



**FOOD
INNOVATION
CENTER**
NEWSLETTER
| Spring/Summer 2022 |
Department of Food Science and Technology
The Food Processing Center
UNIVERSITY of NEBRASKA-LINCOLN



Letter from the Director



Spring is now moving into summer. The academic year of 2021-2022 is in the books. Despite a couple upticks in COVID case numbers due to variants, I am happy to report that in-person departmental events returned to the departmental calendar. Specifically, the Battle of the Food Scientists event and the Spring Student Banquet were held. An initial Food Science and Technology research symposium allowed graduate students to showcase their research and outreach presentations.

Maybe insignificant in the big picture of things, but of great interest to the departmental faculty members and me is the pending summer refresh of AV equipment in the three teaching classrooms of the Food Innovation Center. New classroom projectors will not use bulbs so supply-chain delays of six months for replacement bulbs will no longer be an issue.

In January, Dr. Amanda Ramer-Tait was awarded the Maxcy Professor of Agriculture and Natural Resources and Dr. Ozan Ciftci was awarded the Kenneth E. Morrison Distinguished Professor of Food Engineering. Dr. Byron Chaves and Dr. Ozan Ciftci were recognized, respectively, with a Holling Family Faculty Award for Inclusive Excellence in Teaching and Learning and the Darrell W. Nelson Excellence in Graduate Student Advising Award in April. Promotions of Dr. Melanie Downs and Dr. Phil Johnson to Associate Professors with continuous appointments are to be celebrated.

I share that a total of 27 undergraduate and 12 graduate students completed their degree programs over this past academic year. Generous financial support to 14 Food Science and Technology-associated NU Foundation Funds benefited many of the graduating undergraduate students. In fact, this past year, 22 undergraduate students were the recipients of \$62,750 in scholarship funding. A special thanks to all who have provided and continue to provide support.

As the department looks to the future, recommendations received during last fall's successful Academic Program Review have helped my colleagues and me develop a set of action items for the next few years. Completion of a report by October 1 on assessment of an initial set of Essential Learning Outcomes for our Food Science and Technology curriculum approved under the revised 2018 IFT approval guidelines is also on our to-do list. Recruitment of undergraduate students and continued development of digital badge credentialed-training opportunities are priorities we have set to meet food industry needs.

Feel free to stop by the Food Innovation Center and take a tour the next time you make it to Lincoln. I would be pleased to show you around.

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

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

Focus on Faculty

Byron Chaves experienced outstanding mentorship throughout his education. Now, he's paying it forward as a mentor for undergraduate and graduate students in his microbial food safety lab at the University of Nebraska–Lincoln.

"The best part of my job is mentoring and interacting with students," said Chaves, assistant professor in food science and technology and applied food safety specialist. "I love seeing the students' accomplishments and hearing about their stories. If I have played even a minimal part in making some of our students successful, then I think that's awesome. Seeing my students succeed when they leave my lab and get jobs and go into the world is very rewarding."

Over the past couple of years, Chaves mentored an undergraduate towards his goal of going to graduate school for food safety microbiology. Chaves helped the student choose the right courses, gain research experiences and develop skills such as time management and oral communication. Now, the student will be attending graduate school at Texas A&M University. Chaves hopes that he helped the student not only reach his graduate school goal, but also helped develop skills that will last a lifetime.

In addition to undergraduates, Chaves typically mentors a handful of graduate students. This includes Carmen Cano-Roca, who successfully defended her thesis and graduated with her Ph.D. in food science and technology in May 2022.

"Dr. Chaves has been a great mentor during my Ph.D. journey," Cano Roca said. "He's helped me develop into a better scientist by providing opportunities to carry out applied research with local industry and other scientists. He has supported my professional development by encouraging me to apply for opportunities and promoting my engagement with the community. These skills and networking will be great for my future career."

Chaves has been a mentor at the university for almost five years through his three-way appointment as researcher, professor and extension specialist. He was recently awarded the Holling Family Award for Inclusive Excellence in Teaching and Learning, recognizing efforts to advance diversity, equity, and inclusion across the Department, College, and university community.

Originally from Costa Rica, Chaves's passion for food safety science led him to Nebraska.

Chaves originally wanted to major in chemical engineering at the University of Costa Rica. Through a university career fair, he discovered food technology and engineering, which to him was the intersection of biology and engineering. It was through that program that he discovered his passion for food microbiology.



