall conform to applicable provisions of the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-, 3-A Accepted Practices for Permanently Installed Product and Solution Pipelines and Cleaning Systems Used in Milk and Milk Product Processing Plants, Number 605-, and/or 3-A Sanitary Standards for Polished Metal Tubing for Milk and Milk Products, Number 33-, except:

D8.1 Those used in high pressure moistening medium lines.

D9 *Gaskets and Gasket Grooves on Product Contact Surfaces:* Gaskets having product contact surfaces shall be removable or permanently bonded to the surface. Any gasket groove or gasket retaining groove, except in the bonded area, shall be no deeper than its width and shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm). The minimum radius in a gasket groove or gasket retaining groove, other than those for standard 1/4 in. (6.35 mm) and smaller O-rings, shall not be less than 1/8 in. (3.18 mm). The minimum radii in grooves for standard 1/4 in. (6.35 mm) O-rings shall be not less than 3/32 in. (2.38 mm) and for standard 1/8 in. (3.18 mm) O-rings shall not be less than 1/32 in. (0.794 mm). Use of gasket positioning grooves or pins, premolded fitted gaskets or gaskets cut from sheet material is recommended.

D10 Openings in the top of a dryer for a centrifugal atomizer that is removed for cleaning shall have a permanently installed flange or ring around the opening that extends upward at least 1/2 in. (12.70 mm) above the opening for the centrifugal atomizer. Openings in product contact surfaces shall be provided with close fitting overlapping covers having a downward flange of at least 3/8 in. (9.52 mm), unless the opening is fitted with a permanently attached sanitary fitting conforming to D8.

D11 Bar screen and perforated plate may be used for after-dryers and dry product coolers or for screening and shall be easily removable, or shall be readily cleanable in place.

D12 Mechanical joints shall be dust-tight and splash-proof.

D13 *Nonproduct Contact Surfaces:* Nonproduct contact surfaces shall be smooth, free of pockets and crevices, and be readily cleanable and those to be coated shall be effectively prepared for coating.

D14 The means of support shall provide a clearance between the lowest part of the instantizer and the floor, with the exception of legs, of (1) at least 6 in. (152.4 mm) when the equipment outlines an area in which any point is less than 36 in. (914.4 mm) from the nearest edge of the area or (2) a clearance of at least 8 in. (203.2 mm) when any point is more than 36 in. (914.4 mm) from the nearest edge.

D15 Legs, if provided, shall be smooth with rounded ends and have no exposed threads. Legs made of hollow stock shall be sealed.

D16 Any bearing having a product contact surface shall be of a nonlubricated type. Lubricated type bearings shall be located outside the product area with at least 1 in. (25.4 mm) clearance between the bearing and any product contact surface to assure (1) that the product does not contact the bearing or lubricant and (2) lubricants and/or product do not build-up between the bearing and any product contact surface. When a shaft passes through a product contact surface, the portion of the opening surrounding the shaft shall be protected to prevent the entrance of contaminants.

D17 Ductwork of the product contact portion of the instantizing system that is designed to be separated or dismantled for cleaning shall be provided with tight fitting covers to be used when the ductwork is separated or dismantled to prevent fore or back draft and to segregate the dry areas from wet areas during clean-up.

D18 Ducts shall be designed and fabricated to minimize product accumulation.

D19 Air pressure seals between product and nonproduct contact areas shall be acceptable if the sealant air is applied at the properly designed pressure and if the sealant air is from a source complying with the applicable provisions of the 3-A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products, and Product Contact Surfaces, Number 604-.

D20 Belt conveyors shall conform to 3-A Sanitary Standards for Mechanical Conveyors for Dry Milk and Dry Milk Products, Number 41-.

D21 Conveyors utilizing air as the conveying medium shall conform to the 3-A Sanitary Standards for Pneumatic Conveyors for Dry Milk and Dry Milk Products, Number 39-.

E PROCESSING AIR

E1 The location and nature of adjacent structures and the variations of wind and weather shall be considered in selecting the location of the outside air intake opening(s). Air quality and source shall be considered when selecting the location of the inside air intake opening(s). Both inside and outside opening(s) shall be so located that they will reasonably insure that the character of the intake air will be suitable for its intended use.

E2 Outside intake openings shall be suitably protected against the admission of all foreign objects. Openings shall be provided with louvers which can be closed when processing equipment is not in use. Hoods shall be used over these openings to minimize the intake of rain, snow, dust or other foreign material. Openings shall be equipped with sturdy screens having opening not larger than 1/4 in. (6.35 mm) in any dimension.

E3 The air supply system and/or ducting shall be such that all of the air is caused to pass through properly installed air filters before coming in contact with product contact surfaces of the instantizing system.

E3.1 Processing air which will be heated before product contact shall be passed through a properly installed and maintained filter(s), selected to have a minimum average efficiency of 90% when tested in accordance with the ASHRAE Synthetic Dust Arrestance Test[6] when operated at its design face velocity.

E3.2 Processing air which will not be heated before product contact shall be passed through a properly installed and maintained filter(s), selected to have a minimum average efficiency of 85% when tested in accordance with the ASHRAE Atmospheric Dust Spot Method when operated at its design face velocity.

