

FOOD INNOVATION CENTER NEWSLETTER

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Department of Food Science and Technology
The Food Processing Center



FOOD INNOVATION CENTER

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UNIVERSITY OF NEBRASKA-LINCOLN

Committed to collaboration and exploring new ways of thinking



We've had a very exciting fall, bringing on some new, talented faculty. Over half the people in our department have "assistant" in their title, meaning we have a very young, energetic faculty right now. Byron Chaves from Texas Tech is working in the area of applied food safety, a position that we are excited to fill after a two-year gap. Kurt Piepenbrink is another new faculty member with a background in structural glycobiology who complements others doing research within the Nebraska Food for Health Center. We also welcomed Yulie Meneses at The Food Processing Center and the Daugherty Water for Food Institute. She focuses on improving water and energy conservation and reducing waste in food processing operations.

In fact, a very generous donation of a three-and-a-half-barrel brew house was given to our Food Processing Center this year with six one-barrel fermenters and six one-liter brite tanks. This will allow us to provide services such as like studying beers brewed using different combinations of malts prepared from locally-sourced cereals and experimenting with locally-grown hops. We look to strengthen our state's craft brewing industry.

We are in the third year of our 3+1 program, an international collaboration between our department and the College of Food Science and Engineering at the Northwest Ag & Forestry University, Yangling, China. Three of our faculty members (Jiajia Chen, Mei Lu and Barbara Clement) are now teaching in China, and in a year, we will welcome more than 50 NWAUFU students to Lincoln to complete their degrees at UNL. We are now starting the hiring process for several new faculty and staff members to make sure these students have the best experience possible at our university. This program has been an exciting opportunity to collaborate with great minds from the other side of the globe.

We're continuously working to provide healthy, safe and less wasteful food to consumers in Nebraska and beyond. I'm excited to showcase our services, students and research in this newsletter as each is helping us do just that. I'm very thankful for your continuing support that has helped keep up a tradition of excellence in our program. Here's to another successful year!

Best wishes,

Curtis L. Weller, Ph.D., P.E.

*Professor and Head, Department of Food Science and Technology
Director, The Food Processing Center*

These microbes, known as the gut microbiota, are a tremendous help in the digestion process and in training our immune system, but their power may reach beyond that.

Amanda Ramer-Tait



Focus on Faculty – Amanda Ramer-Tait

Amanda Ramer-Tait is very interested in the interactions between gut microbes and the immune system, and after getting her PhD in immunology, she decided to come here from Iowa State to conduct research in the Department of Food Science and Technology.

Everyone has gut microbes, and there are a plethora of popular articles on how to improve gut health. Known connections exist between the microbes and health, but research is still lacking. These microbes, known as the gut microbiota, are a tremendous help in the digestion process and in training our immune system, but their power may reach beyond that.

There are links between gut microbes and certain chronic illnesses like cancer, inflammatory bowel disease, obesity and metabolic diseases. These connections are apparent in the compositional differences of microbes in someone who is "healthy" versus someone with a chronic illness. Although the compositions differ, correlation does not equal causation, and that's where Amanda's research starts. More importantly, she wants to know how we can use diet to modulate that relationship. Diet is a very powerful factor in shaping the composition of the gut microbiota, and if diet can balance microbial communities, it may contribute positively to human health.

WHAT SHE'S FOUND

In Amanda's lab, she has learned that there are certain types of dietary fibers that can modulate the microbiota, and that

these fibers also provide health benefits when fed to obese mice. But what the team did not yet know was whether one particular type of fiber, called resistant starch, required the presence of gut microbes to improve the health of the mice, including lowering insulin levels. So, her team fed the resistant starches to mice with and without gut microbes.

"We think the microbiome is involved sometimes, and other times, we think it's not," Ramer-Tait said. "That's what we're trying to tease apart."

It turns out that the metabolic improvements aren't necessarily associated with changes in the microbes. The dietary fibers can actually utilize one of two pathways to better health: through modulation of the microbiota or a microbiota-independent pathway. Her research suggests that the immune system is involved with the latter. They think the dietary fibers can directly influence the immune response, and they know that immune responses are linked to insulin metabolism. Although they haven't quite reached a conclusion, the knowledge gained has been very exciting, and Amanda is incredibly thankful for UNL's facilities and its impact on her research.

"It's been a fantastic opportunity. I can do things here that I couldn't do in other places," Ramer-Tait said. "Nebraska provides such a unique environment to do this kind of research, especially now with the establishment of the Nebraska Food for Health Center. I think it's one of the best places in the world for it."