Byron Chaves

When studying for his food microbiology exam as a junior, Chaves had an epiphany. While he had developed a great interest in food rheology, he realized he was fascinated by the biology of microorganisms as well as the broad application potential for food microbes, from fermentation to spoilage. Ultimately, he decided to study the ones that make people sick.

Clemson University recruited Chaves from Costa Rica for his master's degree in food science with a concentration in food safety and a minor in experimental statistics. When researching Ph.D. programs, Chaves met his future advisor at Texas Tech and knew that it'd be a great fit. In Texas, he studied how *Salmonella* in pathogenic *E. coli* was distributed in the meat supply chain in Mexico and Central America, before graduating with his Ph.D. in food safety microbiology.

After earning his Ph.D., Chaves worked in consulting in Philadelphia before securing his position in Nebraska.

Chaves chose Nebraska because he was attracted to the top-notch food science facilities and departmental reputation.

At Nebraska, Chaves splits his time between teaching, researching and extension work.

As an extension specialist, Chaves works with Nebraska food manufacturers to provide training and technical assistance in food safety, sanitation, regulatory compliance, environmental monitoring and more. As a professor, he teaches a core food science course and a couple of graduate-level applied microbiology courses.

In the lab, Chaves focuses on solving real-world problems. He studies risk mitigation for foodborne pathogens in foods of animal origin and in the processing environment. Funded in part by the USDA National Institute for Food and Agriculture and his startup funds from the university, Chaves works directly with industry members and stakeholders to develop solutions that will result in fewer people getting sick.

"The reality is that 1000's of people die every year from foodborne illness," Chaves said. "We work under the premise that foodborne illness is entirely preventable. To prevent illness, we have to implement antimicrobial interventions and understand how microbes grow in food. We then have to educate industry and consumers. We're trying to provide solutions to mitigate the burden on public health and financial costs."



Julie Reiling

How Can the Food Processing Center Help You?

If you've ever tried a company's new low-sodium or gluten free product, you may have enjoyed the fruits of a sensory analysis test run at the University of Nebraska-Lincoln.

The Sensory Analysis Lab, housed within the Food Processing Center on the Nebraska Innovation Campus, fills a niche need for low-cost, high-value insights for food product developers and companies. The sensory lab offers companies consumer insights about new products and products that undergo ingredient substitutions. This unique offering helps food companies determine whether or not their products are ready for market, among many other things.

"We're a good resource for those smaller to medium sized companies that are wanting quick and fairly inexpensive feedback," said Julie Reiling, manager of the sensory lab.

Typical sensory lab clients are growing companies who are expanding their offerings or ingredient companies looking to differentiate their product from competitors. The sensory lab provides timely, inexpensive feedback from panelists using a variety of test options.

"We had one well-known Nebraska company that had an ingredient in their product that contained wheat gluten and they wanted to remove that so that they could advertise it as being gluten free," Reiling said. "They didn't want it to affect the flavor because it's a very popular product, and people would be upset if it tasted different. So, they made the substitution and then we ran sensory panels here to see if people could tell the difference. We found that they could not, so they were able to make that substitution, and nobody would be the wiser other than now they can claim gluten free."

In another case, a Texas company that made refrigerated microwave meals was in search of general consumer feedback. Panelists were given portions of the company's meals and rated things such as flavor balance and appearance. The



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panelists rated the meals on a Hedonic scale, which is a nine-point scale ranging from dislike extremely (1) to like extremely (9). The typical response for a meal was an 8 (like very much), indicating to the company that the product was ready for market.

When clients come to the sensory lab, they give the lab a sample of their product and the lab gathers panelists, who are usually university affiliates who have signed up to participate and prepares rating forms for the company-selected test.

The lab offers in-depth analysis, informal feedback and a range of consumer test options tailored to a company's needs. These include Hedonic scales, attribute rating scales and triangle testing.

During testing using hedonic scales, panelists may be asked about aroma, appearance, flavor and aftertaste. By specifying different areas of the product, companies can troubleshoot more specific issues with their product.

Attribute rating scales go more in-depth, digging into attributes that the companies want to know more about. Panelists are asked several questions about texture, flavor and more. They then rate the attributes on a 15-point scale that has opposite attribute indicators. For example, a question about saltiness would have ends marked from "lacking" or "intense".

The attribute rating scales are best used as a product development tool, when companies are trying to fine-tune their product. Hedonic testing is better suited towards determining if a product is ready for consumption.