E4 Processing air exhausted from the processing equipment shall be through stacks or other openings located so as to minimize re-entry of exhausted air or product into process air contact and product surface areas, and to minimize accumulation of product on surrounding structures. Except for relatively small air quantities, such as from bin or hopper vents, all air shall be exhausted to the outside atmosphere.

E5 The instantizing system shall be designed and fabricated so that processing air exhausted from the equipment shall be substantially free of residual product.

E6 A self-closing head shall be installed at the terminal end of all ducts exhausting processing air to the atmosphere outside the building.

F **MOISTENING MEDIUM**

F1 Steam used as a moistening medium shall meet the criteria for culinary steam, as specified in 3-A Accepted Practices for A Method of Producing Steam of Culinary Quality, Number 609-.

[6]The method of making these tests will be found in the following references: Method of Testing Air Cleaning Devices, ASHRAE Standard 52-76. Available from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, 1791 Tulle Circle, NE, Atlanta, GA 30329. Ph: 404-636-8400; Fax: 404-321-5478.

F2 Water used as a moistening medium shall be of a safe sanitary quality. (See B4.)

F3 Liquid milk and liquid milk products used as a moistening medium shall be at least of equal sanitary quality to the product being instantized and shall be pasteurized prior to use. The pasteurization process shall comply with the 3-A Accepted Practices for Sanitary Construction, Installation, Testing, and Operation of High-Temperature Short-Time and Higher-Heat Shorter-Time Pasteurizer Systems, Number 603-.

APPENDIX

G **PRODUCT CONTACT SURFACE MATERIALS**

G1 Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C2 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%. The first reference cited in C2 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM specifications[7] A351/A351M, A743/A743M and A744/A744M.

H **PRODUCT CONTACT SURFACE FINISH**

H1 Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of subsection D1 and subsection D2.1.

I Experience in the use and operation of instantizing systems has proven certain practices to be satisfactory from a sanitary control and operational standpoint. The following set forth certain recommendations as a guide to control authorities and/or processors.

J **INSULATION**

J1 To assure proper operation and to prevent condensation, it is recommended that insulating and jacketing techniques be employed on equipment and cold air ducts where necessary.

[7]Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Phone: (610) 832-9500.

K **CLEANING**

K1 Equipment should be designed so that it can be inspected for cleanliness by either sight or touch, except in the case of mechanical cleaning and pipelines designed to be cleaned in place.

K2 Equipment should be cleaned as often as necessary to prevent contamination of product.

K3 Dry cleaning of normally dry equipment areas should be performed in accordance with need. Too frequent opening of equipment to dry clean may lead to increased contamination of product contact surfaces and should be avoided.

K4 Cleaning methods employing air under pressure should be used only when vacuum cleaning methods are inadequate.

K5 While cleaning the instantizing system, air complying with the pressure and source requirements of D19 should be applied to all air pressure seals provided for in D19.

K6 Hand and vacuum cleaner brushes, scoops, scrapers, and any other tools used in the dry cleaning of product and process air contact areas of equipment should not be used on any other surfaces. Such tools should be made of materials that can be cleaned and sanitized and should not have wooden parts nor be of mild steel or other iron products that will rust. They should be maintained in a sanitary manner and stored in clean, separate, labeled lockers or cabinets. Separate brushes, tools, and appliances should be provided and should not be used for the cleaning of other surfaces of equipment and processing areas.

K7 Suitable written cleaning procedures should be established.

K8 Wet cleaning of rooms should be avoided and done only when necessary.

L **MAINTENANCE**

L1 All equipment should be kept in good repair, free of cracks and corroded surfaces.

L2 Filters should be maintained and serviced on the basis of the manufacturer's instructions and specific operating history and experience. To prolong filter life, the use of prefilters is suggested. Filter installation should be provided with suitable air pressure gauges to indicated pressure drop as an aid to maintenance.

M **INSTANTIZING PROCESS ROOMS**

M1 The instantizing process rooms should be designed and maintained in such manner as to minimize the introduction and migration of airborne contamination.

M1.1 Rooms should be well ventilated, by means of mechanical ventilation if necessary, and free of objectionable odors.

M1.2 Intakes for mechanical ventilation supply systems should be fitted with suitable filters.

N **PRODUCT HANDLING**

N1 Transfer of product from one container to another should be accomplished with minimum exposure of product and product contact surfaces to the atmosphere and with minimum development of atmospheric dust load.

O **O-RING GROOVE RADII**

O-Ring Cross Section, Nominal (AS 568[8])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[9])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

[8]The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15086 (412-776-4970).

[9]The document establishing these standard dimensions is ISO 3601-1: 1988 (E), published by the International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 58, CH 1 1211, Geneva, Switzerland (41-22-734-1240).

These Amended Accepted Practices are effective November 20, 2001.

