Spring 2008

Food Science & Technology Alumni News, Spring 2008

University of Nebraska Lincoln

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

ALUMNI NEWS

SPRING 2008

A message from the Department Head . . .

Rolando A. Flores

Greetings from the Department of Food Science and Technology and The Food Processing Center!

Since this is the fortieth anniversary of our Department, I would like to begin by announcing that in the coming months we hope to expand our faculty. We are searching for a new assistant professor with specialization in food allergy research. This individual will add to our world-renowned strength in this field. Also, we are searching for a mucosal immunologist to strengthen our very dynamic gastro intestinal (GI) microbiology group. The GI initiative was developed in our Department under the leadership of Dr. Andy Benson and our colleagues Drs. Hutkins and Walter. The GI initiative has collaborators in numerous departments across the Institute of Agriculture and Natural Resources, and other colleges and UN campuses.

We have great news for our newest major, Food Technology for Companion Animals. This new major, a joint program developed and taught by the Departments of Food Science and Technology and Animal Science, has been welcomed by the pet food industry. Recently, the Nestlé Purina Corporation announced that it will support students who pursue this major with scholarships. Starting in 2008, ten scholarships of $2,500 each will be awarded, for a total of $25,000 a year during three years. In addition to the scholarships, Nestlé Purina will support industry speakers in our classrooms, student internships in their plants, sponsor plant visits, and provide other programs to enrich the students' experiences and learning process in the field.

Our faculty continue receiving recognition for their outstanding teaching: Drs. Cuppett, Rupnow, and Subbiah were awarded the "Certificate of Recognition for Contributions to Students" by the Parents' Association and the Teaching Council of UNL. This is a well deserved recognition of their dedication.

To celebrate the twenty-fifth anniversary of The Food Processing Center, three new unit operations are being installed in The FPC pilot plants. These units are a single screw extruder, a reverse osmosis and ultrafiltration unit, and a vibratory fluidized bed dryer. These unit operations are adding to the systems available to The FPC clients and open new avenues for research and instruction for our faculty and students. In addition, this will be a big year for workshops at The Food Processing Center. We will offer, as we have in the past, workshops on Extrusion, Better Process Control School (BPCS), Ingredient Functionality, and numerous seminars for entrepreneurs. Acidified Foods BPCS and BPCS in Spanish will be conducted for the first time this year – part of our response to the food industry's growing needs. A specialized workshop on food safety and risk analysis of foods for domestic and foreign trade is being developed for the Health and Food representatives in the Americas of the Inter-American Institute for Cooperation on Agriculture; this workshop will be held in May of this year.

I hope you appreciate this issue of our Alumni Newsletter, and I also hope you will take a few moments to keep us updated on your activities. We are grateful for the quality that support from alumni affords our department and our students.

Rolando A. Flores

Professor, Head, and Director

IANR

Graduates of the B.S. Program

Steven Beckman
Pei Wen Lim
Sheu Lih Lim
Wee Chin Low
Melissa Waszak

Graduates of the M.S. Program

Viviana Bermudez
Thesis: "Dynamic Predictive Model for Growth of Escherichia Coli 0157:H7 in Ground Beef"
Dr. John Rupnow, Advisor

Jon Steckelberg
Thesis: "Development of Protein Mircroarrays for Profiling IgE-binding Proteins; Using Extracts of Lentils (Lens culinaris)"
Dr. Michael Zeece, Advisor

Walter Tembo - Randy Wehling, Advisor

Graduates of the Ph.D. Program

Choo Lum Ng
Dissertation: "Applications of Infrared Spectroscopy to Agricultural and Food Products"
Dr. Randy Wehling, advisor

Panjama Cheewapramong
Dissertation: "Use of Near-Infrared Spectroscopy for Qualitative and Quantitative Analyses of Grains and Cereal Products"
Dr. Randy Wehling, advisor

Steve Beckman, Baccalaureate and Future Ph.D.

Steve and Dr. Cuppett at CASNR's Salute to Graduates

Steve Beckman set his sights on UNL's Food Science program when a recruiter came to his Lincoln High School biology class and showed how to make gummy worms. Steve said, "I crave a deeper understanding of the world I am in, and thought that knowing food on a scientific scale was a very interesting way of accomplishing this goal."

Steve discovered his passion for dairy products in Dr. Hutkins's Dairy Products Technology class. "I liked it so much," he remembers, "that I have chosen to undertake a master's degree in Dairy Science at Cornell University."

Steve has very gracious words for Dr. Hutkins and Dr. Andrew Benson. "These two gentlemen are at the top of their fields and have given me insight into not only Food Science, but science in general."

Outside of class, Beckman has been an active member of the Food Science Club. He has served as an ice cream manager during sales at the state fair. He took part in food industry tours which he feels are an amazing opportunity. "I met new people and made contacts with companies that I might work for in a few years." He also found time to work as an assistant in the Dairy Pilot Plant where he worked on cheeses, ice cream, yogurt, and other products for the Dairy Store; to assist recruitment for the department as a Department of Food Science Ambassador; and to play on several intramural teams.

How did it make him feel? "Simply being at UNL for the past four and a half years has been one great memory that I will not soon forget. Through my time in the Food Science program I have garnered some great friendships that will last a lifetime."

Steve graduated with a Bachelor's Degree in Food Science in December and is moving to Ithaca, NY to study with Dr. David Barbano at Cornell University. "I hope to achieve a master's degree in Dairy Science and possibly go on to attain a doctorate in some field of Food Science."

Wee Chin in "Fruit and Vegetable Technology" class

Recent Graduate Wee Chin Low

Wee Chin Low, who came to UNL from Malaysia, graduated in December with a Bachelor's Degree in Food Science.

Wee Chin was drawn to UNL in part because of our program's generous financial support: "I am not only receiving a scholarship from UNL but also from Department of Food Science and Technology. I am especially grateful, because the money was awarded as tuition fees deduction. Since I am an international student, tuition can sometimes be a burden for me."

"I think it is not easy to be here at the beginning, but after I took more courses at UNL, I had more confidence to work on my own, and I had some bearing on what I need to do. It was something I wanted, strived for and got after I chose to be here." Wee Chin found her passion in applying food science to maintaining a high quality food supply, making the best use of available food resources and creating new products.

As part of her training, for the past two years Wee Chin has been assisting graduate research projects under the guidance of Dr. Thippareddi. This work has focused on the microbiology of food products and entailed research on a number of food borne pathogens like *E. coli* 0157:H7, *Listeria* monocytogenes, and *Salmonella*.

During her time at UNL, Wee Chin became involved with the Food Science club. She enjoyed the development opportunities the club provides: "I went to fall break food industry tour and the tour helped me to build up career network in the field." Given the chance to grow closer to faculty and other students, Wee felt like she was treated as part of their families.

"I have thoroughly enjoyed my experiences at UNL. And following graduation, I hope to get a job doing food quality assurance."

