FOOD RESEARCH INSTITUTE
University of Wisconsin-Madison

Since 1946, a tradition of food safety leadership through research, training, and outreach

contents:

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The Food Research Institute (FRI) was founded in 1946 at the University of Chicago and moved to the University of Wisconsin in 1966.

FRI activities focus on the microbiology of foodborne disease and on bioactive compounds in foods that affect human health. The major efforts continue to be on foodborne disease microbiology, yet expansion into these other areas has enabled us to respond to a broader aspect of foodborne diseases. The goal is to enhance the understanding of the science underlying food safety for the scientific community, government, industry, and the public to make informed decisions.

FRI is an interdepartmental entity at the University of Wisconsin–Madison, with the core Executive Committee and the Affiliated Faculty having tenure homes in the departments of Bacteriology, Animal Sciences, Food Science, Medical Microbiology & Immunology, Plant Pathology, and the School of Veterinary Medicine. In addition, faculty and staff collaborate on food protection projects with the Wisconsin Center for Dairy Research, the Center for Human Performance and Risk Analysis, and the departments of Genetics, Molecular and Environmental Toxicology, Nutrition, Civil and Environmental Engineering, Biosystems Engineering, and Veterinary Diagnostics. The core faculty normally conducts about 50 basic and applied research projects in: foodborne pathogens and their toxins; pre-harvest and post-harvest controls; food bio-defense; food sensitivity; bioactive compounds; and diet and cancer.

FRI's mission is focused on the cause and control of food-related disease. Occasionally, commercial products and processes are an outcome of the research, such as the development of the Wisconsin Process for low-nitrite cured meats and the preparation of purified botulinum toxin for medical use.

FRI's funding is derived from four sources:

1. The University, which provides our building and laboratories; pays faculty salaries; and contributes to certain projects.
2. Competitively awarded government grants and contracts.
3. Industry funds for work on specific non-proprietary projects.
4. Unrestricted gifts from companies, suppliers, and trade associations.

   Category 4 is extremely important because it provides the resources to quickly respond to developing problems without having to wait for formal project support. For example, FRI projects on *Listeria* and *E. coli* O157:H7 were underway and some basic questions answered almost a year before agency support became available. The unrestricted gifts support the FRI infrastructure and provide funding for faculty to maintain their research programs relevant to FRI sponsor needs.

Industrial companies that support FRI provide an annual contribution based upon the annual volume of their food sales. The rate is $34.00 per million dollars in sales up to a billion dollars of food sales, or a maximum of $34,000. The minimum annual gift is $2,500.

Food Research Institute
University of Wisconsin–Madison 1550 Linden Drive Madison, Wisconsin 53706
Phone: 608/263-7777 Fax: 608/263-1114 Web: fri.wisc.edu/

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FRI SPONSORSHIP BENEFITS

Many benefits accrue from industrial sponsorship:

1 - ***Portal to the vast resources at the University of Wisconsin–Madison*** campus for food safety information, including experts in microbiology, food science, animal and meat sciences, veterinary medicine, plant pathology, engineering, dairy research, and many others.

2 - ***Consultation with FRI faculty*** at no charge. However, consultation requiring extensive work and/or travel results in a consulting fee.

3 - ***Access to collaborative research*** at sponsor rate with the highly regarded Applied Food Safety Laboratory having capabilities to work with *Clostridium botulinum, Listeria monocytogenes, Bacillus cereus, Staphylococcus aureus, Salmonella,* and *E. coli* O157:H7 as well as other foodborne microorganisms in a wide variety of refrigerated and shelf-stable foods. The laboratory is a recognized process authority for pasteurized process cheese products. Sponsored research with other faculty members is welcomed and encouraged.

Food processing equipment dedicated for pathogen use in the Applied Food Safety Laboratory:

- *Dairy products (various, including HTST/UHT milk pasteurization, natural and process cheese products)*
- *Grinders, stuffers, cooking vessels to prepare small casing, ready-to-eat meat and poultry products*
- *Modified atmosphere and vacuum packaged foods, including cook-in-bag*
- *Mixers, slicers, grinders, microwave, grill, combioven (convection-steamer)*
- *Programmable and traditional incubators to mimic storage at refrigerated-abuse temperatures*

4 - Several literature ***Food Safety Reviews*** (Briefs) per year reviewing emerging food safety concerns.

5 - ***Customized literature reviews*** on specific food protection issues; additional fee for extensive reviews and development of white papers.

6 - ***Rapid access to significant findings*** generated from FRI research through biweekly FRESH (Food Research & Education Seminar Highlights) seminars and webinars, updates in newsletters, at annual and special meetings, and personal communication with FRI and affiliated faculty. Publication in referred journals usually takes a year after a project is completed.

7 - Multiple opportunities to participate in ***conferences, seminars, and webinars***.

