

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

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

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, and the departments of Genetics, Molecular and Environmental Toxicology, Nutrition, Civil and Environmental Engineering, Biosystems Engineering, and Veterinary Diagnostics.

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.



### **Sponsorship Benefits**

- 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. Consultation requiring extensive work or travel results in a consulting fee.
- 3. Access to collaborative research at sponsor rate with the FRI Applied Food Safety Laboratory, which can work with *Clostridium botulinum*, *Clostridium perfringens*, *Listeria monocytogenes*, *Bacillus cereus*, *Staphylococcus aureus*, *Salmonella*, *E. coli* O157:H7, and other foodborne microorganisms in a 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.
- 4. Several literature Food Safety Reviews per year reviewing emerging food safety concerns, as well as customized literature reviews on specific food protection issues. There is an additional fee for extensive reviews and white paper development.
- 5. Rapid access to significant findings generated from FRI research through seminars and webinars, updates in newsletters, at annual and special meetings, and personal communication with FRI and affiliated faculty.
- 6. Multiple opportunities to participate in conferences, seminars, and webinars, including:
  - Biweekly FRESH seminars during fall and spring semesters
  - FRI Annual Meeting, 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
- 7. Monthly e-newsletter FRI eNews provides updates on research and events at FRI and UW-Madison. Special FRI eAlerts provide the latest developments on exceptional issues, upcoming events and pertinent publications affecting the food industry.
- 8. Third-party contact with regulatory agencies regarding issues and problems.
- 9. Access to well-trained graduates as potential employees.
- 10. A location for your employees to learn and work on problems with a pathogen.
- 11. Access to the Sponsors Only portion of the FRI website, which includes the most current Food Safety Reviews and recorded presentations from FRESH seminars and select conferences. Contact outreach specialist Lindsey Jahn (<u>lindsey.jahn@wisc.edu</u>) to request access codes.



## Supporting Organizations of the Food Research Institute

Affy Tapple American Pasteurization Company ARYZTA Bel Brands USA Berner Foods, Inc. Campbell Soup Company Chr. Hansen Coca-Cola ConAgra Foods Corbion Purac Covance Dairy Farmers of Wisconsin Dairyfood USA Emmi Roth USA Fonterra Fromm Family Foods Gamav General Mills Gilman Cheese Corp. Great Lakes Cheese Hormel Foods (Jennie-O and Century Foods International) ICL Performance Products (BK Giulini) Jeneil Biotech Johnsonville Foods

Jones Dairy Jungbunzlauer Kemin Food Ingredients **Kerry Ingredients** Kikkoman Foods Foundation Kraft Heinz Company Kwik Trip Land O' Frost Leprino Foods Mattson Niacet Corporation Old Fashioned Foods, Inc. Ornua PepsiCo Promega Corporation Salm Partners Sargento Foods Schreiber Foods Sensient Technologies Sysco Quality Assurance Thermo Pac Wayne Farms Wegmans Wenda America, Inc. Winona Foods

## **FRI Contacts**

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Adam Borger, Outreach Program Manager 608-263-7062, <u>acborger@wisc.edu</u>

Lindsey Jahn, Associate Outreach Specialist 608-263-4229, <u>lindsey.jahn@wisc.edu</u>