Dr. Taylor at Work in the Netherlands

On February 20, Dr. Steven Taylor served as an external examiner for the Ph.D. defense of Ms. Berber Vlieg-Boerstra at the University of Groningen in the Netherlands. The title of Ms. Vlieg-Boerstra's Medical Sciences thesis was "Standardization, Validation and Outcome of Double-Blind, Placebo-Controlled Food Challenges in Children." Dr. Taylor was invited as an examiner both due to his expertise in the field of food allergies and his encouragement of Vlieg-Boertstra's research over the course of her Ph.D. studies. The defense was conducted in the historic Academiegebouw on the campus of the University of Groningen with 6 examiners including guests from the University of Rotterdam and the University of Wageningen and Ms. Vlieg-Boerstra's thesis advisors Dr. A. E. J. Dubois and Dr. E. J. Duiverman. The defense was open to the public, and it is estimated 100 people attended including Ms. Vlieg-Boerstra's husband and two children.

Left to right, Drs. Taylor, Vlieg-Boerstra, and Dubois

The thesis defense is largely a formality in the Netherlands as virtually no student ever fails. Before the thesis defense is conducted, however, the thesis must either be published or submitted for publication. This requirement is understood to assure adequate peer review and high scientific quality of the work. The University of Groningen does not have graduate ceremonies for Ph.D. students as we do here; at the defense's conclusion, Dr. Vlieg-Boerstra was conferred her diploma.

New B.S. Students

Katie Guenther
Christy McCarty
Alex Nelson
Russell Parde
Laurel Weilage

New M.S. Graduate Students

Jeremy Hinkle
Advisor - Dr. Thippareddi

Malcond Valladares
Advisor - Dr. Flores

Michelle Zywiec
Advisor - Dr. Wehling

Dr. Cascante receiving her BPCS Certificate from Dr. Smith

Visiting Faculty and New Opportunities from Costa Rica

"The choices for cooperation in the area of food processing are enormous," concluded Dr. Maricela Cascante Sánchez of The National University of Costa Rica (UNA) after her visit to The FPC and the Department of Food Science and Technology on October 1-19, 2007. Dr. Cascante visited The FPC under the auspices of the Memorandum of Agreement that was signed between UNL and UNA in June of 2007. UNA is one of the four state universities in Costa Rica and describes its mission as "finding real solutions for social problems through research, outreach, and professional training of leaders."

Dr. Cascante represents the School of Agricultural Sciences, and her visit aimed to establish opportunities for students and professionals from Costa Rica to benefit from the expertise of The FPC. In addition to meetings with The FPC experts and FST faculty, Dr. Cascante participated in Better Process Control School and Applied Extrusion workshop to experience first-hand our excellent training programs. In addition, she met with a number of UNL administrators, visited local enterprises that are clients of The FPC, and delivered a seminar on the topic of "Agro-Industry and Analysis of Local Agro-Food Systems: A Case Study of Santa Cruz de Turrialba, Costa Rica." Dr. David Rickert, The FPC product development researcher, discussed with Dr. Cascante his interest in tropical fruits and the possibility of developing new healthy products using fruits grown in Costa Rica.

A number of events are now being planned to expand the exchange started by Dr. Cascante's visit. Dr. Owens, Vice Chancellor of IANR, and Dr. Flores will pay a return visit to UNA in thespring. David Rickert and Laurie Keeler are creating a product development seminar for micro and small processors of fruits, vegetables and dairy, to be delivered at UNA.

"It was very interesting to analyze the FEAP program as an extension activity within an academic department. We can emulate this model in the development of an Empowerment Center for Agro-Industry which would transform rural producers into entrepreneurs. The FPC is the best resource in terms of facilities and expertise for any programmatic need that UNA may have," said Dr. Cascante. Dr. Rolando Flores comments, "Having international contacts is very important for us. We seek out other organizations not only to create new markets for Nebraska products but also to provide new opportunities for UNL students and faculty."

Inés Martínez conducting analyses for The FPC

Graduate Student Spotlight: Inés Martínez

Inés Martínez has begun her second semester in the Food Science and Technology Master's program. Already she's made herself highly valuable to both The Food Processing Center and the department as a whole.

Inés came to us from Montevideo, Uruguay. There she attended Universidad de la República, majoring in food engineering. Her interest in food science stems from her aptitude with engineering. "I was leaning towards engineering and I liked process engineering the best. My attention was then turned to chemical engineering and food engineering."

Inés found out about UNL's program by accident. "I was visiting my host family in Texas a few years ago and was watching a TV show in which they showed UNL's Dairy Store, and students getting ice cream that was produced within The FPC facilities and they showed the facilities a bit. I thought it was very interesting and that I would like to go somewhere like that later on in my studies."

After experiencing UNL first hand, Inés says, "I have loved food micro! I love the professors. They are smart, knowledgable and above all highly motivating and motivated. They love what they do, they love to teach and I think they have a great program and team. The subject is fascinating and they make it even more so." She goes on to say, "Also, being a FPC student I have been doing rotations around The FPC facilities and have worked with great people. Dr. Stratton, Dr. Rickert, and Laurie Keeler have been great to me. Everyone has. And Dr. Flores is a wonderful advisor."

In Montevideo, Inés was involved in sports and community service. In Lincoln, she has made it her habit to run every day. "In one of my daily runs I ran into an ex-high school teacher of mine from back home. That was two days after getting here. He's doing a post-Ph.D. in biology. It was great and very unexpected!"

Busy Autumn for the Food Science Club

Contributed by Melanie Downs

The UNL Food Science Club started its busy fall 2007 semester with our largest fundraiser of the year, selling Dairy Store ice cream at the Nebraska State Fair. For the second year, the club also worked with the Nebraska Beekeepers' Association to sell Honey Bee Ice Cream. With the generous help of faculty, staff, and student volunteers, the club scooped its way to one of its most profitable years in recent memory.

The Food Science Club at Fireside Orchard and Gardens in Minneapolis, Minnesota

The income from ice cream sales helped to fund the club's annual Fall Break Industry Tour. This year the club traveled to the Minneapolis area to visit Fireside Orchard and Gardens, General Mills Headquarters and James Ford Bell Technical Center, Old Dutch Foods, Dakota Growers Pasta Company, Land O'Lakes, and Hormel. These tours have become one of the club's most successful and popular events as they give students the opportunity to see interesting and varied food facilities.

Giving back to the community is also an important part of the club's mission. In this spirit, the club held its annual Trick or Treating for Canned Goods event. On Halloween, club members trick-or-treated around Lincoln in order to collect food for the Lincoln Food Bank. This event is a unique opportunity for the club to help an important cause and connect with the community.

Throughout the semester, the club brought industry speakers to its monthly meetings, to talk with club members about internship and job opportunities. Speakers included representatives from Wells Dairy (Blue Bunny), Cargill, and Danisco. In November, the club hosted an international potluck, where unique dishes by students, faculty, and staff showcased our department's diversity.

As part of its activities this spring, the club will be hosting the Institute of Food Technologists Student Association North Central Area meeting in April. The two-day meeting will be an excellent way to feature the outstanding Food Science and Technology program at UNL.