- Biweekly FRESH seminars during fall and spring semesters; attend in person, as a webinar, or download select presentations from the FRI website
- FRI Annual Conference, featuring our own project reports plus presentations on related subjects by speakers from other institutions and government agencies
- *Focus on Food Safety* symposia on select issues facing the food industry
- *Better Process Cheese School* for safe production of low-acid canned food process cheese
- *Food Safety and Meat Microbiology School* provides an overview of microbiology, sanitation, thermal processing, new ingredients/technologies, and demonstrations and laboratory exercises pertinent to fresh and processed meats
- Other training webinars and customized training sessions can be developed by coordination with UW–Madison faculty
- Reduced-rate registration for all conferences; no charge for participation at training webinars and FRESH seminars

8 - ***Regular communications*** include a monthly electronic newsletter, ***FRI eNews***, to provide timely updates on research and events at the FRI and UW–Madison. Our annual ***FRI Newsletter*** covers FRI activities and visitors, presents perspectives on food safety issues and policies, profiles FRI investigators, reports abstracts of current FRI-funded research, and summarizes meeting proceedings. Special issues of ***FRI eAlert*** provide readers with the latest developments on exceptional issues and pertinent publications affecting the food industry.

9 - ***Third-party contact with regulatory agencies*** regarding issues and problems. Regulators know that our questions are frequently on behalf of another organization, but realize there is nothing wrong with providing straightforward advice without identification.

10 - ***Well-trained graduates as potential employees***.

11 - A ***location for your employees to learn*** and work on problems with a pathogen.

12 - ***Website*** includes a ***Sponsors Only*** section with exclusive web access to the most current Food Safety Reviews, recorded presentations from FRESH seminar speakers and select conferences, and the FRI eNews archive. Contact Associate Director Kathleen Glass to request access codes (user name and password).

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SUPPORTING ORGANIZATIONS OF THE FOOD RESEARCH INSTITUTE

ALKAR - RapidPak
American Meat Institute Foundation
Bel Brands USA
Berner Foods
Biery Cheese
Corbion / Purac
Covance Laboratories
Deibel Laboratories
Emmi Roth USA
Fonterra
Fromm Family Foods
Gamay Flavors
Great Lakes Cheese
Hillshire Brands (Sara Lee)
Hormel Foods (Jennie-O Turkey Store; Century Foods International)
ICL Performance Products (BK Giulini)
Jeneil Biotech
Johnsonville Foods
Jones Dairy Farm
Kemin Food Ingredients
Kerry Ingredients and Flavours
Kikkoman Foods Foundation
Kraft Foods (Oscar Mayer Foods)
Land O'Lakes
Leprino Foods
Maple Leaf Farms
Niacet
Old Fashioned Cheese
Pacific Cheese
PepsiCo
Promega Corporation
Salm Partners
Sargento Foods
Schreiber Foods
Sensient Technologies
Sysco Quality Assurance
Thermo Pac
Winona Foods

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FRI STRATEGIC PLAN — EXECUTIVE SUMMARY

Vision and Mission:

FRI aims to be an internationally recognized leader in research on microbial foodborne pathogens and toxins and a center that conducts independent research, catalyzes multidisciplinary and collaborative research, and promotes education and outreach to enhance the safety of the food supply.

To fulfill this mission FRI will engage in the following food safety activities:

- Provide leadership in identifying and resolving food safety issues to meet community, government, and industry needs
- Conduct fundamental and applied research
- Provide accurate and practical information and expertise
- Deliver quality education and training

Strategies:

Food Safety Leadership: *Identify emerging or continuing food safety issues and seek their resolution through research, outreach, and education.*

- Consult and communicate with food safety professionals (industry, regulatory agencies, academia) to identify high priority food safety issues and their solutions
- Consult with the Board of Visitors regularly
- Identify and fund research on high priority food safety issues
- Identify UW–Madison and other investigators to collaborate with FRI faculty and staff on high priority projects
- Serve on relevant advisory committees and professional societies with a focus on food safety

Research: *Conduct fundamental and applied research on foodborne microbial pathogens and their toxins.*

- Enhance understanding of mechanisms of pathogenesis and virulence of microbial foodborne pathogens, including bacteria, fungi, and viruses
- Identify pre-harvest interventions, based on the ecology of pathogens, husbandry practices, and host–pathogen interactions
- Develop post-harvest interventions for foods (raw and ready-to-eat), including process and formulation controls, antimicrobial systems, and shelf life
- Understand and develop control strategies for process-generated toxicants

Outreach: *Provide useful and accurate information to industry, academicians, government, and consumers for science-based decision-making.*

- Obtain input from academic, industrial, and governmental officials on public health issues
- Serve as liaison between industry and regulatory officials in developing scientific evidence for sound food safety regulations
- Maintain and enhance capabilities for providing UW–Madison experts to assist FRI and their stakeholders in problem solving
- Prepare reviews on current and emerging food safety issues; organize symposia, seminars, and webinars on current and emerging food safety issues; and use the FRI website to communicate these with stakeholders