#### Executive Committee Jeri Barak Laura J. Knoll Associate Professor, Dept. Plant Pathology, UW-Madison Professor, Dept. Medical Microbiology & Immunology, UW-Madison (608) 890-2581; barak@plantpath.wisc.edu (608) 262-3161; ljknoll@wisc.edu **Charles Czuprynski** Andrew Milkowski Director, FRI; Chair, Dept. Pathobiological Sciences Adjunct Professor, Dept. Animal Sciences, UW-Madison (608) 263-6826; czuprync@svm.vetmed.wisc.edu (608) 263-6826; milkowski@wisc.edu Kathleen Glass Michael W. Pariza Associate Director and Distinguished Scientist, Food Research Professor Emeritus, Dept. Food Science, UW-Madison (608) 263-6955; mwpariza@wisc.edu Institute; (608) 263-6935; kglass@wisc.edu Eric A. Johnson Jeff Sindelar Professor, Dept. Bacteriology, UW-Madison Associate Professor, Dept. Animal Sciences, UW-Madison (608) 263-7944; eajohnso@wisc.edu (608) 262-0555; jsindelar@wisc.edu Charles W. Kaspar Amy C. Wong Professor, Dept. Bacteriology, UW-Madison Professor Emeritus, Dept. Bacteriology, UW-Madison (608) 263-6936; cwkaspar@wisc.edu (608) 263-7777; acwong@wisc.edu Nancy P. Keller Jae-Hvuk Yu Professor, Dept. Medical Microbiology & Toxicology, UW-Professor, Department of Bacteriology, UW-Madison Madison; (608) 262-9795; npkeller@wisc.edu (608) 262-4696; jyu1@wisc.edu Affiliate Faculty Robert K. Bush Keith Poulsen Professor Emeritus, Dept. Medicine, Allergy & Immunology, Director, Wisconsin Veterinary Diagnostic Laboratory UW-Madison; rkb@medicine.wisc.edu (608) 262-5432; keith.poulsen@wvdl.wisc.edu **Dorte Dopfer** Federico E. Rev Associate Professor, UW School of Veterinary Medicine Assistant Professor, Dept. of Bacteriology, UW-Madison dopferd@vetmed.wisc.edu (608) 890-2046; ferey@wisc.edu Tu Anh Huvnh Stacey Schultz-Cherry Assistant Professor, Dept. Food Science, UW-Madison Associate Member, St. Jude Children's Research Hospital (608) 262-5960; thuynh6@wisc.edu Stacey.Schultz-Cherry@stjude.org **Barb Ingham** Anne Marie Singh Professor, Dept. Food Science, UW-Madison Associate Professor, UW School of Medicine and Public Health bhingham@wisc.edu amsingh@wisc.edu Steven Ingham Garret Suen Administrator, Division of Food Safety, Wisconsin Dept. of Ag, Associate Professor, Dept. Bacteriology Trade, and Consumer Protection (608) 890-3971; gsuen@wisc.edu (608) 224-4701; Steve.Ingham@wisconsin.gov Jan Peter van Pijkeren **Rachel Klos** Epidemiologist, Wisconsin Division of Public Health Assistant Professor, Dept. Food Science, UW-Madison (608) 267-7422; Rachel.klos@wi.gov (608) 890-2640; vanpijkeren@wisc.edu

## FRI Executive Committee and Affiliate Faculty



## **FRI Research**

#### **FRI Research and Expertise**

#### Microbiology

Clostridium botulinum and medical uses of its toxin Clostridium perfringens 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 Pre-harvest interventions Traditional – Clean-label antimicrobial food ingredients Dairy/Meat/Produce safety Biofilm intervention Host-Microbe interaction Other expertise Bioactive compounds/CLA

Host response to food components/pathogens Food allergy Microbiome in health and disease Alternatives to antibiotics in food animals Statistical analysis of complex data sets Safety issues related to fruit Probiotics

#### Select FRI Funded and Sponsored Research

Jeri Barak: Human and plant pathogen synergy in the tomato phyllosphere (*Salmonella*) Chuck Czuprynski

- How does *Listeria monocytogenes* cause fetal infection and abortion?
- Formation, survival, and virulence of stress-induced filamentous L. monocytogenes and Salmonella (with Chuck Kaspar)
- Antimicrobial activity of volatile compounds
- Novel strategies to prevent bacterial adhesion and biofilm formation
- Kathy Glass
  - Enhancing the safety of reduced-sodium cheese
  - Enhancing the safety of foods with clean-label antimicrobial food ingredients
  - Developing thermal processing tools to improve the safety of RTE meat and poultry products (with Jeff Sindelar)
  - Thermal inactivation of *Listeria monocytogenes* in process cheese products
  - Developing a predictive model for the botulinum safety of shelf-stable process cheese products
  - Microbiological safety of foods during extended cooling

Eric Johnson

- Construction of nontoxigenic *Clostridium botulinum* strains for food challenge studies
- Genomic and proteomic analyses of *Clostridium botulinum* endospore resistance