FSC Roster

Officers	2007-2008
President	Melanie Downs
Vice President	Olivia Kunzman
Secretary	Tessa Porter
Treasurer	Rob Lacy
Undergraduate Liaison	Steven Kaiser
Graduate Liaison	Kenzi Clark, Rachel Reuss
PR Chair	Daniela Bautista
Ice Cream Managers	Steve Beckman, Tim Anderson, Rob Lacy
Junior Advisor	Dr. Bob Hutkins
Senior Advisor	Dr. Jeyam Subbiah

Undergraduate Spotlight: Melanie Downs

At the age when other girls dreamt of ponies, Food Science senior Melanie Downs knew her future lay in food. She even dreamt of being a chef in a restaurant until the day she discovered the science of food.

"One day I read an article in one of my food magazines about scientists who were studying food at the molecular level, and I was hooked. I loved learning about how the food we eat every day is made and how the constituents of food interact with each other."

Melanie at work in the FARRP Lab

Melanie chose UNL's Food Science Program over several alternatives. "I toured several universities with food science programs before my senior year of high school. The UNL program seemed to have the most complete package. The department had world-class programs including FARRP, and at the same time the department was very welcoming and inviting. Even on my first visit, I could tell that the combination of academics, research, and atmosphere was excellent."

Once at UNL, Melanie quickly felt at home. "When I came to the Food Science Department at UNL, I was pleasantly surprised at how close-knit the department was. Dr. Cuppett has been my academic advisor as well as my professor for several classes. As an advisor, Dr. Cuppett does a tremendous job of guiding students through the program. In addition to academic advising, she is always willing to give advice and guidance about careers, internships, and graduate schools. Few people at the university work as hard for students as she does."

Melanie has dedicated herself to working at UNL's Food Allergy Research and Resource Program (FARRP). "I have learned a great deal from all of them and my experience in the program has greatly affected my undergraduate years. Dr. Steve Taylor has been a great teacher and advisor for my research project. His vast experience with food allergies has helped to guide me through my research. Julie Nordlee, Lynn Niemann, and Deb Lambrecht have also been outstanding sources of information and support throughout my time at FARRP."

Outside of FARRP, she's been able to accomplish some of her own research goals. "Recently I have been working on a research project to determine the effects of thermal treatment (simulated deep-fat frying) in the presence of reducing sugars, and on the solubility and immunochemical detection of milk proteins. I have thoroughly enjoyed my research experience and I look forward to continuing my work in the area of food allergies."

Melanie has also involved herself in the Food Science Club. "I am the current club president and I also served as secretary for the 2006-2007 academic year. Over my years in the club I have participated in numerous activities including food industry tours, Nebraska State Fair ice cream sales, food drives, the IFTSA college bowl, product development competitions, and social activities."

Melanie is set to graduate this spring. Her immediate plans don't stray far from campus: "After graduation, I will continue my education at UNL and pursue a master's degree in food science."

New and Improved Sensory Analysis Lab

The existing Sensory Evaluation Laboratory in the Department of Food Science and Technology came into being with the 1990 Food Industry Complex addition to Filley Hall, and it has served the department and The Food Processing Center quite well. However, as with all things, time does tell, and last spring it was decided that the lab needed to be upgraded and remodeled.

The remodeling involved replacing and updating aging portions of the lab. Preparation and serving countertops were replaced. New washing equipment was installed, including a new dishwasher and a spray for tall vessels. A new Jenn-Air stove was installed and the convection oven was replumbed. Space for an analyst station has been gained by removing a water cooler. These and other fresh touches have given the lab a more streamlined, modern look.

The upgrade also provided a move into the computer age for Dr. Cuppett. A sensory computer program was purchased which has individual touch pad monitors for each of the lab's eight booths. Also added was a 32-inch flat screen television to make it easier for laboratory staff to track sample serving order. The computer system has completed its test runs and, according to Dr. Cuppett, "It is really very nice to have in place for collecting and analyzing data."

FPC Project Assistant Nina Murray uses the new touch screen survey

Selected Grants

Nebraska Dry Bean Commission: Vicki Schlegel and Susan Cuppett, "Antiproliferation Activities of the Great Northern Bean Against Human Colon Carcinoma Cells" $28,533 (6 months)

USDA/FAS: Richard Goodman, "Borlaug Fellowships for Indian Scientists" $44,200 (15 months)

UNL Mussehl Poultry Research Endowment: H. Thippareddi, "Microbiological Safety of Egg White Hydrolysate Manufacturing Process: Bacillus cereus and Clostridium perfringens Risk Evaluation" $25,000 (1 year)

UNL Mussehl Poultry Research Endowment: Jens Walter, "Use of Probiotic Lactobacilli & Prebiotic Carbohydrates to Reduce Infections in Poultry" $25,000 (1 year)

UNL Mussehl Poultry Research Endowment: Randy Wehling "Determination of Yolk Contamination in Egg White by Raman Spectroscopy" $25,000 (1 year)

UNL Mussehl Poultry Research Endowment: Michael Zeece "Enhanced Egg White Functionality by use of High Hydrostatic Pressure Treatment" $25,000 (1 year)

American Meat Institute Foundation: Randy Wehling, Michael Zeece, and Harshavardhan Thippareddi "Evaluation and Analysis of Meat Products Contaminated by Low Levels of Ammonia" $70,500 (1 year)

New Faces

Joey Best began on December 17, 2007 as a project assistant with FARRP. She has a B.S. in Nuclear Medicine Science from the University of Wisconsin. About her current department, she says "FARRP is a great program, and it does a great service for consumers via the food industry."

Wanda Bowder began in October 2007 as the Administrative Assistant for the Department. Wanda came to us from UNL Athletics where she served as the Administrative Assistant/Office Manager for the Soccer Program for 8 years.

Connie Gebhardt began on March 17, 2008 as the new Graduate Secretary for the Department. Connie came to us from UNL Athletics where she served as the Ticket Office Representative. Before that, Connie worked as a Graduate Secretary in the Architecture Department.

Jonathan Hnosko started on January 14 as the Dairy Operations/Research Manager. He is responsible for the manufacture of cheese, ice cream, and other dairy products as well as working with faculty, industry, and staff on research and teaching projects.

Melissa Hnosko joined the Food Innovation and Entrepreneurship unit of The FPC where she is working with clients to assess their promotional efforts, and design marketing plans that fit their business. Melissa received her B.A. in Advertising from Washington State University in 2005.

Michele Laritson started on September 25, 2007 as a Business Analyst in the The Food Processing Center. She received her MBA from UNL in 1997 and has worked in a financial and accounting capacity for companies across many industries. She also owns her own business, an online retail store for cat lovers called www.catgifts4u.com.

Sean Murray started in February 2008, and is assisting The FPC with grant and international program development. Sean holds a JD from University of Nebraska College of Law and spent 2006/07 in Lithuania as a Fulbright scholar. "Like those celbrities for whom 'it's an honor just being nominated,' I'm just happy to be here. Except I really mean it when I say it."