A triangle test is "where we present panelists with three samples all at the same time. Two are the same and one is different, and we ask them to try to pick the one that's different," Reiling said. "This test is something that would be very valuable in an ingredient substitution where you're hoping that the product tastes the same after switching an ingredient."

In some cases, a combination of tests can be tailored to best suit a company's needs.

"We had a sports drink company that wanted to update their formula and replace artificial sweeteners with a more natural sweetener," Reiling said. "They wanted to get people's preference, but they also wanted to collect a little more information. For the first test, panelists got one sample at a time and rated it on a Hedonic scale. After that, they got both samples at the same time and were asked to pick which of those they preferred. That's just one example of how we would mix tests together to try to get more information."

The sensory lab has flexible options that cater to a client's needs, providing a range of general and precise services at a fraction of the cost of bigger facilities. Other unique services are available to Nebraska Innovation Campus partners.

Partnerships range from an occasional drop-in desk to a rented office on the Nebraska Innovation Campus, and companies benefit through discounted services and instant collaboration with the team. Current partners include a beef company, two pet food companies, a natural ingredient company, a creamery, and two companies developing Aronia berry products. These companies have employees stationed on the Nebraska Innovation Campus.

Through all of these partnerships, collaboration and testing, the Sensory Analysis Lab provides companies with high-value insights to produce high-quality products.



Food Processing Center's Co-packing Program and SQF Certification Meet Client Needs

A homemade ice cream company from Texas found their way to the University of Nebraska–Lincoln's Innovation Campus, through the Food Processing Center's small-batch co-packing specialty and recently-acquired SQF certification.

The Food Processing Center houses a co-packing operation for companies who don't have their own facilities or can't keep up with production. Clients will send their ingredients, mix and packaging and the center runs their product for a tolling fee. While the center can take on larger clients, their sweet spot is with smaller orders that larger co-packing facilities typically wouldn't take on.

"Our specialty is starting with very small batches," said Josie Houston, manager of the Food Processing Center's Dairy Plant. "Most co-packers work with larger batches. I talked to an ice cream co-packer and their minimum order is a 3,000-gallon order of mix of one single flavor. We typically don't even make that in one run across seven flavors."

For instance, the Texas company was making ice cream in-store but couldn't handle the volume needed to expand to online sales and grocery stores. They sought outside help, but most co-packing facilities wouldn't take their smaller 100-gallon operation. This is where the University of Nebraska–Lincoln's Food Processing Center stepped in.

"They came to us with their recipes in cups and teaspoons, and we converted everything to milliliters and pounds," Houston said. "When you scale up you don't need to use as much vanilla or cocoa for example, so we did some development work as well."

Through the center's SQF (safe quality food) certification, companies like this one can offer their products to more retailers.

"The company is starting to get into some of the larger local retailers that want them to have that food safety certification," said Sami Fischer, food safety expert at the Food Processing Center. "It helps them to say that their products were made in an SQF facility. It's like a backing that they're selling safe, quality products."

The Food Processing Center obtained SQF certifications for cheese and ice cream in March 2021, after a co-packing client needed it for their operation. It now serves as an extra benefit for those who co-pack with the university, and even attracts companies who choose the Food Processing Center because of its certification. This allows clients to offer their products through more companies, such as Walmart, which requires products to be SQF certified before beginning the pitch process.



Josie Houston

The SQF (Safe Quality Food) certification is offered by the SQF Institute and is a GFSI (Global Food Safety Initiative) benchmarked auditing scheme. It was established to create a leading, global certification for food safety.

“The FDA and USDA do a lot of things to regulate safety in our food supply, but they have to make regulations that fit the largest and smallest manufacturers in the United States,” Fischer said. “This goes a step above and sets a standard for all countries.”

While the SQF certification attracts and supports clients, earning and maintaining the certification is no small feat.

“We do a risk analysis for every ingredient and every step in the process,” Houston said. “We have to have a flow chart of every step in the process and assess the risk of an ingredient being frauded or containing any hazards or allergens. There’s a lot of paperwork and record keeping.”

A trained practitioner must be on-site, and the training costs hundreds of dollars. The process requires a lot of high-level food safety program writing, making it harder for smaller manufacturers to set up. By having the certification, the Food Processing Center takes that burden off of companies who work with them.