SAN DIEGO

IAFP 2002

89TH ANNUAL MEETING

June 30–July 3, 2002
San Diego, CA

Proposed Symposia

Biosecurity Issues Relating to Food

Minimizing *Salmonella* Enteritidis Risk in Shell Eggs

Emerging Technologies in Food Processing and Regulatory Implications

Alternative Approaches to Microbiological Risk Assessment

Sanitary Design of Plants and Equipment

Risk Management and Personal Hygiene

Microbiological Safety at Retail

Controlling *Clostridium perfringens* Hazards during Cooling

Innovations in Retail Food Safety

Integrated Approaches for Control of Food-borne Pathogens in Meat and Poultry

Issues in Cheese Safety

Dairy Waste Management Issues

The Role of Food Safety Professional in Investigating an Outbreak

Aquacultured Muscle Foods: Significant Microbial and Chemical Hazards

Changing Foodborne Illness Risks in Produce – GAPs Benchmarking

Listeria Research Update

Chronic Wasting Disease and Other Transmissible Spongiform Encephalopathies

Antibiotic Resistance in Humans and Feed Animals

Extended Shelf Life Meat Products – New Issues/New Cures

Water Quality after Disinfection Usage

Food Safety Education

Preharvest Control of *Escherichia coli* O157:H7

Current Issues in Seafood Safety

Applications of DNA Chip Technology in the Food Safety Area

Viruses in Food

Watch our Web site at **www.food.protection.org**
for the most up-to-date Annual Meeting information

SAN DIEGO
IAFP 2002
89TH ANNUAL MEETING

CONTRIBUTE TO THE FIFTH ANNUAL FOUNDATION FUND SILENT AUCTION TODAY!

The Foundation of the International Association for Food Protection will hold its Annual Silent Auction during IAFP 2002, the Association's 89th Annual Meeting in San Diego, California, June 30–July 3, 2002. The Foundation Fund supports the:

★ Ivan Parkin Lecture
★ Travel support for exceptional speakers at the Annual Meeting
★ Audiovisual Library
★ Developing Scientist Competition
★ Shipment of volumes of surplus *JFP* and *DFES* journals to developing countries through FAO in Rome

Support the Foundation by donating an item today. A sample of items donated last year included:

★ Charleston Sweetgrass Basket
★ Food Safety Videos & Publications
★ Jeff Gordon Jacket
★ Phantom of the Marsh Print
★ Waterford Crystal Frame
★ White House 2001 Ornament
★ Wine
★ Wisconsin Master Cheesemaker Cheese Selection

Complete the form and send it in today.

Description of auction items ______________________________
Estimated Value ______________________________
Name of Donor ______________________________
Company (if relevant) ______________________________
Mailing Address ______________________________
(Please specify: ❐ Home ❐ Work)
City ______________________________ State or Province ______________________________
Postal Code/Zip + 4 ______________________________ Country ______________________________
Telephone # ______________________________ Fax # ______________________________
E-mail ______________________________

Return to:

Donna Gronstal
International Association for Food Protection
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2864, USA
Fax: 515.276.8655
E-mail: dgronstal@foodprotection.org

International Association for Food Protection®

SPONSORSHIPS

We invite you to participate as a sponsor for IAFP 2002. Sponsorship participation provides an excellent opportunity to position your company or organization as a supporter of the Association.

Several exciting opportunities will be available in 2002. Please review the event listing to select the one that will best position your organization. Reservations will be taken in order received for any open sponsorship events. A waiting list for events with a right of first option will be established.

SPONSORSHIP EVENT LIST

Amount	Event
$16,000	Monday Evening Social
$14,000	Opening Reception (Sunday)
$14,000	Exhibit Hall Reception (Monday)
$10,000	President's Reception (Tuesday)
$7,500	Badge Holders w/Lanyards
$3,250	Exhibit Hall Pastries and Coffee (Monday Morning)
$2,750	Exhibit Hall Coffee Break (Monday Afternoon)
$3,250	Exhibit Hall Pastries and Coffee (Tuesday Morning)
$2,750	Coffee Break (Tuesday Afternoon)
$2,750	Coffee Break (Wednesday Morning)
$2,250	Coffee Break (Wednesday Afternoon)
$3,500	Spouse/Companion Hospitality Room
$3,500	Student PDG Luncheon (Sunday)
$3,000	IAFP New Member Orientation (Saturday)
$3,000	Affiliate Reception (Saturday)
$2,000	Exhibitor Move-in Refreshments (Sunday)
$1,800	Awards Banquet Flowers (Wednesday)
$1,750	Committee Day Refreshments (Sunday)
$1,000	Speaker Travel Support
$600	Golfers' Continental Breakfast (Sunday)
$Various	Golf Tournament Prizes (Sunday)

Partial sponsorship for the above events is available.
Contact Dave Larson for details.

SPONSORSHIP PARTICIPANT

Name ______________________________

Company ______________________________

Address ______________________________

City ______________________ State or Province ______________

Country ______________________ Postal Code/Zip + 4 ______________

Phone ______________________ Fax ______________

E-mail ______________________

Desired Event to Sponsor ______________________________

Amount Paid ______________

Payment: ❑ Check ❑ VISA ❑ Mastercard ❑ American Express

Account Number ______________________

Expiration Date ______________________

Cardholder Signature ______________________

Payment Must be Enclosed for Order to be Processed
★ US Funds on US Bank ★

Contact:

Dave Larson
Phone: 515.440.2810
Fax: 515.440.2809
E-mail: larson6@earthlink.net

SAN DIEGO

IAFP 2002

89th Annual Meeting

June 30–July 3, 2002

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

MEETING INFORMATION

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

Registration includes:

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

4 EASY WAYS TO REGISTER

Register online at www.foodprotection.org

or

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

Fax:	515.276.8655
Mail:	6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2864, USA
Phone:	800.369.6337; 515.276.3344

The early registration deadline is May 30, 2002.
After this date, late registration fees are in effect.