Bryan Scherbarth began as Dairy Store manager on April 2, 2008. Bryan has over 20 years of hospitality experience, most recently as general manager of P. O. Pears. Additonally, Bryan serves on the adjunct Spanish faculty of both Wesleyan and Doane colleges.

Steve Stephens joined The FPC on October 15, 2007 as a Food Process Engineer. Steve received his Bachelor's Degree in Chemical Engineering and Master's Degree in Environmental Engineering from the University of Nebraska–Lincoln.

Departures

Kathleen Borg had worked as Graduate Secretary for the Department since 2006. She left this February.

Joan Scheel was the head of The FPC Special Projects Division where she was responsible for business plans, marketing plans, feasibility studies, and market research projects. Joan left in late February to take a position with USDA Rural Development.

Courtney Wilson was the manager of the UNL Dairy Store. She resigned for other interests in January 2008.

Heidi Wilson was a project assistant for FARRP from June 2006 to October 2007. She left the position when her husband accepted a transfer from within his company to Des Moines, Iowa. She currently is enjoying the opportunity to be a stay-at-home mom and is looking forward to the arrival of their second child this spring.

Visiting Faculty

Dr. Maricela Cascante Sánchez (see page 3)

Dr. Soo-Hyun Chung was visiting from Korea University in Seoul for the past year. While here, he worked closely with Dr. Lloyd Bullerman and Dr. Jayne Stratton. Dr. Chung returned home in late February.

Food Science Alumna Wins Folsom Award

Dr. Hutkins and Jennifer Huebner at the February 6 awards reception

On February 6, Jennifer Huebner received the 2008 Folsom Distinguished Master's Thesis Award. In addition to $500 honorarium, Jennifer has the honor of being the first Food Science student to be recognized by this award since its inception in 1997.

Huebner, who graduated from the Department of Food Science and Technology in December 2006, was honored for her thesis titled "Functional Activity and Stability of Commercial Prebiotics." The objectives of this research project were to develop and validate a prebiotic activity assay and then to determine the functional activity and stability of commercial prebiotics. This has led to the development of a quantitative method for evaluating the activity of commercial prebiotics. The method also is useful for predicting the stability of commercial prebiotics during food processing. Information gained from this research will aid in the optimization of probiotics and prebiotics as functional food ingredients.

"I first became interested in research in the area of gastrointestinal health while working with Dr. Cuppett on my UCARE project, which dealt with bioavailability of phenolic acids and isoflavones with Caco-2 cells. Later I took a dairy science course with Dr. Hutkins which first exposed me to the idea of working with fermented foods. Dr. Hutkins showed a great deal of passion for this area of research and helped to motivate me to pursue it in my research."

The Folsom Thesis Award is given every year to one Master's student at UNL. Every department is allowed to nominate one thesis, and the nominations are judged by reviewers outside the university.

After graduation, Jennifer began working with ConAgra as an Associate Food Scientist. Her work includes product prototype development and product scale-up. Recent projects have involved improving nutrition and processing for frozen dinners.

The North Platte native said, "I was very honored to have been selected for such a prestigious award. I am forever grateful to Dr. Hutkins, Dr. Cuppett, Dr. Wehling, Dr. Parkhurst and Dr. Rupnow for the guidance and support that they gave me throughout my graduate studies at UNL."

Dr. Elizabeth Arndt

Dr. Elizabeth Arndt Appointed to Adjunct Faculty

Dr. Elizabeth Arndt was appointed an adjunct faculty member in December 2007.

After majoring in Food Engineering Technology at Kansas State University, Dr. Arndt chose to do her Master's graduate research at UNL. "I was attracted by the broad range of research conducted by the faculty. There were many interesting classes and research focus areas including Dr. Bullerman's toxicology class and Dr. Shahani's research on gut health," she remembers.

Under the guidance of Dr. Randy Wehling, Dr. Arndt's research project involved developing a whey-based sweetener syrup using a two-step enzymatic process to hydrolyze lactose and isomerize glucose to fructose. This was an exciting research project and called for ultrafiltration and vacuum evaporation to make the syrup, HPLC to analyze the syrup and then testing the syrup in cookie and ice cream systems to determine its effects on product functionality and consumer satisfaction.

Since achieving her doctorate from Kansas State University, Dr. Arndt has gone on to manage the research and development team for ConAgra Mills. There her duty is to find innovative and proprietary solutions in developing new and improving existing grain-based ingredients in functionality, taste and nutrition. "Our current research includes development and optimization of whole grain-based products to optimize and balance consumer liking, product functionality and nutritional delivery. We are sponsoring whole grain food consumption studies in schools using Ultragrain whole wheat flour, traditional whole wheat flour and Sustagrain barley to help determine the best ways to increase whole grain consumption in children. We have also conducted research to help determine the effect of grain type, inclusion level and particle size on glycemic response."

"I have worked with both The Food Processing Center and the Nutrition Department to conduct a diverse range of projects and studies, including determining the effect of wheat origin on functionality and flavor in a pizza crust system, conducting a processing study on the effect of UV treatment on microbes in vegetables, as well as sponsoring animal feeding studies conducted by Dr. Tim Carr on the effect of barley beta-glucan on cholesterol. It is beneficial to have the University so close to ConAgra Foods to be able to take advantage of the Center's capabilities."

Dr. Arndt was invited to this appointment by Dr. Flores, who comments, "She brings extensive research expertise and industry experience to the faculty in the area of whole grain processing and component functionality."

As an adjunct faculty member, Dr. Arndt will be able to participate in departmental activities, supervise graduate students, participate in grant preparation, and collaborate with the faculty in her area of expertise. Dr. Arndt is very enthusiastic about the potential for this role. "I'm very excited about the opportunities and possibilities for collaboration and discovery."

The Food Mycology and Mycotoxins Laboratory at the University of Nebraska–Lincoln

Lloyd B. Bullerman, Ph.D.
Professor
UNL Department of Food Science and Technology
lbullerman1@unl.edu

Research on molds and mycotoxins has been ongoing in The Food Mycology and Mycotoxins Laboratory since the laboratory was established in 1970. Food Mycology is the sub-discipline of Food Microbiology that deals with molds in foods. Molds pose both spoilage problems and food safety issues. Molds are slower growing than bacteria and do not compete well with bacteria in high moisture foods, but are adapted to growth on substrates with lower moisture contents. Moisture content is more appropriately expressed as moisture available for microbial growth or water activity (a_w).

The a_w of pure water is 1.0. The a_w of any aqueous solution, such as food, will be less than 1.0 and will be expressed as a decimal such as 0.99. This would describe a food with a very high moisture content and high a_w such as milk or fresh meat. While many molds can grow at high a_w in the absence of bacterial competition, molds grow best in drier substrates at lower a_w. Most molds will grow over an a_w range from 0.80 to 0.98. Some molds, often called xerophiles, are well adapted to growth at a_w below 0.80 down to 0.75 or 0.70. Others, referred to as extreme xerophiles, can grow at a_w as low as 0.65 to 0.60.