Chuck Kaspar

- Desiccation tolerance in *Salmonella* serovars
- Modeling persistence of non-O157 Shiga toxin-producing *E. coli* during beef cattle production and slaughter (with Dorte Dopfer)
- Survival of *Salmonella* in dry environments

Nancy Keller: Antimicrobial activity of fungal metabolites

Laura Knoll: Using next generation sequencing of the CRISPER system to create a Toxoplasma vaccine

JP van Pijkeren: Development of next-generation probiotics to eradicate foodborne pathogens

Jae-Hyuk Yu: Use of novel regulators to achieve fungal spore inactivation and mycotoxin control



## FRI Undergraduate and Graduate Student Opportunities

Since 2011, FRI has coordinated 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.

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.

Name	Last known employer	Position and Degree at FRI
Meareg Amare	Cellular Dynamics International	M.S.
Keegan Anderson	PPD	FRI Summer Scholar
Susan (Anderson) Hough	Masterson Company	Undergrad Lab Asst.
Rhona Applebaum	The Coca-Cola Company (retired)	Ph.D.
Emma Baar	Northwestern School of Medicine	FRI Summer Scholar
Nicole Baker	DuPont	FRI Summer Scholar
Cheryl Barrett-Kaiser	Rockline Industries	Undergraduate
Adam Bartling	PepsiCo	FRI Summer Scholar
David Baumler	University of Minnesota	Ph.D.
Doug Beecher	FBI Laboratory, Hazardous Materials Unit	Scientist
Erica Behling-Kelly	Cornell University	Ph.D.
Trace Borchardt	Takeda	FRI Summer Scholar
Jeffrey Bose	University of Kansas	M.S.
Robert Brackett	Institute for Food Safety & Health (IFSH)	Ph.D.
Ken Brandenburg	San Antonio Military Medical Center	Ph.D.
Byron Brehm-Stecher	Iowa State University	Ph.D.
Carmen Buchrieser	Pasteur Institute, France	Visiting scientist
Donald Burr	FDA CFSAN	Ph.D.
Nurliza Buyong	Kraft Heinz Company	Ph.D.
Jeffrey Byrd	St. Mary's College, Maryland	Visiting scientist
Bingming Chen	Merck	FRI Summer Scholar
Michelle Ciezek	Jones Dairy Farm	Undergraduate, Research Intern
Maribeth Cousin	Purdue University, Food Microbiology	Ph.D.
Alan Degnan	Wis State Lab of Hygiene (retired)	Research Specialist
Virginia Deibel	Covance	Independent Study
Ratih Dewanti	Bogor Agricultural University, Indonesia	Ph.D.
Sean Dineen	Beckman Coulter Genomics	Ph.D.