Education and Training: *Provide quality food safety education and training to students, postdoctoral fellows, and governmental and industrial personnel.*

- Identify and train students and postdoctoral fellows in food safety research
- Teach undergraduate and graduate courses in food microbiology
- Assist students in obtaining internships in industry, academia, and government
- Seek support for student and postdoctoral training
- Organize workshops for training in microbial food safety techniques
- Provide opportunities for industry personnel to collaborate/train in FRI laboratories

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FRI FACULTY AND FIELDS OF SPECIALIZATION

Core Executive Committee

Jeri Barak, Associate Professor, Plant Pathology; 608-890-2581; barak@plantpath.wisc.edu
Bacterial colonization of plants with a focus on food safety of fresh produce

Charles J. Czuprynski, Director, Food Research Institute; Professor, School of Veterinary Medicine; 608-263-6826; czuprync@svm.vetmed.wisc.edu
Pathogenesis of listeriosis and salmonellosis; Bovine respiratory disease; Biofilm formation; Immunotoxicology; Use of nanotechnology in wound healing

Kathleen Glass, Senior Scientist and Associate Director, Food Research Institute; 608-263-6935; kglass@wisc.edu
Development of safe low acid refrigerated foods, processed meat products, and process cheese; Effect of antimicrobials on Gram-positive foodborne pathogens

Eric A. Johnson, Professor, Bacteriology; 608-263-7944; eajohnson@wisc.edu
Clostridium botulinum: control, toxins, genetics

Charles W. Kaspar, Professor, Bacteriology; 608-263-6936; cwkaspar@wisc.edu
E. coli O157:H7; Stress-response systems; Pre-harvest food safety; Molecular and physiological mechanisms of acid tolerance

Nancy P. Keller, Professor, Medical Microbiology & Immunology; 608-262-9795; npkeller@wisc.edu
Antifungals; Fungal molecular biology; Mycotoxins; Fungal genomics

Laura J. Knoll, Associate Professor, Medical Microbiology & Immunology; 608-262-3161; ljknoll@wisc.edu
Molecular parasitology; Vaccine development for the intracellular parasite *Toxoplasma gondii*

Andrew Milkowski, Adjunct Professor, Animal Sciences, Muscle Biology Laboratory; 608-262-1606; milkowski@wisc.edu
Meat quality; Processed meat product quality measurement; Product and ingredient safety; Regulatory policy

Michael W. Pariza, Professor Emeritus, Food Science; 608-263-6955; mwpariza@wisc.edu
Dietary aspects of carcinogenesis; Biological significance of conjugated linoleic acid (CLA) and other naturally occurring biological compounds in food

Jeffrey Sindelar, Associate Professor, Animal Sciences; 608-262-0555; jsindelar@wisc.edu
Quality and sensory characteristics of processed meats; Non-meat ingredient functionality; Intervention strategies to control pathogenic bacteria in meat products

Amy C. L. Wong, Professor Emeritus, Bacteriology; 608-263-1168; acwong@wisc.edu
Biofilm formation and control; Virulence mechanisms of foodborne pathogens

Jaehyuk Yu, Professor, Bacteriology; 608-262-4696; jyu1@wisc.edu
Fungi and mycotoxins: Molecular genetics of asexual sporulation and mycotoxin biosynthesis in filamentous fungi

Affiliated Faculty

Donald H. Burr, CAPT, USPHS, Center for Food Safety and Applied Nutrition/FDA, Summit-Argo, IL; 708-728-4107; donald.burr@fda.hhs.gov

Robert K. Bush, Professor Emeritus, Medicine, Allergy & Immunology; 608-263-6174; rkb@medicine.wisc.edu
Food allergy: causes and consequences

Mark Cook, Professor, Animal Sciences; 608-262-7747; mcook@wisc.edu
Nutritional and dietary control and detection of inflammation and related disease

Dörte Döpfer, Associate Professor, Medical Sciences, School of Veterinary Medicine; dopferd@vetmed.wisc.edu
Veterinary epidemiology of infectious diseases with a focus on food safety

Barbara Ingham, Professor, Food Science; 608-263-7383; bhingham@wisc.edu
Methods to validate Critical Limits in the processing of meats

Steven Ingham, Administrator, Division of Food Safety, Wisconsin Dept. Agriculture, Trade and Consumer Protection (DATCP); 608-224-4701; Steve.Ingham@wisconsin.gov

Stacey Schultz-Cherry, Associate Member, St. Jude's Children's Research Hospital, Memphis, Tenn.; Stacey.Schultz-Cherry@STJUDE.ORG
Molecular and cellular virology

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FRI Research and Expertise

Microbiology
Clostridium botulinum and medical uses of its toxin
Bacillus cereus
Listeria and listeriosis
Salmonella
Shiga-toxin producing *E. coli*, including O157:H7
Staphylococcus aureus
Fungi and Mycotoxins
Fungal/Bacterial genomics
Cryptosporidia, Toxoplasma
Novel detection systems
Stress response
Viruses (Astrovirus, Norovirus)
Challenge studies