Molds are the main spoilage organisms of drier foods and commodities such as cereal grains, oilseeds, nuts, aged natural cheeses, cured, and aged meats, dried meats and fish and salted foods. Molds are also adapted to growth in acid environments at low pH's. This makes molds common spoilers of fruits and high acid vegetables such as apples, citrus fruits, berries, and tomatoes. Molds may also spoil foods that are high in solids and foods with high sugar content such as jams and jellies.

Molds also pose food safety concerns and potential health hazards to both humans and animals because of the production, by some species, of toxic metabolites known as mycotoxins. The term mycotoxin is a general term that simply means mold toxin. Within the broad category of mycotoxins are many specific compounds or metabolites that have various toxicological properties. Most mycotoxins are acutely toxic in high doses and produce chronic toxicity in lower doses. Some mycotoxins are carcinogenic, teratogenic (capable of causing deformities and birth defects in developing embryos), fetotoxic, immunotoxic and immuno-suppressive.

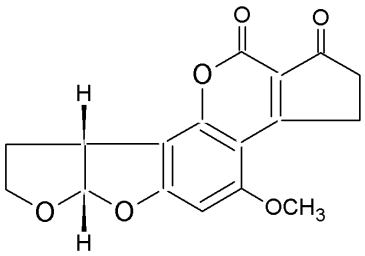
Mycotoxins are now thought to have contaminated human and animal foods and feeds for millennia going back into antiquity. The plagues of Egypt, recounted in the Bible, have been speculated to have actually been mycotoxicoses (diseases caused by mycotoxins). The so-called St. Anthony's fire of the Middle Ages in Europe was caused by ergot, a fungal disease of rye and other grasses, in which fungal structures of *Claviceps purpurea*, called sclerotia, replace the rye grain. The ergot sclerotia contain psychoactive and vasoconstrictive alkaloids that can cause hallucinations and burning sensations in the extremities. Alimentary Toxic Aleukia (ATA), a disease in which the bone marrow was progressively destroyed and which occurred in Eastern Europe, Russia and Siberia up until the mid-20th century was caused by mycotoxins produced by *Fusarium* molds growing on cereal grains that overwintered in fields under snow cover. Because of food shortages in those lands, especially during World War II, such grain was often consumed by humans in the spring.

Certain diseases in farm animals had long been suspected to be caused by molds, but before 1960, no link was documented. In 1960, a major disease outbreak occurred in England in which more than 100,000 turkey poults and other young farm animals died. At first the cause of the disease was a mystery, since it was not caused by any infectious agents and no known poisons or toxins were found in the feed. So the disease was given the name "Turkey X Disease." Ultimately a feed ingredient, ground nut (peanut) meal from Brazil was found to be heavily contaminated with a common storage mold, *Aspergillus flavus*. The feed was also found to contain a fluorescent substance that was toxic and determined to be the cause of the disease and which was shown to be produced by *A. flavus*. The substance was given the name aflatoxin for *A. flavus* toxin (a-fla-toxin). The discovery of aflatoxin was the first proof that metabolites of filamentous fungi or molds could cause disease in animals and ultimately humans. This led to extensive research on molds and mycotoxins that continues to the present.

The mycotoxins considered to be of greatest concern at the present time include aflatoxins, ochratoxin A, patulin, fumonisins, deoxynivalenol, T-2 toxin and zearalenone. These individual mycotoxins are all produced by different mold species that are found contaminating and growing in different commodities and foods.

Aflatoxins are produced by *Aspergillus flavus, Aspergillus parasiticus* and *Aspergillus nomius*. These molds are commonly found in the soil and may contaminate certain crops such as corn and peanuts in the field. They may also be found in stored products. *Aspergillus flavus* is commonly found in corn, whereas *A. parasiticus* is more likely to be associated with peanuts. *Aspergillus nomius* is primarily an inhabitant of soils in the Western U.S. and is not associated with any particular commodity. Aflatoxins are potent liver toxins and carcinogens. Aflatoxins can contaminate corn, peanuts, tree nuts, cottonseed and other stored commodities.

Ochratoxin A is produced by *Aspergillus ochraceus*, *Aspergillus carbonarius* and *Penicillium verruscosum*. *Aspergillus ochraceus* is found in tropical regions and often contaminates green coffee beans. *Aspergillus carbonarius* is frequently found in vineyards and as a contaminant of grapes, particularly in warmer regions. *Penicillium verrucosum* is a common contaminant of barley and wheat grown in cooler regions such as Canada and Northern Europe. Because of the occurrence and distribution of these organisms ochratoxin A can sometimes be found as a contaminant of green coffee beans, wines and dried fruits such as raisins as well as barley and beer. Ochratoxin A is a kidney toxin and potential carcinogen. It has been implicated in a human kidney disease in Eastern Europe known as Balkan Endemic Nephropathy. Ochratoxin has been found in the blood of people in Canada and Europe, presumably from exposure through cereal products and beer.



Aflatoxin B_1

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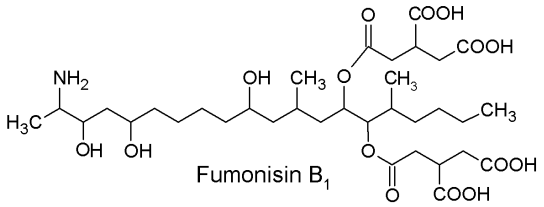

Fumonisin B_1

Patulin is a mycotoxin produced by *Penicillium expansum*. This organism is responsible for causing rots in damaged apples and patulin is primarily a contaminant of damaged apples and apple products such as apple juice and apple sauce.

Fusarium molds commonly contaminate grain in the field and are responsible for producing several mycotoxins. *Fusarium verticillioides* (formerly called *F. moniliforme*) and *Fusarium proliferatum* are common contaminants of corn and are the main producers of fumonisins, mycotoxins very commonly found in corn. *Fusarium verticillioides* is found in all corn-growing areas of the world and may be associated with corn plants as an endophyte, an organism found in the intracellular spaces of plants without producing disease or adverse effects in the plant. These organisms may also be found in the corn grain where they may produce low amounts of fumonisins. All corn, even good quality food grade corn, may contain *F. verticillioides* and low amounts of fumonisins. Fumonisins have been shown to cause Equine Leucoencephalomalacia (ELEM), a fatal brain disease in horses and other equines and Porcine Pulmonary Edema (PPE). Fumonisins have also been implicated as a possible cause of human esophageal cancer and neural tube defects in developing human embryos.