REFUND/CANCELLATION POLICY

Registration fees, less a $50 administration fee and any applicable bank charges, will be refunded for written cancellations received by June 7, 2002. No refunds will be made after June 7, 2002; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after July 8, 2002. Event and tour tickets purchased are nonrefundable.

International Association for Food Protection®

EXHIBIT HOURS

Sunday, June 30, 2002	8:00 p.m. – 10:00 p.m.
Monday, July 1, 2002	9:30 a.m. – 1:30 p.m. 3:00 p.m. – 6:30 p.m.
Tuesday, July 2, 2002	9:30 a.m. – 1:30 p.m.

DAYTIME TOURS

(Lunch included in all daytime tours)

Saturday, June 29, 2002	
Wine Country Tour	10:00 a.m. – 3:00 p.m.
Sunday, June 30, 2002	
Scenic San Diego by Land and Sea	10:00 a.m. – 3:00 p.m.
Monday, July 1, 2002	
La Jolla: The Jewel of San Diego	10:00 a.m. – 3:00 p.m.
Tuesday, July 2, 2002	
Behind the Scenes at the Wild Animal Park	9:00 a.m. – 2:00 p.m.

EVENING EVENTS

Sunday, June 30, 2002	
Opening Session	7:00 p.m. – 8:00 p.m.
Cheese and Wine Reception	8:00 p.m. – 10:00 p.m.
Monday, July 1, 2002	
Exhibit Hall Reception	5:00 p.m. – 6:30 p.m.
Monday Night Social at the San Diego Zoo	6:00 p.m. – 10:00 p.m.
Tuesday, July 2, 2002	
Dinner Cruise	6:00 p.m. – 10:00 p.m.
Wednesday, July 3, 2002	
Awards Banquet Reception	6:00 p.m. – 7:00 p.m.
Awards Banquet	7:00 p.m. – 8:00 p.m.

HOTEL INFORMATION

For reservations, contact the hotel directly and identify yourself as an International Association for Food Protection Annual Meeting attendee to receive a special rate of $143 per night, single or double. Make your reservations as soon as possible; this special rate is available only until May 30, 2002.

Hyatt Regency San Diego
One Market Place
San Diego, California 92101
Phone: 800.233.1234
619.232.1234

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

SAN DIEGO
IAFP 2002
89TH ANNUAL MEETING

Attendee Registration Form

June 30–July 3, 2002
San Diego, CA

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

Employer ______ Title ______

Mailing Address (Please specify: ❐ Home ❐ Work) ______

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

Telephone ______ Fax ______ E-mail ______

❐ First time attending meeting — Member since: ______

❐ Regarding the ADA, please attach a brief description of special requirements you may have.

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

PAYMENT MUST BE RECEIVED BY MAY 30, 2002 TO AVOID LATE REGISTRATION FEES

REGISTRATION FEES:	MEMBERS	NONMEMBERS	TOTAL
Registration (Awards Banquet included)	$ 295 ($345 late)	$ 445 ($495 late)	______
Association Student Member (Awards Banquet included)	$ 50 ($ 60 late)	Not Available	______
Retired Association Member (Awards Banquet included)	$ 50 ($ 60 late)	Not Available	______
One Day Registration: ❐ Mon. ❐ Tues. ❐ Wed.	$ 165 ($190 late)	$ 225 ($250 late)	______
Spouse/Companion* (Name): ______	$ 45 ($ 45 late)	$ 45 ($ 45 late)	______
Children 15 & Over* (Names): ______	$ 25 ($ 25 late)	$ 25 ($ 25 late)	______
Children 14 & Under* (Names): ______	FREE	FREE	______
*Awards Banquet not included			

EVENTS:		# OF TICKETS	
Student Luncheon (Sunday, 6/30)	$ 5 ($ 10 late)	______	______
Monday Night Social at the San Diego Zoo (Monday, 7/1)	$ 39 ($ 44 late)	______	______
Children 14 and under	$ 34 ($ 39 late)	______	______
Dinner Cruise (Tuesday, 7/2)	$ 70 ($ 75 late)	______	______
Awards Banquet (Wednesday, 7/3)	$ 45 ($ 50 late)	______	______

DAYTIME TOURS: (Lunch included in all daytime tours)			
Wine Country Tour (Saturday, 6/29)	$ 63 ($ 68 late)	______	______
Scenic San Diego by Land and Sea (Sunday, 6/30)	$ 68 ($ 73 late)	______	______
La Jolla: The Jewel of San Diego (Monday, 7/1)	$ 71 ($ 76 late)	______	______
Behind the Scenes at the Wild Animal Park (Tuesday, 7/2)	$ 76 ($ 81 late)	______	______

PAYMENT OPTIONS:

❐ Check Enclosed ❐ VISA ❐ MasterCard ❐

TOTAL AMOUNT ENCLOSED $ ______
US FUNDS on US BANK

Expiration Date ______

Name on Card ______

Signature ______

JOIN TODAY AND SAVE!!!
(Attach a completed Membership application)
(See page 164 of this issue
for a Membership application)

EXHIBITORS DO NOT USE THIS FORM

Coming Events

MARCH

•4-6, **Principles of Quality Assurance Seminar,** Manhattan, KS. For further information, contact AIB at 785.537.4750.