Intervention strategies
Preharvest interventions
Traditional/Natural antimicrobials
Dairy/Meat/Produce safety
Biofilm intervention
Host–Microbe interaction

Other expertise
CLA
Bioactive compounds
Dietary aspects of carcinogenesis
Host response to food components/pathogens
Food defense
Process-generated food toxicants

Select FRI Funded and Sponsored Research

- Antimicrobial activity of fungal metabolites (*Keller*)
- Characterization of chitosan clearance of *E. coli* O157:H7 from cattle (Kaspar)
- Construction of nontoxigenic *Clostridium botulinum* strains for food challenge studies *(Johnson)*
- Desiccation tolerance in *Salmonella* serovars (*Kaspar)*
- Detection and survival of *Clostridium difficile* in milk and cheese (*Johnson)*
- How does *Listeria monocytogenes* cause fetal infection and abortion? (*Czuprynski*)
- Effects of conjugated linoleic acid (CLA) on adipocyte metabolism (*Pariza*)
- Enhancing the safety of reduced-sodium foods with antimicrobial salt substitutes (*Glass*)
- Formation, survival, and virulence of stress-induced filamentous *L. monocytogenes* and *Salmonella* (*Wong*)
- Genomic and proteomic analyses of *Clostridium botulinum* endospore resistance (*Johnson)*
- Human and plant pathogen synergy in the tomato phyllosphere (*Salmonella*) *(Barak)*
- Modeling persistence of non-O157 Shiga toxin-producing *E. coli* during beef cattle production and slaughter (*Kaspar, Döpfer*)
- Storage temperature on microbiological safety of cheese *(Glass)*
- Survival of *Salmonella* in dry environments *(Wong)*
- Use of novel regulators to achieve fungal spore inactivation and mycotoxin control *(Yu)*
- Validation of pepperoni process to control shiga-toxin-producing *E. coli* (*Glass, Kaspar, Milkowski, Sindelar*)

Contact:

Director: Dr. Charles Czuprynski, czuprync@svm.vetmed.wisc.edu, 608.262.8102
Associate Director: Dr. Kathleen Glass, kglass@wisc.edu, 608.263.6935

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RESEARCH: SPECIAL CAPABILITIES AND FACILITIES OF FRI AND UW–MADISON

Primary Pathogens

- Large stock culture collection of primary pathogens derived from clinical, food, and environmental isolates

Food processing equipment in BL-2 laboratories

- Grinders, stuffers, cooking vessels to prepare small casing, ready-to-eat meat and poultry products
- Dairy products equipment(various, including HTST, UHT, LTLT pasteurization of milk, natural cheese production, process cheese spreads, sauces)
- Modified atmosphere packaged foods equipment, including cook-in-bag
- Slicers, grinders, mixers, microwave, grill, conventional oven, range, deep-fryer
- Refrigerated, constant, and programmable temperature incubators (–2ºC to 45ºC)

Other relevant equipment and facilities available at UW–Madison

- BL3 labs and animal facilities for working with *C. botulinum*, avian influenza, and other select pathogens
- Equipment in other departments to custom-produce products for inoculation at FRI for collaborative projects
  - USDA-inspected meat processing facility
- Biotron, a controlled atmosphere facility
- Center for Plasma-Aided Manufacturing, for use in modifying surfaces
- Library, with an extensive collection on campus and access to nearly all recent publications through interlibrary collaborations

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INSTRUCTION: GRADUATE AND UNDERGRADUATE STUDENT PROGRAM

In 2011 FRI launched the **FRI Undergraduate Research Program in Food Safety** for UW–Madison students seeking a B.S. degree. Each summer FRI supports talented undergraduate students as FRI Research Scholars, who work on food safety projects in the laboratories of FRI faculty and staff, attend tutorials, and visit food processing plants.

- Undergraduate Student Opportunities: http://fri.wisc.edu/training_undergrad.php

Since FRI moved to UW–Madison in 1996, FRI faculty and senior staff have trained hundreds of undergraduate and graduate students, post-docs, visiting scientists and research specialists. Our alumni hold positions in industry, government and academia across the country and abroad, where they continue to promote food safety. Many are recognized internationally as leaders in the field.