Welcome New Faculty Members

KURT PIEPENBRINK – ASSISTANT PROFESSOR

Dr. Piepenbrink studies the role bacterial extracellular appendages play in interactions with host organisms and within microbial communities. He has a particular interest in the evolutionary relationships between structurally-related appendages found in distinct bacterial species. Because of the diverse roles polysaccharides play in both promoting and inhibiting molecular recognition, he is also interested in protein glycan interactions and the structures of glycoproteins. He received his bachelor's degree in chemistry from the Johns Hopkins University and his doctorate in biochemistry from the University of Notre Dame. He was a postdoctoral fellow at the University of Maryland School of Medicine in Baltimore.



Kurt Piepenbrink



Byron D. Chaves-Elizondo

BYRON D. CHAVES-ELIZONDO – ASSISTANT PROFESSOR

Chaves' area of expertise is microbial safety of food and agricultural commodities. His research focuses on the evaluation and development of physical, chemical, and biological interventions for the mitigation of pathogenic microorganism in foods of animal origin, low water activity foods, and minimally processed foods. Additional research interests include improvement of pathogen detection methods and the prevalence and persistence of pathogens in the food processing environment. As an extension specialist, Dr. Chaves will work directly with the Nebraska food industry to tackle food safety issues. He obtained his doctorate degree in food safety and microbiology from Texas Tech University, his master's in food science from Clemson University, and his bachelor's in food technology from the University of Costa Rica.



Introducing Graduate Student Julianne Kopf

Julianne Kopf is the cofounder of Bugeater Foods, a Lincoln-based start up that works to create sustainable, delicious and nutritious protein products from insects.

While in the Food Science and Technology undergraduate program, Julianne became interested in insects while working with Laurie Keeler in the Food Processing Center. Keeler was working with a client that was exploring the use of insects in products, and Julianne decided to spend a year grinding crickets and learning more about the sustainability and nutrition of insects. Throughout the next three years, she worked with other clients to develop insect products with Keeler, and she eventually saw a Facebook post by her now business partner looking for a food scientist to team up with for the Global Food for Thought competition.

The competition challenged participants to make a meal replacement shake out of insects to help third world countries with malnutrition problems. After completing their product, they unfortunately did not make it too far since their powder-based entry required milk or water. On the bright side, they were met with overwhelming positive feedback from the community. They decided to change the formulation and sell their product as a protein shake, eventually running a test trial in Hyvee and selling out all 90 units.

In 2016, Bugeater Foods received a \$100,000 grant to conduct research on insect products—an exciting opportunity for such a young business. They have since made insect-based rice, pasta and noodles.

The biggest challenge in the bug business is, of course, getting people to try it. Changing perceptions of ingesting insects is a huge hurdle, but Julianne believes they're making progress.

"We don't give you whole insects, we just incorporate it into the food you already eat, like a protein shake, rice or pasta," Julianne said. "That's the best way to change perceptions—trying things that already look like traditional foods and slowly moving toward eating whole insects."

Julianne appreciates the Food Science and Technology program and the opportunities it has presented her. Working in the Food Processing Center gave her real, hands-on experience that contributed to her present and future success.



Serving Up 100 Years of Tradition

It all started on East Campus in 1917: student employment opportunities, sweet and savory dairy products and a warm welcome to all university visitors. Come celebrate our 100th anniversary with our special edition Scarlet and Cream – available to enjoy in a dish or cone, or in a sundae or shake. Unlike the Dairy Store, which has been around for a century, it won't last long. Get a scoop today.

dairystore.unl.edu | [Department of Food Science and Technology](#) | [The Food Processing Center](#)
 Located at 38th & Holdrege on East Campus | 402.472.2828 | marketplace.unl.edu/dairystore



How Can the Food Processing Center Help You?

Julie Reiling, a sensory and product development consultant, and her team work with clients from all over the country at the Sensory Evaluation Lab in the Food Processing Center. The lab gives companies a chance to test their products with a panel of consumers before it hits the shelves, allowing them to make adjustments if needed. It also allows ingredient companies to test their products in different food categories, such as a salt substitute in baked goods, meats or soups.

Consumer testing is vital, and since these services are so important, there are several different testing options. First, there’s informal sensory testing, typically costing around \$250. This is not a full-blown panel, just a group of people that are accustomed to taste-testing and more sensitive to different product attributes. These tests are often done during shelf-life studies, meaning they analyze a product as it ages. Product development prototypes could also fall under this testing, giving the client feedback from the small group.

Consumer testing at the Food Processing Center includes four major types of testing, using panels with 40 to 60 people and costing around \$1,600. The first test is difference testing. An example of this would be a triangle test where three samples are given to each panelist at once. They are then asked to pick which sample is different. If the product is successful, panelists should not be able to tell the difference between the three samples. This test could be useful for products with necessary ingredient substitutions, such as eliminating gluten.