•7, **Controlling *Listeria* in Your Plant,** Nashville, TN. For further information, call Silliker Laboratories at 800.829.7879.

•7-10, **Meat and Poultry Industry Council Annual Conference,** Sheraton Hacienda del Mar Resort and Spa, Cabo del Sol, Mexico. For further information, contact Cheryl Clark at 703.684.1080.

•13-15, **Food Safety Summit and Expo,** Marriott Wardman Park Hotel, Washington, D.C. For further information, call 800.746.9646.

•13-15, **Idaho Environmental Health Association Spring Conference,** West Coast Park Center Suites, Boise, ID. For further information, contact Angela Markham at 208.239.5231.

•14-15, **Carolinas Association for Food Protection Annual Meeting,** Holiday Inn, Charlotte, NC. For further information, contact Beth Johnson at 803.896.0872.

•14-17, **Association of Water Technologies (AWT) Regional Training Seminar East,** The Holiday Inn Inner Harbor, Baltimore, MD. For more information, call AWT 800.858.6683.

•18-19, **HACCP I: Documentating HACCP Prerequisites,** Guelph Food Technology Center, Guelph, Ontario. For further information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.

•24-27, **International Conference on Emerging Infectious Diseases, 2002,** Hyatt Regency Hotel, Atlanta, GA. For further information, contact Charles Schable at cas1@cdc.gov.

•26-27, **Food Irradiation 2002 Conference,** Westin Park Central Hotel, Dallas, TX. For further information, call 207.781.9604.

APRIL

•3-5, **Missouri Milk, Food and Environmental Health Association Annual Meeting,** Ramada Inn, Columbia, MO. For further information, contact Linda Haywood at 417.962.4243.

•9-10, **Upper Midwest Dairy Industry Association Spring Meetings.** April 9, 2002 at the Best Western Hotel, Mankato, MN. April 10, 2002 at the Holiday Inn, Alexandria, MN. For further information, contact Paul Nierman at 763.785.0484.

•11-13, **International Fresh-cut Produce Assocation's (IFPA) 15th Annual Conference and Exhibition,** Millennium Biltmore Hotel and the Los Angeles Convention Center, Downtown Los Angeles, CA. For additional information, call 703.299.6282; Web site: www.fresh-cuts.org.

•18, **Indiana Environmental Health Association, Inc. Spring Conference,** Valle Vista, Greenwood. For further information, contact Helene Uhlman at 219.853.6358.

•19-24, **Conference for Food Protection,** Sheraton Nashville, Nashville, TN. For further information, contact Trevor Hayes at 408.848.2255; E-mail: TWHgilroy@aol.com.

•24-25, **HACCP Workshop,** Cherry Hill, NJ. For further information, contact AIB at 785.537.4750.

MAY

•6-7, **Food Plant Sanitation Workshop,** Atlanta, GA. For further information, contact AIB at 785.537.4750.

•8-10, **Environmental Health: Protecting Children,** West Coast Olympia Hotel, Olympia, WA. For further information, contact Rick Zahalka at 425.339.5250; E-mail: rzahalka@shd.snohomish.wa.gov.

•20-22, **Microbiology and Engineering of Sterilization Processes Course,** St. Paul, MN. For further information, contact Ms. Ann Rath at 612.626.1278.

•20-24, **3-A Sanitary Standards Committee Annual Meeting,** Sheraton Four Points Hotel, Milwaukee Airport, Milwaukee, WI. For more information, contact Tom Gilmore at 703.761.2600; E-mail: tgilmore@iafis.org.

JUNE

•4-6, **Penn State Food Microbiology Short Course: Detection and Control of Foodborne Pathogens**, Penn State Berks Campus, Reading, PA. For further information, Dr. Cathy Cutter at 814.865.8862; E-mail: cnc3@psu.edu.

•30-July 3, **IAFP 2002, the Association's 89th Annual Meeting,** San Diego, CA. Registration materials available in this issue of *DFES* on page 157 or Visit our Web site at **www. foodprotection.org** for the most up-to-date Annual Meeting information.

JULY

•12-19, **22nd International Workshop/Symposium on Rapid Methods and Automation in Microbiology,** Manhattan, KS. For further information, contact Daniel Y. C. Fung at 785.532.5654; E-mail: dfung@oznet.ksu.edu.

ADVERTISING INDEX

International Association for Food Protection®

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

Reader Service Card *DFES* February '02

Expires: May 31, 2002 (International expiration: August 31, 2002)

For information on membership with the International Association for Food Protection, Circle #100 on this card.