#### PAST FRI STUDENTS AND SCIENTISTS (PARTIAL LISTING)



Name	Last known employer	Position and Degree at FRI	
Michael Doyle	Univ. Georgia, Center Food Safety (retired)	Ph.D.	
Case Dunphy	Richelieu Foods	FRI Summer Scholar	
Staci (Eickert) Richardson	Schreiber Foods Inc.	Undergraduate	
Patrick Eimerman	Illumina	Undergrad Lab Asst.	
Katina Fisher	Kraft Heinz	Undergrad Lab Asst.	
Jacob Folz	UC-Davis	FRI Summer Scholar	
Joseph Frank	University Georgia, Food Science (retired)	Ph.D.	
Chase Fredrick	Artizan Biosciences	FRI Summer Scholar	
Mike Goodnough	Metabiologics	Ph.D.	
Alyssa Hangartner	Kraft Heinz Company	FRI Summer Scholar	
Tim Harried	Socius Ingredients	Undergrad Lab Asst., Research Spec.	
Susan Hefle	Deceased (Univ. Nebraska)	Ph.D.	
Shawn Heidel	Covance	Ph.D.	
Jeff Hsueh	Yuan-Ze University, Taiwan	Ph.D.	
Tzu-Pi Huang	National Chung Hsing University	Ph.D.	
Quinn Huibregste	Food Research Institute	FRI Summer Scholar	
Jennifer Johnson	Badger State Food Safety Consulting	Ph.D.	
Alan Junkins	Norton Healthcare	Ph.D.	
Rebecca Kalscheur	Foremost Farms	FRI Summer Scholar	
Kristine (Kaufman) Clemons	Silliker Laboratories	Undergrad Lab Asst., Research Spec.	
Katherine Kennedy	Michigan State University	FRI Summer Scholar	
Amanda King	Kemin Food Technologies	Ph.D.	
Hilary Kleinert	DaVita Kidney Care	FRI Summer Scholar	
Jeffrey Kornacki	Kornacki Microbiology Solutions, Inc.	Ph.D.	
Ben Korte	UW-Madison Ph.D. student	FRI Summer Scholar	
Ronald Labbe	Univ. Massachusetts, Food Science	Ph.D.	
Anna Lammerding	Public Health Branch , Health Canada, retired	Ph.D.	
Sean Leighton	Cargill	B.S.	
Greg Leyer	UAS Laboratories	Ph.D.	
Michael Liewen	PepsiCo	Ph.D.	
Wei-Jen Lin	California State Polytechnic University	Ph.D.	
Melanie Maas	Oscar Mayer, retired	Ph.D.	
Nicole Maks	NCFST	M.S.	
Carl Malizio	Metabiologics	Undergrad Lab Asst., Research Spec.	
Kristin (Marshall) Schill	FDA	Ph.D.	
Julia Martien	UW-Madison Ph.D.	FRI Summer Scholar	
Jodi McDermott	University of Wisconsin-Platteville	Research Specialist	



Name	Last known employer	Position and Degree at FRI	
Joseph Meyer	Kraft Heinz Company	Master's Program	
Lloyd Moberg	Church And Dwight Co.	Ph.D.	
Lori Neal	University of Michigan-Ann Arbor	Ph.D.	
Min Ni Regeneron Pharmaceuticals		Ph.D.	
Alhaji N'jai	Procter & Gamble	Ph.D.	
Julie Nordlee	University of Nebraska, Dept Food Science	Research Specialist	
Lindsey O'Brien	Foremost Farms	Research Specialist	
Katie Osterbauer	University of Washington	FRI Summer Scholar, Assoc. Research Spec.	
HeeSoo Park	Duke University, Molecular Genetics	Ph.D.	
Yeonhwa Park	Univ. Massachusetts, Food Science	Ph.D.	
Amy Parr	UC-Davis	FRI Summer Scholar	
James Pestka	Michigan State University, Food Sci. and Human Nutrition	Ph.D.	
Dawn (Waidanz) Picket	Smithfield (John Morrell Food Group)	Undergrad Lab Asst.	
Keith Poulsen	School of Vet Med, UW-Madison	Ph.D.	
Dawn Preston Gadicke	Grande Cheese	Undergrad Lab Asst.	
Ian Rasch	UW Hospital	FRI Summer Scholar	
Angel (Duerr Smith) Rayller	Lifecore	Undergrad Lab Asst., Research Spec.	
Anjan Reddy	Bel Brands	Ph.D.	
Jennifer Roberts	Agropur	FRI Summer Scholar	
Karien J. Rodriguez	Kimberly-Clark	Ph.D.	
Nicholas Rogall	Promega	FRI Summer Scholar	
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.	
Kori Scherer	Food Research Institute	FRI Summer Scholar	
Ellen Schneider	UW-Madison School of Veterinary Medicine	FRI Summer Scholar	
William Schroeder	Cargill	Ph.D.	
Lucas Schuette	LeanCor	Research Specialist	
Jenny Scott	FDA	M.S.	
Merike Seaman	Gehl Foods	Undergrad Lab Asst.	
Joe Shebuski	Cargill (retired)	Ph.D.	
Jack Shere	USDA, APHIS, VS	Ph.D.	
Amanda Skarlupka	University of Georgia	FRI Summer Scholar, Assoc. Research Spec.	
Jill Snowdon	USDA/APHIS/VS/NCIE	Scientist	
William Sperber	Cargill (retired)	Ph.D.	
Ann Sticha	PepsiCo	Student Hourly	