PAST FRI STUDENTS AND SCIENTISTS (*PARTIAL LISTING*)

Name	Last known employer	Position and Degree at FRI
Rhona Applebaum	The Coco-Cola Company	Ph.D.
Cheryl Barrett-Kaiser	Jeneil Biotech	Undergraduate
David Baumler	UW-Madison, Biotechnology Center	Ph.D.
Doug Beecher	FBI Laboratory, Hazardous Materials Unit	Scientist
Jeffrey Bose	Univ Georgia, Food Science (Graduate student)	M.S.
Robert Brackett	NCFST (National Center for Food Safety and Technology	Ph.D.
Byron Brehm-Stecher	Iowa State, Food Science Asst. Professor	Ph.D.
Carmen Buchrieser	Pasteur Institute, France	Visiting scientist
Donald Burr	WI DACTP/NCFST / FDA	Ph.D.
Nurliza Buyong	Kraft Foods	Ph.D.
Jeffrey Byrd	St. Mary's College, Maryland	Visiting scientist
Michelle Ciezek	Jones Dairy Farm	Undergraduate, Research Intern
Maribeth Cousin	Purdue University, Food Microbiology	Ph.D.
Alan Degnan	Wis State Lab of Hygiene	Research Specialist
Virginia Deibel	Covance	Independent Study
Ratih Dewanti	Bogor Agricultural University, Indonesia	Ph.D.
Sean Dineen	Tufts University, MA	Ph.D.
Michael Doyle	Univ. Georgia, Center Food Safety	Ph.D.
Staci (Eickert) Richardson	Schreiber Foods Inc.	Undergraduate
Joseph Frank	University Georgia, Food Science	Ph.D.
Mike Goodnough	Metabiologics	Ph.D.
Tim Harried	Glanbia	Undergrad Lab Asst, Research Specialist
Susan Hefle	Deceased (Univ. Nebraska)	Ph.D.
Jeff Hsueh	Indiana University, Dept. Biology	Ph.D.
Tzu-Pi Huang	National Chung Hsing University	Ph.D.
Jennifer Johnson	Salm Partners	Ph.D.
Alan Junkins	University of Iowa	Ph.D.

Name	Last known employer	Position and Degree at FRI
Kristine Kaufman	Silliker Laboratories	Undergrad Lab Asst, Research Specialist
Jeffrey Kornacki	Kornacki Microbiology Solutions, Inc.	Ph.D.
Ronald Labbe	Univ. Massachusetts, Food Science	Ph.D.
Anna Lammerding	Public Health Branch , Health Canada	Ph.D.
Sean Leighton	Coco-Cola Company	B.S.
Greg Leyer	Danisco	Ph.D.
Michael Liewen	Yum Brands	Ph.D.
Melanie Maas	Consulting (Previously Oscar Mayer)	Ph.D.
Nicole Maks	NCFST	M.S.
Carl Malizio	Metabiologics	Undergrad Lab Asst, Research Specialist
Kristin Marshall	Institute for Food Safety and Health (NCFST, IFSH)	Ph.D.
Jodi McDermott	University of Wisconsin-Platteville	Research Specialist
Joseph Meyer	Covance	Masters Program
Lloyd Moberg	Church And Dwight Co.	Ph.D.
Julie Nordlee	University of Nebraska, Dept Food Science	Research Specialist
Yeonhwa Park	Univ. Massachusetts, Food Science	Ph.D.
James Pestka	Michigan State University, Food Sci and Human Nutrition	Ph.D.
Keith Poulsen	Oregon State University, College of Veterinary Medicine	Ph.D.
Dawn Preston Gadicke	Grande Cheese	Undergrad Lab Asst
Angel (Duerr Smith) Rayller	Lifecore	Undergrad Lab Asst, Research Specialist
Anjan Reddy	Bel Brands	Ph.D.
Julian Rood	Monash University, Australia; Microbiology	Ph.D.
Amy Ronner	Silgan Containers Manufacturing Corp.	Research Specialist
Elliot Ryser	Michigan State University, Food Science	Ph.D.
Jean Schoeni	Covance	Ph.D.
William Schroeder	Cargill	Ph.D.
Jenny Scott	FDA	M.S.
Joe Shebuski	Cargill	Ph.D.
Jack Shere	USDA, APHIS, VS	Ph.D.
Jill Snowdon	USDA/APHIS/VS/NCIE	Scientist
William Sperber	Cargill (retired)	Ph.D.
Yi-Cheng Su	Seafood Res Education Center, Oregon State Univ	Ph.D.
Susan Sumner	Virginia Tech, Dept. Food Science	Ph.D.
Dawn (Granberg) Tessmer	City of Norwich, Connecticut	Undergrad Lab Asst, Research Specialist
Pam Wilger	Cargill	Undergrad Lab Asst.,M.S.
Ahmed Yousef	The Ohio State University, Dept. Food Science	Ph.D.

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OUTREACH: MEETINGS, TRAINING, SEMINARS

These meetings, short courses, conferences, and symposia represent an outreach component to the scientific community by the Food Research Institute in collaboration with other UW–Madison departments as well as other organizations, including an extensive roster of invited speakers. The purpose of this outreach component is to bring those persons interested in specific food safety topics together. These interactions allow for public debate and development of relationships among scientists.