Name ______________________ Title ______________

Company ______________________

Address ______________________

City ______________________ State/Prov. ______________

Country ______________ Zip/Postal Code ______________

Phone Number ______________________

100	115	130	145	161	175	190	205	220	235	250	265	280	295	310	325	340
101	116	131	146	162	176	191	206	221	236	251	266	281	296	311	326	341
102	117	132	147	163	177	192	207	222	237	252	267	282	297	312	327	342
103	118	133	148	164	178	193	208	223	238	253	268	283	298	313	328	343
104	119	134	149	165	179	194	209	224	239	254	269	284	299	314	329	344
105	120	135	150	166	180	195	210	225	240	255	270	285	300	315	330	345
106	121	136	151	167	181	196	211	226	241	256	271	286	301	316	331	346
107	122	137	152	168	182	197	212	227	242	257	272	287	302	317	332	347
108	123	138	153	169	183	198	213	228	243	258	273	288	303	318	333	348
109	124	139	154	170	184	199	214	229	244	259	274	289	304	319	334	349
110	125	140	155	171	185	200	215	230	245	260	275	290	305	320	335	350
111	126	141	156	172	186	201	216	231	246	261	276	291	306	321	336	
112	127	142	157	172	187	202	217	232	247	262	277	292	307	322	337	
113	128	143	158	173	188	203	218	233	248	263	278	293	308	323	338	
114	129	144	160	174	189	204	219	234	249	264	279	294	309	324	339	

Career Service Section

FOOD MICROBIOLOGIST & HYGIENE EXPERT

Individual with a strong technical and managerial skills in private sector R&D, and Food Safety and Q.A. programs with a proven record of accomplishment in Food Hygiene, Sanitation and HACCP training. Has demonstrated expertise in AOAC, ASTM including rapid microbiology methods. Highly proficient in Environmental-hygiene plant audits. Has excellent communication skills with many technical presentations at IAFP, ASM & IFT.

- Established and implemented new programs for oxidative biocides for Food Retail, Service and Processing markets including site field trials.
- Performed and developed long-term R&D studies in food processing in assessment of cleaning, water treatment and fogging.
- Developed plant HACCP, SSOP and GLP manuals, as well as finished product and raw material specifications for major food processor. Implemented Environmental Sanitation programs for HACCP, conducted field audits for FDA plant clearances.

Interested in all Food Safety Hygiene opportunities. Interested parties should contact Charles Giambrone at 215-862-0388; E-mail: cjgiambr@pil.net.

IAFP Members

Did you know that you are eligible to place an advertisement if you are unemployed and looking for a new position? As a Member benefit, you may assist your search by running an advertisement touting your qualifications.

FOOD SAFETY INSPECTOR P/T — SET OWN HOURS

Company Overview:

Everclean is the National frontrunner in food safety audits, and on-site training. Our services and client list cannot be matched. For more information about our services, please visit our website at www.everclean services.com — if contacting us through our website, let us know you heard about our company on restaurantbeast.com.

Position Overview:

Our inspectors work under a subcontracting agreement and set their own hours. Payment is made monthly and calculated per audit which varies per account. Inspectors perform thorough audits, similar but more extensive than a health department inspection. Inspectors communicate with and train managers and hourly staff on-site. It's a great way for a professional and experienced EHS or equivalent to remain in their area of expertise while earning outside income under the umbrella of their own business (tax write offs may apply and the ability to set own hours is also a plus).

Current Opportunity Areas:

Los Angeles, CA	Jacksonville, FL
Las Vegas, NV	South Miami, FL
Chicago, IL	Memphis, TN
Nashville, TN	Tulsa, OK
Salt Lake City, UT	Fresno/Merced, CA
Austin, TX	Indianapolis, IN
Baton Rouge or New Orleans, LA	Denver, CO
Raleigh, NC	

Requirements:

REHS, EHO or equivalent

- Previous or current Health Department or similar experience
- Excellent communication, motivation and service skills
- Organized, responsible and able to set/follow schedule
- Bi-lingual preferred in some areas as needed but not required
- (Current HD officials are welcome! We can structure your inspections so they fall outside your current county so there is no conflict of interest.)

Contact:

Please send resume to:
info@evercleanservices.com,
or inquire at 1-877-5ECLEAN.

EVERCLEAN

The Table of Contents from the *Journal of Food Protection* is being provided as a Member benefit. If you do not receive *JFP*, but would like to add it to your Membership contact the Association office.

Journal of Food Protection

ISSN: 032-028X
Official Publication

International Association for Food Protection.

Reg. U.S. Pat. Off.

Vol. 65 | February 2002 | No. 2

Articles

Research Notes

* Asterisk indicates author for correspondence.

International Association for Food Protection®

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

The use of the Audiovisual Library is a benefit for Association Members. Limit your requests to five videos. Material from the Audiovisual Library can be checked out for 2 weeks only so that all Members can benefit from its use.

Member # ____________________

First Name ____________________ M.I. ______ Last Name ____________________

Company ____________________ Job Title ____________________

Mailing Address ____________________

(Please specify: ❒ Home ❒ Work)

City ____________________ State or Province ____________________

Postal Code/Zip + 4 ____________________ Country ____________________

Telephone # ____________________ Fax # ____________________

E-mail ____________________ Date Needed ____________________

(Allow 4 weeks minimum from time of request)

PLEASE CHECK THE APPROPRIATE BOX

For Association Members Only

AUDIOVISUAL LIBRARY

DAIRY

❒ D1180 10 Points to Dairy Quality
❒ D1010 The Bulk Milk Hauler: Protocol & Procedures
❒ D1030 Cold Hard Facts
❒ D1040 Ether Extraction Method for Determination of Raw Milk
❒ D1050 The Farm Bulk Milk Hauler (slides)
❒ D1060 Frozen Dairy Products
❒ D1070 The Gerber Butterfat Test
❒ D1080 High-Temperature, Short-Time Pasteurizer
❒ D1090 Managing Milking Quality
❒ D1100 Mastitis Prevention and Control
❒ D1110 Milk Plant Sanitation: Chemical Solution
❒ D1120 Milk Processing Plant Inspection Procedures
❒ D1130 Pasteurizer – Design and Regulation
❒ D1140 Pasteurizer – Operation
❒ D1150 Processing Fluid Milk (slides)