Deoxynivalenol (DON), also called vomitoxin, is produced by *Fusarium graminearum* and *Fusarium culmorum*. These organisms can cause plant diseases such as *Fusarium* head blight or scab in wheat, barley, and other grasses, and ear rots in corn in the field. In these infections of the grain deoxynivalenol can be produced and contaminate the grain. Deoxynivalenol is also called vomitoxin because it causes vomiting and other gastrointestinal problems in animals. DON-contaminated wheat has caused human gastroenteritis and related illnesses. DON and *F. graminearum* have also caused problems in malting and brewing and are responsible for a problem known as "gushing" in beer, where beer gushes out of the bottle when the bottle is opened. DON can also contaminate cereal-based foods made from contaminated grain. DON is one of several mycotoxins that belong to a group of toxins known as trichothecenes. Deoxynivalenol is the most commonly occurring trichothecene in nature. A related toxin that is much less common, but more toxic, is T-2 toxin which is produced by *Fusarium poae* and *Fusarium sporotrichioides*. The trichothene mycotoxins in addition to causing gastrointestinal problems are also potent protein synthesis inhibitors and are immunotoxic, commonly causing immunosuppression that can lead to secondary infections and other diseases including blood disorders.

Zearalenone is another metabolite that can be produced by *F. graminearum* and *F. culmorum*. Zearalenone is not an acute toxin, but rather an estrogenic substance that causes reproductive problems, such as infertility, and spontaneous abortions in farm animals, especially swine. Zearalenone is considered to be a naturally occurring disruptor of the endocrine system in animals and it has been speculated that it could cause health problems involving the endocrine system in humans.

Research in my laboratory, the Food Mycology and Mycotoxins Laboratory, has been devoted to studying molds and mycotoxins in foods and grains since 1970. During this time numerous graduate students, undergraduate students, technicians and post-doctoral scientists have worked with me in this research area. During the 1970's we had several grants and contracts to study molds found on aged natural cheeses. We isolated, identified and studied these molds for possible mycotoxin production. Most of the molds found were *Penicillium* species capable of growing at refrigeration temperatures. Some were capable of producing mycotoxins such as patulin and penicillic acid, but did not produce detectable quantities in cheese. In the early 1980's my laboratory began studying the effects of common antifungal food preservatives on mycotoxin-producing molds and mycotoxin production. Studies were done with sorbates, propionates, benzoates, and herbs and spices. While mold inhibitors at the concentrations that prevented mold growth also prevented mycotoxin production, it was found that sub-inhibitory levels of mold inhibitors might actually stimulate mycotoxin production. It was also observed that the spices cinnamon and cloves and the herb ground mustard seed had strong mold inhibitory properties.

Since about 1988-89 research in my laboratory has concentrated on *Fusarium* molds and toxins in cereal grains. This work has studied the incidence and levels of *Fusarium* mold species, especially *F. verticillioides, F. proliferatum, F. subglutinans, F. graminearum* and *F. culmorum*, and the toxins they produce, fumonisins, moniliformin, deoxynivalenol (DON) and zearalenone in corn and wheat and foods made from these grains. This has lead to studies of the effects of food processing, especially thermal processes and extrusion, on the fate of these toxins (Bullerman and Bianchini, 2007). The results of this work have shown that these mycotoxins are generally quite heat resistant and are not destroyed by most thermal processes used to process grain-based foods. Processes such as boiling, canning, baking and frying do not reduce the levels of the *Fusarium* mycotoxins. Processes that use very high temperatures, such as roasting and extrusion, cause some reductions of these toxins. Fairly extensive studies of the effects of extrusion on fumonisins, moniliformin, deoxynivalenol and zearalenone have been done in my laboratory. Deoxynivalenol and moniliformin appear to be the more stable of these toxins, showing the lowest amounts of reductions in the extrusion processes. Zearalenone appears to be reduced to the greatest extent by extrusion processing, while fumonisins seem to be reduced to a lesser extent, though some reduction does occur. Of the *Fusarium* toxins, we have studied the effects of extrusion on fumonisins to the greatest extent. While fumonisin B1 (FB1) is very heat stable, significant reduction of this toxin occurs with extrusion processing. Heating fumonisins in the presence of a reducing sugar, such as glucose, has been found to reduce the FB1 levels to a greater extent than heating alone (Murphy, et al., 1996). This is also true when FB1 is extruded with added glucose. There were concerns however that reaction products of FB1 with the glucose had not been studied for toxicity nor had these products been identified. Therefore, the most recent work done on this question in our laboratory was designed to investigate the fate of FB1 in corn grits during single screw extrusion in the presence of 10% glucose. It was found that extrusion alone decreases FB1 by 21-37% whereas the same process with added glucose decreases FB1 by 77-87%. The main degradation product of FB1 in grits extruded with glucose was N-(deoxy-D-fructos-1-yl) fumonisin B1. In testing with rats, this degradation product appeared to be much less toxic than FB1. Thus extrusion of FB1 in the presence of glucose reduced the FB1 concentration in

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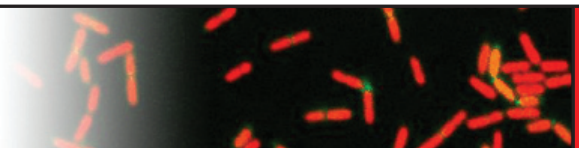
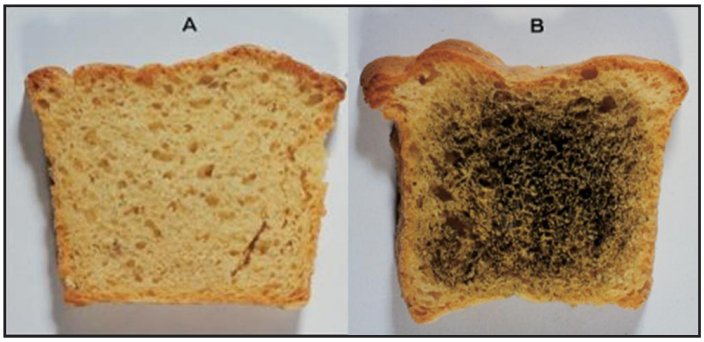
Inhibition of mold by a* Lactobacillus *isolated from sourdough



the corn grits significantly, with the formation of a degradation product that was much less toxic (Bullerman, et al., 2008).

Other recent work in my laboratory has been directed toward searching for bacteria that inhibit or prevent mold growth and mycotoxin production. One isolate of *Bacillus pumilus*, obtained from dried fish from Burundi, appears to have strong antifungal activity and also inhibits production of several mycotoxins (Munimbazi and Bullerman, 1998 a, b). In addition, considerable work has been done with lactic acid bacteria attempting to isolate antifungal strains from fermented foods and sourdough bread cultures (Kam et al., 2007; Hassan and Bullerman, 2008). One strain of *Lactobacillus rhamnosus* obtained from salad dressing in the Czech Republic has fairly strong and consistent antifungal activity and also shows some ability to inhibit production of some mycotoxins. Several *Lactobacillus* and *Leconostoc* species isolated from sourdough bread cultures and from fermented plant foods also appear to have some antifungal activity (Bianchini, et al., 2008). Studies with all of these bacterial isolates continue to characterize the antifungal activity and to determine if any of the isolates have potential as naturally occurring food preservatives.



Inhibition of mold in sourdough bread. (A) Bread made with yeast and sourdough. (B) Bread made with yeast only (Lavermicocca, et al. 2000).