There are also comparison tests, which can include preference tests. Panelists are given two samples and asked to pick which one they prefer. The problem with this test, though, is that it doesn’t measure how much panelists actually enjoy the product. This can be expanded with a nine-point hedonic test, using a scale that ranges from “like extremely” to “dislike extremely.” Questions focus on appearance, texture, flavor and overall acceptability.

The final type of consumer testing is attribute rating. It uses a 15-point line scale for panelists to describe attributes. For example, panelist may be asked about the texture of a hot dog product. Questions for this would focus on details such as first-bite texture, grind size, appearance, flavor, aftertaste and overall acceptability of the sample. This test is often utilized during product development, focusing specifically on what panelists find different between samples.

The success of a food product can hinge on these tests, often correcting companies’ mistakes through panel insights. Employees may think their product is good, but that doesn’t mean their target audience agrees. This oversight can cause product failure and wasted investments. All good research starts with the consumer, and the Food Processing Center readily gives its clients necessary data before their products hit the shelves.

Congratulations to the Graduates

Anamika Bagchi – M.S.
Tushar Verma – M.S.
Henok Belayneh – Ph.D.

Awards and Recognition

JEYAM SUBBIAH
“Certificate of Recognition for Contributions of Students” from the UNL Parents Association. Gamma Sigma Delta Award for Excellence in Research

HENOK BELAYNEH
2017 American Oil Chemists’ Society (AOCS) Processing Division Student Excellence Award

JULIANNE KOPF
Peter Kiewit Student Entrepreneurial Award

STEVE TAYLOR
55th Annual Tanner Lecture Award

ABBY GEIS
Molecular Mechanisms of Disease Symposium Poster Presentation Award

KARI HECK
Outstanding Undergraduate Research in Biomedical Sciences Award

RAFAEL SEGURA MUNOZ
Molecular Mechanisms of Disease Symposium Poster Presentation Award

Where are they now?

An interview with graduate Alex Nelson

Alex started college knowing one thing: he loved science. After taking Dr. Rupnow's Introduction to Food Science course, he was hooked. He graduated with a bachelors degree in Food Science and Technology in 2011.

Alex currently works at Ardent Mills in Denver, Colorado, as a Field Service Manager. His job requires him to manage the mill's instruments, making sure they are accurate, teaching operators how to use them and keeping track of their life cycles. He also works with vendors and negotiates prices.

When looking back on his college experience, Alex could go on and on about the food science program, but above all, he really appreciated how tight-knit it was. Students constantly had opportunities to work in labs and interact with faculty. Professors knew who he was and took interest in how his studies were progressing. He also felt a satisfaction in knowing that his work would directly contribute to society and that job opportunities would always be available.

"I love food, I think everyone does," Alex said. "And as far as job security is concerned, there's a pretty good chance everyone is going to continue to eat."

Dr. Randy Wehling's food analysis and composition class was particularly useful to Alex, considering he still uses everything he learned in the classroom at his current job. Oddly enough, Dr. Wehling also has a history in the flour milling industry, too. Alex admits that he thought the class was a bit boring, and at the time, he didn't realize how relevant it would be in real life. But after interning at a flower mill before graduation, he was convinced that it was his calling. He felt proud to see the product of his work on supermarket shelves.

Today, Alex has grown to love the flour milling industry and its challenges, claiming that his job is far from "run of the mill." His work is dynamic, and he's constantly traveling to check up on instruments in mills across the country. He's especially fond of the partnerships his company has created that are making a big impact.

"We have a special type of whole wheat product that can be blended into white flour to give someone a whole grain benefit," Alex said. "We partner with school lunch programs to improve their dietary guidelines while still keeping students happy with what they're eating. We get to help nourish people."



Professional Development Opportunities

Providing the opportunity for employees to learn new skills and update their knowledge is critical for any company to remain viable in the marketplace. The Food Processing Center provides companies with a variety of unique educational and training opportunities so your company can continue to be successful. Each program is designed specifically for the food manufacturing industry. Information is presented by industry and academic faculty experts. For complete information on each event visit fpc.unl.edu

In addition to the selections below, The Food Processing Center can work with your company to customize learning experiences for your employees. Many workshops can also be presented on-site at your location. To discuss this option please contact Event Manager, Jill Gifford at jgifford1@unl.edu or 402-472-2819.

Food Microbiology Workshop

March 20 – 22, 2018

FSPCA Preventive Controls for Human Food Course

April 10-12, 2018

Better Process Control School for Acidified Foods

April 16 – 17, 2018

Extrusion Workshop

May 15 – 17, 2018

High Pressure Processing Workshop

June 5-6, 2018

Better Process Control School

September 25-27, 2018

Food Processing Management Certificate Online Program

Ongoing

Recipe to Reality Seminars

January 20, 2018

March 31, 2018

June 2, 2018

August 11, 2018

October 27, 2018

Rwanda Undergraduate Student Internships

The CASNR Undergraduate Scholarship Program offers students the opportunity to pursue a Bachelor of Science in integrated science at the College of Agricultural Science and Natural Resources. Rwandan scholars study soil/water conservation, agricultural leadership, entrepreneurship and a third concentration according to each student's interest.