ENVIRONMENTAL

❒ E3010 The ABCs of Clean – A Handwashing & Cleanliness Program for Early Childhood Programs
❒ E3020 Acceptable Risks?
❒ E3030 Air Pollution: Indoor
❒ E3040 Asbestos Awareness
❒ E3055 Effective Handwashing-Preventing Cross-Contamination in the Food Service Industry
❒ E3060 EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Ceriodaphnia)
❒ E3070 EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Fathead Minnow Larva)
❒ E3075 EPA: This is Super Fund
❒ E3080 Fit to Drink
❒ E3110 Garbage: The Movie
❒ E3120 Global Warming: Hot Times Ahead
❒ E3130 Kentucky Public Swimming Pool & Bathing Facilities
❒ E3135 Plastic Recycling Today: A Growing Resource
❒ E3140 Putting Aside Pesticides
❒ E3150 Radon
❒ E3160 RCRA – Hazardous Waste
❒ E3170 The New Superfund: What It is & How It Works-(1) Changes in the Remedial Process: Clean-up Standards & State Involvement Requirements
❒ E3180 The New Superfund: What It is & How It Works-(2) Changes in the Removal Process: Removal & Additional Program Requirements
❒ E3190 The New Superfund: What It is & How It Works – (3) Enforcement and Federal Facilities
❒ E3210 The New Superfund: What It is & How It Works – (4) Emergency Preparedness & Community Right-to-Know
❒ E3220 The New Superfund: What It is & How It Works – (5) Underground Storage Tank Trust Fund & Response Program
❒ E3230 The New Superfund: What It is & How It Works – (6) Research & Development/Closing Remarks
❒ E3240 Sink a Germ
❒ E3245 Wash Your Hands
❒ E3250 Waste Not: Reducing Hazardous Waste

FOOD

❒ F2260 100 Degrees of Doom...The Time & Temperature Caper
❒ F2450 A Guide to Making Safe Smoked Fish
❒ F2005 A Lot on the Line
❒ F2440 Cleaning & Sanitizing in Vegetable Processing Plants: Do It Well, Do It Safely!
❒ F2010 Close Encounters of the Bird Kind
❒ F2015 Controlling *Listeria*: A Team Approach
❒ F2037 Cooking and Cooling of Meat and Poultry Products (2 Videos)
❒ F2030 "Egg Games" Foodservice Egg Handling and Safety
❒ F2020 Egg Handling & Safety
❒ F2036 Emerging Pathogens and Grinding and Cooking Comminuted Beef (2 Videos)
❒ F2035 Fabrication and Curing of Meat and Poultry Products (2 Videos)
❒ F2039 Food for Thought – The GMP Quiz Show
❒ F2040 Food Irradiation
❒ F2045 Food Microbiological Control (6 Videos)
❒ F2050 Food Safe – Food Smart – HACCP & Its Application to the Food Industry (Part 1&2)
❒ F2060 Food Safe – Series I (4 Videos)
❒ F2070 Food Safe – Series II (4 Videos)
❒ F2080 Food Safe – Series III (4 Videos)
❒ F2133 Food Safety First
❒ F2090 Food Safety: An Educational Video for Institutional Food-Service Workers
❒ F2100 Tape 1-Food Safety for Food Service: Cross Contamination
❒ F2101 Tape 2-Food Safety for Food Service: HACCP
❒ F2102 Tape 3-Food Safety for Food Service: Personal Hygiene
❒ F2103 Tape 4-Food Safety for Food Service: Time and Temperature Controls
❒ F2120 Food Safety: For Goodness Sake, Keep Food Safe
❒ F2110 Food Safety is No Mystery
❒ F2130 Food Safety: You Make the Difference
❒ F2125 Food Safety Zone: Basic Microbiology
❒ F2126 Food Safety Zone: Cross Contamination
❒ F2127 Food Safety Zone: Personal Hygiene
❒ F2128 Food Safety Zone: Sanitation
❒ F2135 Get with a Safe Food Attitude
❒ F2137 GMP Basics: Avoiding Microbial Cross-Contamination
❒ F2140 GMP Basics: Employee Hygiene Practices
❒ F2143 GMP Basics: Guidelines for Maintenance Personnel
❒ F2148 GMP – GSP Employee
❒ F2150 GMP: Personal Hygiene and Practices in Food Manufacturing
❒ F2147 GMP Basics: Process Control Practices
❒ F2160 GMP: Sources & Control of Contamination during Processing
❒ F2180 HACCP: Safe Food Handling Techniques
❒ F2169 HACCP:Training for Employees– USDA Awareness
❒ F2172 HACCP:Training for Managers
❒ F2170 The Heart of HACCP
❒ F2171 HACCP: The Way to Food Safety
❒ F2175 Inspecting For Food Safety – Kentucky's Food Code
❒ F2190 Is What You Order What You Get? Seafood Integrity
❒ F2210 Northern Delight – From Canada to the World
❒ F2240 On the Front Line
❒ F2250 On the Line
❒ F2270 Pest Control in Seafood Processing Plants
❒ F2280 Principles of Warehouse Sanitation
❒ F2290 Product Safety & Shelf Life
❒ F2220 Proper Handling of Peracidic Acid
❒ F2230 Purely Coincidental
❒ F2310 Safe Food: You Can Make a Difference
❒ F2320 Safe Handwashing
❒ F2325 Safe Practices for Sausage Production
❒ F2460 Safer Processing of Sprouts
❒ F2330 Sanitation for Seafood Processing Personnel
❒ F2340 Sanitizing for Safety
❒ F2350 SERVSAFE® Steps to Food Safety (6 Videos)
❒ F2430 Smart Sanitation: Principles & Practices for Effectively Cleaning Your Food Plant
❒ F2370 Supermarket Sanitation Program – "Cleaning & Sanitizing"
❒ F2380 Supermarket Sanitation Program – "Food Safety"
❒ F2390 Take Aim at Sanitation
❒ F2410 Wide World of Food-Service Brushes
❒ F2420 Your Health in Our Hands – Our Health in Yours