Looking back over the years of the existence of the Food Mycology and Mycotoxins Laboratory much has been accomplished in terms of research. Much, if not most, of the credit for these research accomplishments belongs to the students, technicians and post-docs who have worked in the laboratory and who were very productive in that work. Whether on the way to receiving degrees or gaining work experience, all contributed. I am privileged to have had the opportunity to work with all of them. I would like to hear from former students, technicians and post-docs who may receive this newsletter. Please contact me through email, regular mail or telephone and let me know what you are now doing and your current contact information. If you know of others who worked in the laboratory who may not receive this, please pass the information along.

References

Bianchini, A., A. Rigdon and L. B. Bullerman. 2008. Biological control of molds and mycotoxins in foods. Presented at the ACS/AGFD Symposium on Mycotoxin Prevention and Control in Agriculture. 235th ACS National Meeting. April 6-10. New Orleans, LA.

Bullerman, L. B. and A. Bianchini. 2007. Stability of mycotoxins during food processing. Int'l. J. Food Microbiol. 119:140-146. Special Issue.

Bullerman, L. B., A. Bianchini, M. A. Hanna, L. S. Jackson, J. Jablonski and D. Ryu. 2008. Reduction of Fumonisin B1 in corn grits by single screw extrusion. J. Ag. & Food Chem.

Hassan, Y. I. and L. B. Bullerman. 2008. Antifungal activity of *Lactobacillus paracasei* ssp. *tolerans* isolated from a sourdough bread culture. Int'l. J. Food Microbiol. 121:112-115.

Kam, P. V., A. Bianchini and L. B. Bullerman. 2007. Inhibition of mold growth by sourdough bread cultures. RURALS: Review of Undergraduate Research in Agriculture and Life Sciences. 1:(1) 1-11.

Lavermicocca, P., F. Valerio, A. Evidente, S. Lazzaroni, A. Corsetti and M. Gobbetti. 2000. Purification and characterization of novel antifungal compounds from the sourdough *Lactobacillus plantarum* Strain 21 B. Applied and Environmental Microbiology, 66:4084-4090.

Munimbazi, C. and L. B. Bullerman. 1998. Isolation and partial characterization of antifungal metabolites of *Bacillus pumilus*. J. Appl. MIcrobiol. 84:959-968.

Munimbazi, C. and L. B. Bullerman. 1998. Inhibition of aflatoxin production of Aspergillus parasiticus NRRL 2999 by *Bacillus pumilis*. Mycopathologia 140:163:169.

Murphy, P. A., S. Hendrich, E. C. Hopmans, C. C. Hauck, Z. Lu, G. Buseman and G. Munkvold. 1996. Effect of processing on fumonisin content of corn. In Fumonisins in Food. L. S. Jackson, J. W. DeVries and L. B. Bullerman Eds. Plenum Press, New York, NY, pp. 326-334.

Technology Transfer: Assisting Industry

Technology Transfer Manager Laurie Keeler at work in the Product Development Lab

Professionals across the food industry know that keeping up with modern technology is crucial if their enterprises are to remain competitive in local, regional, or global markets. The Food Processing Center Technology Transfer Group is a valuable resource for anyone, from small entrepreneurs to large manufacturing firms, who is looking for new technology and creative ideas.

The Food Processing Center takes pride in its position at the cutting edge of development in processing, new ingredients, and food safety solutions. Whether finding novel ways to produce healthier snacks or developing new ingredients with improved functionality, The Food Processing Center is here to improve the bottom line of our clients and the economy of our communities. The Technology Transfer Group creates an environment that adds value to and supports technological innovation and process efficiency tasks for our clients. The group addresses process and ingredient limitations, provides training, and fosters integration with other services such as business analysis or microbiological testing. Working with Technology Transfer gives clients several advantages:

1. Reduced time, cost, and risk compared to in-house R&D projects.
2. Innovative, customized analysis of procedures and activities such as patent development, process efficiencies, energy, waste and water reduction, food safety and employee safety.
3. Fundamental and advanced training and workforce development for all sizes of companies in the food and pet food industries.

Food Technology Transfer is not a new concept—just a more accurate title for the technical assistance activities that have long been a crucial part of The Food Processing Center. With the expansion of the staff to include Steve Stephens as process engineer and Dr. Dave Rickert and Julie Reiling providing product development services, The Food Processing Center's services are more integrated and efficient than ever while growing more involved with faculty research.

Justin Smith Morrill created funding for land grant colleges: ". . . where agriculture, the foundation of all present and future prosperity, may look for troops of earnest friends, studying its familiar and recondite economies, and at last elevating it to that higher level where it may fearlessly invoke comparison with the most advanced standards of the world."

FPC Adds a New Workshop to Fall Schedule

The Pet Food Technology Symposium, a new one-day educational and networking event, made its debut at The FPC in early November. The Symposium attracted a diverse group of 18 pet food industry professionals – from OCIA personnel to manufacturers, to UNL faculty and students. Heartwin Pushpadaas, a doctoral candidate in Biosystems Engineering, commented, "The topics were wide ranging, addressing the interests of the heterogeneous audience. I was particularly impressed by the approaches taken on the project "Mycotoxins in Pet Food and the Impact of Extrusion Processing." This project was based on research in Dr. Bullerman's lab and presented by Andreia Bianchini.

With an overarching focus on safety, the symposium also included presentations on melamine poisoning, challenges in novel ingredient sourcing, and extrusion hardware innovations. The Pet Food Technology Symposium is an organic part of our commitment to companion animal food technology research; it will continue as an annual event. The theme of the 2008 Symposium is "Functional Ingredients Application and Processing."

The Pet Food Symposium adds to the traditional FPC offerings: the Applied Extrusion Short Course and the Better Process Control School (BPCS) in October.

In its 18th year, Applied Extrusion workshop appeals to those seeking a quick, intensive introduction to extrusion principles and theories, augmented by hands-on afternoon exercises in The FPC pilot plants. In only three days, participants learn to test and evaluate extruded products, make cost-effective decisions about extrusion application in product development, and become familiar with applied extrusion theory. In 2008, a new single-screw extruder will be used to demonstrate co-extrusion.

Brian Zanghi from Nestle Purina delivers a lecture on performance dog food development

Our BPCS certifies more than 50 supervisors of thermal food processing operations, acidified food processing operations, and food container closure operations each year. A shorter course, concentrating on acidified foods, was offered for the first time in March of 2008 and a Spanish version will follow shortly.

Most current information about workshops and training can be found at **http://www.fpc.unl.edu/Workshops/index.shtml**. We welcome your inquiries about training needs that are not being met by our regular offerings—the Outreach Team will work with you to deliver a custom program.

The next few pages introduce you to the men and women responsible for The Food Processing Center. Should you need assistance with product development, laboratory analysis, business development, or a host of other services, these experts are ready to help you.

Dr. Rolando A. Flores

Director, Food Processing Center

Dr. Flores has been assisting the food industry in academia and government for over 20 years, both in the United States and in his home country of Costa Rica. He has specialization in international trade and the modeling of food processes and processing for grain and grain products.