Meetings: http://fri.wisc.edu/news_meetings.php
Training: http://fri.wisc.edu/training_overview.php
Seminars: http://fri.wisc.edu/news_seminars.php

Dates	Event	Comments
2005–present	FRESH seminar series	Bi-weekly seminar series each semester
2009-present	Better Process Cheese School: Processing Controls for Shelf-Stable Pasteurized Process Cheese Product Manufacture	Presented annually Co-sponsored with the Wisconsin Center for Dairy Research and Dept. Food Science, UW–Madison
2010, 2012, 2014	Food Safety and Meat Microbiology School	Co-sponsored with the Master Meat Crafter Program, Dept. Animal Sciences, Dept. Meat Science, and the Muscle Biology Lab, UW–Madison
2013	Role of Water in Food Safety & Health Symposium	*FRI Focus on Food Safety Series*, co-sponsored with the Institute for Food Safety and Health (IFSH)
2013	FRI 2013 Spring Meeting	FRI current research; *Special Topics*: Detection and control of foodborne pathogens; Challenges / controversies in foodborne microbes; Control of toxin-forming bacteria; Issues and new concepts in food protection
2012	Calculating Thermal Inactivation of Pathogens	Training webinar; offered periodically
2012	FRI 2012 Spring Meeting	FRI current research; *Special Topics*: STECs — virulence and risk management; *Salmonella* — low moisture foods, produce, and antibiotic resistance; Foodborne pathogen control; Epidemiology; Packaging; Noroviruses, toxins, and *Toxoplasma*
2012	Mycotoxin Symposium	*FRI Focus on Food Safety Series*, co-sponsored with the Institute for Food Safety and Health (IFSH)
2011	FRI 2011 Spring Meeting	FRI current research; *Special Topics*: Microbial tolerance to low-water-activity environments; Issues related to raw, natural, and reduced-sodium products; Control and detection of toxins/allergens
2010	Water Safety and Quality: Issues Affecting Food Safety and Public Health	*FRI Focus on Food Safety Series*
2010	FRI 2010 Spring Meeting	FRI current research; *Special Topics*: Challenges in Reducing Sodium Content of Foods; Water Issues
2009	Developing Risk-Based Food Safety Regulations: Using attribution and risk assessment to develop risk-based food regulations	*FRI Focus on Food Safety Series*, co-sponsored with the UW–Madison Center for World Affairs and the Global Economy (WAGE)
2009	FRI 2009 Spring Meeting	FRI current research; *Special Topic*: Epidemiology and government emergency response and decision making

Dates	Event	Comments
2008	Sodium Reduction and Its Effect on Food Safety, Food Quality, and Human Health	*FRI Focus on Food Safety Series*
2008	Treatment and Disposal of Food Products Contaminated with Biological Threat Agents, Phase Two	Workshop co-sponsored with College of Engineering, UW–Madison
2007	Microbial Food Spoilage — Losses and Control Strategies	*FRI Focus on Food Safety Series*
2007	Treatment and Disposal of Food Products Contaminated with Biological Threat Agents	Workshop co-sponsored with College of Engineering, UW–Madison
2006	Trends, Concerns and Solutions for Natural and Organic Food Safety	*FRI Focus on Food Safety Series*
2006	Nanotechnology Applications in Food, Food Processing and Food Packaging	*FRI Focus on Food Safety Series*, co-sponsored with College of Engineering, UW–Madison
2005	Developments and Applications of Food Antimicrobials, Cleaning and Sanitation	*FRI Focus on Food Safety Series*
2005	Development and Production of Safe Process Cheese Formulations	*FRI Focus on Food Safety Series*
2004	U.S. Food Law and Regulations Symposium	*FRI Focus on Food Safety Series*, co-sponsored with Dept. Food Science, UW–Madison
annually	FRI Annual Spring Meeting; augmented in 2004 with the FRI Focus on Food Safety Series	FRI faculty and their staff and students present current research, and invited speakers from academia, industry and government offer hot-topic and regulatory updates.
2003–2007; 2012	Science, Research and Regulation: Their Impact on the Food and Dietary Supplement Industries	Co-sponsored with Covance Laboratories
2002	Interagency Botulism Research Coordinating Committee Meeting	Eric Johnson, conference chair
2002	Fungi and Mycotoxin	FRI Short Course
2000	Safety Validation of Heating/Cooling Processes for Meat and Poultry Products	FRI Short Course [conducted twice in 2000]
1999	Managing Dairy Food Safety Workshop	Co-sponsored with Wisconsin Center for Dairy Research, UW–Madison
1999	Environmental Benefits and Sustainable Agriculture Through Biotechnology	Co-sponsored with Georgetown University Center for Food & Nutrition Policy
1997	Bovine Spongiform Encephalopathy (BSE) Forum	Current status and direction in the food industry
1997	The CLA Forum	First international meeting on conjugated linoleic acid (CLA) was hosted by FRI and held in Madison, WI. About 100 researchers from around the world participated.
1995	FRI/CALS Conference: Vision for Food Safety	

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FRI FOOD SAFETY REVIEWS

Until 1996, a printed FRI Annual Report contained an extensive annual summary of all the previous year's published research papers in peer-reviewed journals, as well as the summaries of on-going research by FRI faculty. With the advent of rapid and widespread internet direct access to journals, abstracting services, and database search engines specializing in scientific journals, the comprehensive literature survey was discontinued. The "FRI Briefs," re-named "FRI Food Safety Reviews" in 2010, appear periodically and continue the literature survey effort, now focusing on special topics.