OTHER

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

Visit our Web site at www.foodprotection.org for detailed tape descriptions

International Association for Food Protection®

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

SHIP TO: (Please print or type. All areas must be completed in order to process.)

Member # ______________________

First Name ______________________ M.I. ________ Last Name ______________________

Company ______________________ Job Title ______________________

Mailing Address ______________________

(Please specify: ❐ Home ❐ Work)

City ______________________ State or Province ______________________

Postal Code/Zip + 4 ______________________ Country ______________________

Telephone # ______________________ Fax # ______________________

E-mail ______________________

BOOKLETS

Quantity	Description	Member or Gov't. Price	Non-Member Price	TOTAL
	Procedures to Investigate Waterborne Illness—2nd Edition	$10.00	$20.00	
	Procedures to Investigate Foodborne Illness—5th Edition	10.00	20.00	

SHIPPING AND HANDLING – $3.00 (US) $5.00 (Outside US)
Each additional booklet $1.50

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

Shipping/Handling ______

Booklets Total ______

OTHER PUBLICATIONS

Quantity	Description	Member or Gov't. Price	Non-Member Price	TOTAL
	Pocket Guide to Dairy Sanitation (minimum order of 10)	$ .60	$ 1.20	
	Before Disaster Strikes...A Guide to Food Safety in the Home (minimum order of 10)	.60	1.20	
	*Developing HACCP Plans – A Five-Part Series (as published in *DFES*)	15.00	15.00	
	*Surveillance of Foodborne Disease – A Four-Part Series (as published in *JFP*)	18.75	18.75	
	*Annual Meeting Abstract Book Supplement (year requested ________)	25.00	25.00	
	*IAFP History 1911–2000	25.00	25.00	

SHIPPING AND HANDLING – Guide Booklets – per 10 $2.50 (US) $3.50 (Outside US)
*Includes shipping and handling

Shipping/Handling ______

Other Publications Total ______

TOTAL ORDER AMOUNT ______

Payment Must be Enclosed for Order to be Processed
★ US Funds on US Bank ★

❐ **CHECK OR MONEY ORDER ENCLOSED** ❐ VISA ❐ MasterCard ❐

Exp. Date ______________

SIGNATURE ______________________

4 EASY WAYS TO ORDER:

Phone: 515.276.3344; 800.369.6337
Fax: 515.276.8655
Mail: to the Association address listed above.
Web site: www.foodprotection.org

Prices effective through August 31, 2002

MEMBERSHIP APPLICATION

International Association for
Food Protection®

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

MEMBERSHIP DATA:

Prefix (☐ Prof. ☐ Dr. ☐ Mr. ☐ Ms.)

First Name ______________________ M.I. ________ Last Name ______________________

Company ______________________ Job Title ______________________

Mailing Address ____

(Please specify: ☐ Home ☐ Work)

City ______________________ State or Province ______________________

Postal Code/Zip + 4 ______________________ Country ______________________

Telephone # ______________________ Fax # ______________________

E-mail ______________________

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

MEMBERSHIP CATEGORIES:

		US	Canada/ Mexico	International
☐ **Membership with *JFP & DFES*** 12 issues of the *Journal of Food Protection* and *Dairy, Food and Environmental Sanitation*	◀ BEST VALUE	$150.00	$175.00	$220.00
☐ **Membership with *DFES*** 12 issues of *Dairy, Food and Environmental Sanitation*		$90.00	$100.00	$115.00
Student Membership*				
☐ *JFP* and *DFES*		$75.00	$100.00	$145.00
☐ *Journal of Food Protection*		$45.00	$60.00	$90.00
☐ *Dairy, Food and Environmental Sanitation*		$45.00	$55.00	$70.00

*Student verification must accompany this form

All Prices Include Shipping & Handling

	Gold	Silver	Sustaining
☐ **Sustaining Membership** Includes recognition for your organization and many other benefits. Contact IAFP for details.	$5,000.00	$2,500.00	$750.00

TOTAL MEMBERSHIP PAYMENT:

$ ______________

(Prices effective through August 31, 2002)

Payment Options:

☐ Check Enclosed ☐ VISA ☐ MasterCard ☐

US FUNDS on US BANK

Card # ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Exp. Date ______________

Signature ______________________

DO NOT USE THIS FORM FOR RENEWALS