Name	Last known employer	Position and Degree at FRI	
Yi-Cheng Su	Seafood Res. Education Center, Oregon State	Ph.D.	
Susan Sumner	Virginia Tech, Dept. Food Science	Ph.D.	
Matthew J. Sylte	USDA-ARS	Ph.D.	
Rehan Tariq	Cerner Corporation	FRI Summer Scholar	
Dawn (Granberg) Tessmer	City of Norwich, Connecticut	Undergrad Lab Asst., Research Spec.	
Chelsey Timm	Nestle	FRI Summer Scholar	
Joanne Tsarouha	Thermo Fisher Scientific	M.S.	
Megan Wagner	The Ohio State University	Student Hourly, FRI Summer Scholar	
Di Wang	IMS Health	FRI Summer Scholar	
Regina Whitemarsh	Epic	B.S., Ph.D.	
Pam Wilger	Cargill	Undergrad Lab Asst., M.S.	
Emily Wilson	AmeriCorps	B.S.	
Stella Winarto	Perfect Foods Muuri	FRI Summer Scholar	
Ahmed Yousef	The Ohio State University, Dept. Food Science	Ph.D.	
Sara Zerbel	UW Hospital and Clinic	M.S.	



# FRI Outreach: Meetings, Training, and Seminars

FRI, in collaboration with other UW-Madison departments and other organizations, provides outreach to the scientific community through meetings, short courses, conferences, and symposia. The goal of these events is to bring individuals interested in food safety topics together, allowing for public debate and the development of relationships among scientists. Some of our past events are listed below.

Dates	Event	Comments
2005– present	FRESH seminar series	Bi-weekly seminar series each semester
2009– present	Better Process Cheese School	Presented annually; Co-sponsored with the Dept. of Food Science, UW-Madison
2016– present	Preventive Controls for Human Food Training	This course developed by the FSPCA is the "standardized curriculum" recognized by FDA; successfully completing this course is one way to meet the requirements for a "preventive controls qualified individual."
Biennial since 2010	Food Safety and Meat Microbiology School	Co-sponsored with the Master Meat Crafter Program, Dept. of Animal Sciences, Dept. of Meat Science, and the Muscle Biology Lab, UW-Madison
2018	Food Waste and Sustainability: Strategies to Improve Food Safety, Food Security, and Nutrition	FRI Focus on Food Safety Series, co-sponsored with the Institute for Food Safety and Health (IFSH)
2018	Advanced Meat Microbiology & Food Safety for Processed Meats	Provides resources to manage process variations, establish thermal process, formulating foods for safety, and handling cooling deviations, focusing on real-world, in-plant scenarios.
2018	FRI 2018 Spring Meeting	FRI current research; <i>Special Topics:</i> Diet and human health, foodborne disease investigations, decision tools for product developers, hot topics in food safety
2017	The Microbiomes: From Field to Food to Human Gut	<i>FRI Focus on Food Safety Series</i> , co-sponsored with the Institute for Food Safety and Health (IFSH)
2017	FRI 2017 Spring Meeting	FRI current research; <i>Special Topics:</i> Clean-label ingredients, <i>Salmonella</i> , decision tools for product developers, fermented foods, botulism in traditional ethnic foods
2016	FRI 2016 Spring Meeting and 50/70 Anniversary Celebration	FRI current research; <i>Special Topics:</i> FRI history, food microbiomes, microbial evolution, new detection methods, interactive packaging, produce safety, validation and preventive controls for low-moisture foods, <i>Listeria</i> outbreaks in ice cream, regulatory updates
2015	Food Allergens: Best Practices for Assessing, Managing and Communicating the Risks	<i>FRI Focus on Food Safety Series</i> , co-sponsored with the Institute for Food Safety and Health (IFSH)

#### Social Media

Facebook (<u>https://www.facebook.com/FoodResearchInstitute</u>) Twitter (<u>https://twitter.com/FoodResearchUW</u>) LinkedIn (<u>https://www.linkedin.com/company/10274804/</u>)