Lori Byrne

Business Manager

Lori offers our clients the assurance that they are getting services at our best prices. She does this by reviewing our production information to ensure that we are meeting our labor, material, utility and replacement costs. This enables The FPC to offer good value for the money while assuring we are acting responsibly to the state constituents and the University.

Jana Hafer

Program Development Manager

Jana is in charge of The Food Processing Center's relationships with research partners, corporate clients, and donors. She also serves as a liaison with the University's legal department and guides the strategic development of our workshops and labor force training offerings.

Mark Hutchison

Manager, Food Innovation and Entrepreneurship

Mark provides assistance with all aspects of business planning, feasibility studies, and market research. He provides general consultation on all aspects of business and marketing.

Laurie Keeler

Manager, Technology Transfer

Laurie has over 23 years of food processing and product development experience including research in a wide spectrum of foods with special focus on dairy products. This expertise, as well as USDA dairy inspection and quality assurance knowledge, aids her with many projects involving confidential industry consulting in all areas of product and process development.

Dr. Jayne Stratton

Laboratory Manager

Dr. Stratton manages the UNL-FPC Laboratory Services. Her division strives to offer timely, accurate testing services for the food industry in Nebraska and nationwide. Although specializing in microbiological testing, the lab also offers mycotoxin testing, conducts shelf-life studies, and oversees an acidified foods program.

Wanda Bowder
Administrative Assistant
Wanda is responsible for the day-to-day internal office operations and procedures for the Food Science and Technology Department and The Food Processing Center.

Tom Dobesh
Laboratory Mechanic
It is Tom's responsibility to maintain the condition of the equipment in the pilot plants through routine and preventative maintenance. He also assists in the operation, cleaning and setup of the unit operations during client trials.

Jill Gifford
FEAP Manager
Jill has been with The Food Processing Center since 1994 and offers expertise in start-up business development. The nationally recognized Food Entrepreneur Assistance Program provides comprehensive assistance to entrepreneurs seeking to start value-added food businesses. Jill's responsibilities include coordinating all aspects of the program and providing business development assistance to program participants.

Jonathan Hnosko
Dairy Plant Manager
Jonathan's primary responsibility is the manufacture of cheese, ice cream, and other dairy products for sale in campus Dairy Stores and at various events. Additional responsibilities include working directly with faculty, industry partners, and staff on research and teaching projects related to dairy food systems, as well as with clients on confidential industry projects.

Melissa Hnosko
Marketing Analyst
Melissa brings experience in advertising and promotion as well as a background in small business management. Melissa works with Food Industry and Innovation clients to assess their current and future promotional efforts and design promotional plans that fit their business and their budget.

Bethany Jackson
Technical Services Manager
Bethany is primarily involved in Product Development and Labeling with a focus on serving entrepreneurs. Prior to working at the University, she worked with the food industry in product development, quality control, and quality assurance.

Robin Krokstrom
Research Technologist
Robin works with Dr. Jayne Stratton in UNL-FPC Laboratory Services. She conducts and aids with accurate microbial testing, as well as mycotoxin testing and shelf-life studies.

Michele Laritson
Business Analyst
Michele helps clients who need assistance costing out their products, projecting revenue and cash flow, analyzing their operating procedures, and any other financial tasks involved in managing their business.

Linda Markussen
Clerical Assistant
Linda is service support staff for the MEP project, amongst other duties assigned. She serves as point of contact for all bulk mailing projects involving FEAP and also serves as backup support staff for office functions & procedures.

Erika Martinez
Project Assistant
Erika's duties at The Food Processing Center include, but are not limited to, writing and editing reports, conducting literature review and providing economic consulting to small food processors.

Nina Murray
Project Assistant
Nina holds an MA in English and an MS in Teaching. In addition to coordinating workshops and other special events at The Food Processing Center, she provides editorial oversight to our publications, both in print and on the web.

Sean Murray
Special Projects
Sean's current role at The Food Processing Center is overseeing a Food Defense Grant and building The FPC's capacities in international assistance. Sean holds a JD from University of Nebraska College of Law and spent 2006/07 in Lithuania as a Fulbright scholar.

Julie Reiling
Project Developer
Julie is a member of the Technology Transfer division at The Food Processing Center. Her primary duties focus on food product development for small and medium-sized companies. She also provides assistance with nutritional labeling.

Dr. David Rickert

Research Food Product Developer

Dr. Rickert's projects have included improvement of vegetable processing and vacuum belt drying of novel products. Research projects have included corn dry milling and pulsed electric field treatment of vegetables. He is looking forward to exploring food applications of the ultrasonic processing system recently acquired by The FPC.

Matthew Standley

Administrative Support Associate

Matthew's primary duties with The Food Processing Center are tracking projects and providing regular reports. He also processes inquiries from The FPC website and insures those clients receive assistance.

Steve Stephens

Food Process Engineer

Steve focuses on food engineering services such as process improvements, product development, waste reduction, and energy and water conservation.

Kathy Vokoun

Food Technician and Acting Dairy Store Manager

Kathy has worked for the University for 19 years, eighteen of those as Dairy Store Manager. Recently, her primary duties have been in the Dairy Plant where she has learned ice cream making. She is additionally in charge of procurement for the pilot plants.

Suzanne Weeder-Einspahr

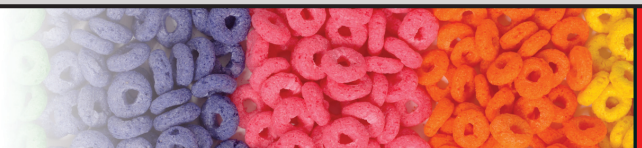
Food Industry Consultant

Suzanne provides business development assistance to a diverse group of businesses and individuals across multiple segments of the food industry. She is responsible for all activities related to consulting with food industry clients on business development activities. Other activities include grant reporting and oversight and serving as a liaison to the Nebraska Manufacturing Extension Partnership (MEP).

Steve Weier

Pilot Plants Manager

Steve oversees the scheduling, operation, cleaning, setup and maintenance of the unit operations in the pilot plants of The Food Processing Center.



CONFERENCES & WORKSHOPS

Food Entrepreneur Program Workshops	May 31, 2008 - Lincoln (Presented in Spanish) June 2, 2008 - Lincoln August 8, 2008 - Lincoln August 15, 2008 - Chicago September 29, 2008 - El Dorado, Arkansas October 27, 2008 - Lincoln
Acidified Foods Better Process Control School	May 6-8, 2008 - Lincoln, NE
FARRP Health Canada Fifth Workshop on Food Allergen Methodologies	May 11-14, 2008 - Halifax, NS, Canada
IICA Assuring the Safety of Foods for Domestic Consumption and International Trade	May 12-16, 2008 - Lincoln, NE
15th Annual Intro to Ingredients and Ingredient Functionality Workshop	May 13-15, 2008 - Lincoln, NE
Better Process Control School in Spanish	May 27-30, 2008 - Lincoln, NE
Better Process Control School	September 30-October 3, 2008 - Lincoln, NE
18th Annual Applied Extrusion Workshop	October 14-16, 2008 – Lincoln, NE

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