FRI Food Safety Literature Reviews	
What Is Food Allergy? This brief review discusses some food allergen issues of interest to food producers and processors..	Jan 2014
Review of Epidemiology of Foodborne Listeriosis Pathways for introduction of *Listeria* into different foods and strategies for preventing contamination and growth in foods are reviewed. Recent data from surveillance studies, outbreak investigations, and economic costs are presented.	Sept 2013
Spores of *Clostridium botulinum* in Dried Dairy Products (FRI Sponsors Science News Alert) A recent report of presumptive *C. botulinum* spores in whey protein concentrate (WPC) generated questions about potential risks and strategies for control of spores in dried dairy products. This document was prepared to address Frequently Asked Questions regarding this episode.	Aug 2013
White Paper on Human Illness Caused by *Salmonella* from all Food and Non-Food Vectors, Update 2013 This update to the February 2009 FRI white paper on *Salmonella* discusses important food and non-food vehicles for outbreaks of salmonellosis during the past five years, routes of infection, interventions, current surveillance reports, and antimicrobial resistance.	April 2013
Clostridium difficile as a Risk Associated with Animal Sources *C. difficile*, a common cause of diarrhea in healthcare settings, has become more prominent in the community as more virulent strains emerge. This paper reviews data on epidemiology of *C. difficile*, including the potential for foodborne transmission.	Jan 2013
UPDATE: MRSA in Foods Supplement to February 2011 review: "Sources of Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Methicillin-Resistant Staphylococci: Implications for Our Food Supply?"	Oct 2012
D-Values References References compiled to accompany the FRI interactive webinar "Calculating Thermal Inactivation of Pathogens"	July 2012
Helicobacter spp. — Food- or Waterborne Pathogens? Although *H. pylori* is a known cause of ulcers and gastric cancer, it resides in the gastrointestinal tract of about half the world's population who are usually asymptomatic. Some other *Helicobacter* species infect mammals, birds and reptiles. Transmission of *H. pylori* is not well understood because these bacteria enter a viable but nonculturable state when exposed to stressful conditions outside the body. *Appendix:* earlier review on *Helicobacter pylori* (1997).	Feb 2012
Toxins from Cyanobacteria Human exposure to cyanobacterial toxins primarily occurs through ingestion of contaminated water or shellfish, with some additional exposure through dietary supplements, other foods, and aerosols from lakes with cyanobacterial blooms. This review addresses recent information on microcystins, β-methylamino-L-alanine, paralytic shellfish toxins, and anatoxin-a. *Appendix:* earlier review on alga *Pfiesteria* (1998).	Aug 2011
Understanding Sodium Replacements from a Food Safety and Health Risk Perspective Sodium affects the taste, texture, and safety of foods; therefore the consequences of reducing sodium levels in various foods must be evaluated carefully. This report reviews health concerns associated with high intakes of sodium, important functions of salt in foods, and potential safety considerations associated with food components that may substitute for some functions of salt in foods.	March 2011
White Paper on Sources of Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Other Methicillin-Resistant Staphylococci: Implications for Our Food Supply? Infections in animals and humans, presence in food, and potential food safety implications. *Appendix:* UPDATE: MRSA in Foods (2012)	Feb 2011
Water Safety and Quality Waterborne disease agents; surveillance and outbreaks.	Nov 2010
White Paper on Effectiveness of Existing Interventions on Virus Inactivation in Meat and Poultry Products Human enteric viruses and animal viruses potentially present in foods; outbreaks and effective control methods *Appendix*, *review on Hepatitis A*: Outbreaks associated with produce and shellfish (1997).	June 2010
White Paper on Human Non-O157:H7 Shiga Toxin-Producing *E. coli* from Meat and Non-Meat Sources Epidemiology, detection, outbreaks, infection routes, and interventions.	April 2010
White Paper on Human Illness Caused by *Salmonella* from all Food and Non-Food Vectors Food and non-food vehicles of infection for human outbreaks of salmonellosis, surveillance strategies, and industry initiatives to control *Salmonella* spp.	Feb 2009

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FRI Food Safety Literature Reviews