As of August 2017, 105 students have received the scholarship and are currently on campus. IANR expects to host up to 200 Rwandan undergraduate students over the next eight years. These scholars have committed to return to Rwanda upon graduation to serve in critical areas across research, extension and training. They represent the talent needed to advance agriculture in Rwanda, with the support of the University of Nebraska-Lincoln and key stakeholders in the country.

Rwandan scholar Erasme Mutuyemungu says, "This experience has helped me discover what is really needed in Rwanda to improve food safety among all

food processing industries. My focus will be improving sanitation services in those industries so that people will be safe from food-borne illnesses."

During their first and second summers, scholars are paired with faculty and agricultural organizations to gain hands-on, practical experiences, including lab, production, research, data collection and fieldwork. In their third summer, students go back to Rwanda to further develop their acquired skill set and knowledge within a local context through projects and/or internship opportunities.

Before starting the program, Erasme's knowledge of food safety was almost nonexistent, but he is now determined to start food sanitation services in his country after graduation. Beyond his education, Erasme claims he's gained immense experience in punctuality, responsibility, communication and leadership through working with his supervisor team.



Introducing Undergraduate Student Erica Lewis

Erica Lewis has always been involved with food, from creating food projects for 4-H and FFA to studying food science and technology in college. She's also majoring in agribusiness, following her father's footsteps, who studied agricultural economics. Although she wasn't raised on a farm, her rural hometown of West Point, Nebraska, shaped Erica's interests while growing up around agriculture.

The culture of the food science department is reminiscent of her roots, with some upper-level labs only consisting of around 12 students. It's a very tight-knit community, and that's just how Erica likes it, claiming, "Your fellow food science students are going to be some of your best friends."

Her favorite parts of the food science program are the amazing facilities and hands-on faculty that are willing to help students toward their success. Dr. Randy Wehling particularly sticks out as a professor that she can always go to for questions. As far as facilities go, she considers the lab spaces top-notch. She thinks food science gives a great overview of many scientific areas coupled with practical applications, making it easier to see results in a lab setting. Additionally, she appreciates all of the techniques learned in her labs that will be useful in future job opportunities.

This past summer, Erica interned in Munster, Indiana, with Land O'Frost as a product development intern. She worked with a new snack product and helped conduct

sensory panels for flavor development, testing the waters to see if product development was her calling. Although she's still unsure, working at a food company was a blast, and she looks forward to pursuing another internship this summer.

In the long run, Erica is looking at law school. She's job shadowed a lawyer, and she's interested in working in the nontraditional side as an in-house lawyer for a food company to make sure they're compliant with regulations. Beyond that, her future is up for grabs, but she'd like to consider international work by helping feed the world in some way. Although her goals may seem lofty, Erica firmly believes that "you shouldn't be afraid to go for something, because even if you don't get it, it's better to say you tried than to have not done anything at all."

Support those with a hunger for learning.

Young and intelligent with an insatiable appetite for knowledge, the students in the Food Science and Technology program are working hard to improve all things related to food. Your donation will help them receive the scholarships they need to make it happen. Make a gift that feeds young minds.

Contact Doug Carr at doug.carr@nufoundation.org or 402-458-1160 or give online at nufoundation.org/foodscience.



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Chancellor,
University of Nebraska–Lincoln
RONNIE GREEN

NU Vice President and
Harlan Vice Chancellor,
Institute of Agriculture and
Natural Resources
MIKE BOEHM

Department Head,
Department of Food Science
and Technology, and Director
of The Food Processing Center
CURTIS WELLER



Dr. Glenn Froning: Teacher, Mentor, Friend

The family and friends of Emeritus Professor Glenn Froning are proud to announce the creation of a scholarship fund to honor Dr. Glenn Froning. Dr. Froning, who died in January of 2017, spent 30 years making an impact on food science at the University of Nebraska-Lincoln. Colleagues, students and all who knew Glenn were inspired by his passion for education. Your gift to this scholarship fund in his name will help ensure Glenn's legacy lives on in the Food Science and Technology Department.

To give to the Dr. Glenn Froning and Family Food Science & Technology Scholarship Fund, contact Doug Carr at the University of Nebraska Foundation, at 402-458-1160 or doug.carr@nufoundation.org.

Thank you for your support of this effort to honor Dr. Glen Froning.

LET US KNOW WHAT YOU THINK!

We'd love to hear from you! For any feedback or story contributions you'd like to see in future issues, email us at **FOODSCI@UNL.EDU**.

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