Sodium Reduction and Its Effects on Food Safety, Food Quality, and Human Health Adverse health effects of high dietary levels of sodium chloride, important functions of sodium chloride for the flavor, structure, and preservation of foods.	Nov 2008
Destruction of H5N1 Avian Influenza Virus in Meat and Poultry Products Effects of heat, irradiation, and high pressure on avian influenza viruses present in meat and eggs, sanitation methods for environmental decontamination.	Aug 2007
Microbial Food Spoilage: Losses and Control Strategies Bacteria, yeasts, and molds causing food spoilage, factors affecting shelf-life of meats, dairy products, fish, cereals, vegetables, fruits, and juices.	Dec 2006
Natural and Organic Foods: Safety Considerations Food safety issues related to organic and natural foods, approved additives and processes.	Dec 2006
Human Illness and *E. coli* O157:H7 Epidemiology, outbreaks, infection routes, surveillance, regulations, interventions.	Nov 2006
Nanotechnology Technology; applications; toxicology and safety issues.	June 2006
Veterinary Drug Residues in Processed Meats — Potential Health Risk Penicillin, tetracyclines, sulfonamides, neomycin, gentamicin, flunixin, streptomycin, arsenicals; withdrawal periods.	March 2006
Food Antimicrobials, Cleaners, and Sanitizers Cleaning compounds for food contact surfaces, fresh produce, animal carcasses; antimicrobials used in foods.	Sept 2005
Safety of Processed Cheese: A Review of the Scientific Literature Bacteria of concern (*C. botulinum, B. cereus, Listeria, Salmonella, S. aureus, E. coli* O157:H7); importance of salt, emulsifiers, fat, bacteriocins, pH, enzyme-modified cheese.	July 2005
Bovine Spongiform Encephalopathy: An Updated Scientific Literature Review Update of previous review; prion structure, analytical methods; CWD, BSE, and other transmissible spongiform encephalopathies. *Appendix, earlier BSE briefs:* historical review, current issues and strategies for control of transmission spongiform encephalopathies (1996–2002).	Nov 2004
Saturated Fat and Beef Fat as Related to Human Health Cardiovascular disease, cancer, different fatty acids.	Feb 2004
Foodborne Parasites Protozoa, Tapeworms, *Anisakis*, *Trichinella*, lung and liver flukes, *Ascaris.* *Appendix, Cryptosporidium and Cyclospora:* Protozoan parasites, waterborne outbreaks, contamination of fresh produce (1996).	Oct 2003
Survival and Growth of *Clostridium perfringens* during the Cooling Step of Thermal Processing of Meat Products Heat resistance in uncured and cured meats; efficiency of different cooling processes; growth inhibitors.	March 2002
Virulence Characteristics of *Listeria monocytogenes* Strain variation; invasion and spread; host defenses; virulence factors.	Oct 2001
Alternatives to Antibiotic Use for Growth Promotion in Animal Husbandry Antibiotic resistance; probiotics and competitive exclusion; enzymes; immune modulators; organic acids; other feed supplements; alternative husbandry practices.	April 2001
Listeria Heat Resistance Data from experiments with laboratory media and foods and importance of *Listeria* serotype and culture conditions and food composition. J. Food Protection 64:410–429 (2001).	March 2001
Hormone Implants Safety of growth hormone implants in livestock.	July 2000
Salmonella Thermal Resistance Data from experiments with laboratory media and foods and importance of *Salmonella* serotype and culture conditions and food composition. *J. Food Protection* 63:779–795 (2000).	June 2000
Listeria Intervention RTE products; organic acids, bacteriocins, thermal processes, irradiation, modified atmosphere packaging, high pressure, UV light, ultrasound.	Nov 1999
Food Irradiation Destruction of microbes; issues of concern; current and proposed applications.	March 1999
Non-Cholera Vibrios *V. vulnificus*, *V. parahaemolyticus*; shellfish; wound infections.	Nov 1998
Campylobacter — Chronic Effects Food vectors; Guillain-Barré syndrome.	July 1998
Fusarium Mycotoxins Pre- and post-harvest approaches to control DON and fumonisins.	Dec 1997
Mycobacterium paratuberculosis Presence in milk; possible link to Crohn's disease.	April 1997
Salmonella typhimurium DT104 Multiple antibiotic resistance.	Jan 1997

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COMMUNICATIONS: FRI NEWSLETTERS

The *FRI Newsletter*, begun in 1989 by Senior Research Program Manager Edwin Traisman and now in its 23rd year, functions to archive and summarize the activities of the Food Research Institute and serves as a complement to the monthly *FRI eNews*, launched in 2009, which alerts recipients to upcoming events and recent important food safety research and regulations. The FRI *eNews* is distributed via email and archived to the sponsors-only portion of the FRI website (https://fri.wisc.edu/sponsors/sponsor_eNews.php). The *FRI Newsletter* features FRI research updates (formerly summarized annually in the FRI Annual Report), personnel profiles, faculty outreach and speaking activities, annual meeting synopses, and occasional "Perspectives" on hot topics in food safety. Newsletters archive: http://fri.wisc.edu/about_newsletter.php.

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