By offering the co-packing option and the SQF certification, the Food Processing Center contributes to major milestones in a company’s growth and will continue to do so for years to come.



Samantha Fischer

Introducing New Faculty

Dr. Keting Li

Dr. Keting Li recently joined the Department of Food Science and Technology as a lecturer. Her area of expertise is the morphological change of *Candida albicans* with a focus on the mechanism of active components (e.g., phenols) on their ability to prevent or remediate *C. albicans* cellular stresses that lead to morphological change. Additionally, her focus is the application of analytical methods for the effects of metabolites from a complex dietary system acting upon human health metabolism.

Dr. Keting Li received her Ph.D. from the University of Nebraska–Lincoln (UNL) with a Nutrition major and Biological Science minor. Before she came to the U.S., she received her M.S. in Food Science from the Northwest A&F Agricultural University (NWFU) in China.

Dr. Li will be involved in teaching two lower-level undergraduate courses (Introductory Food Science and Practical Applications in Food Science) and two upper-level courses in commodity processing (Cereal Technology and Dairy Products Technology) as part of the 3+1 program between UNL and NWFU.

Dr. Joao Carlos Gomes Neto

Dr. Joao Carlos Gomes Neto recently joined the Department of Food Science and Technology as a Research Assistant Professor working in the field of bacterial population genomics. His research group will specifically be working on the intersection between microbiology, bioinformatics, and data science geared toward ecological/epidemiological applications. In particular, his initial projects will focus on two areas, including: 1) Foodborne pathogen population genomics with epidemiological applications; and 2) Mining of human and livestock microbiome datasets to identify novel probiotics capable of preventing gastrointestinal infections (e.g., Salmonellosis). Dr. Gomes Neto is originally from Brazil and was trained as a Veterinarian prior to completing his graduate training in Microbiology and Immunology from Iowa State University (Master’s) and UNL (Ph.D.).



Keting Li



Joao Carlos Gomes Neto



Mouse House: Germ-free Facility Puts Nebraska U at Forefront of Microbiome Research

As appealing as a germ-free facility might be in the era of COVID-19, Nebraska's Amanda Ramer-Tait and her colleagues weren't anticipating a pandemic when they proposed it a few years ago.

The germs of interest are bacterial, not viral, and more likely to help than harm. Besides, the facility isn't designed to house people — though research at the nearly 10,000-square-foot Gnotobiotic Mouse Facility ultimately aims to benefit them.

The intestinal tract of an adult human can house about 100 trillion bacteria, making the gut an ultra-dense ecosystem — a microbiome — whose importance becomes more apparent with each year. It's become undeniable: The microbiome influences a person's gastrointestinal health, immune system and, in ways that remain murky, functions ranging from the cardiovascular to the neurological.

Understanding the whole microbiome starts with understanding its parts — in this case, individual bacterial species. And untangling the effects that a given species might have on its host often means isolating it from its neighbors. Unfortunately, bacteria are almost everywhere — except the few facilities where engineering and sterilization manage to ward them off. There, mice can be raised free of bacteria, transforming their GI tracts into mini-laboratories where bacterial species can be controlled, and their effects measured, in ways impractical with human subjects.

When Ramer-Tait arrived at Nebraska in 2012, some of her colleagues had already worked with germ-free mice for years. But she knew they could be doing much more with

a bit, or ideally a lot, more room. That need became more pressing with the 2016 launch of the Nebraska Food for Health Center. Led by Andrew Benson, the center studies how foods, compounds and molecules can alter a person's microbiome for the better — especially by introducing and establishing bacteria that might reduce risks of diabetes, heart disease, possibly even cancers or dementia.

The center's process goes something like this: Simulate digestion of a grain, legume or other crop. Take bacteria from human subjects and grow them on the remains of those food crops, roughly recreating the interactions taking place in the human gut. Then, search for differences in the growth of the bacterial ecosystems.

Those differences help Benson and colleagues discern which food-based molecules, from which crop lines, show promise for shaping the human microbiome. But the pipeline between recognizing that promise and testing it in humans is long. And it's full of mice.

"With the creation of the Nebraska Food for Health Center, we assembled specialized resources to discover, develop and translate dietary innovations for altering the gut microbiome to improve health," said Ramer-Tait, who directs Nebraska's Gnotobiotic Mouse Program. "Germ-free mice are critical to this mission, because we can 'humanize' them with the same human stool microbiomes that we test with food crops in the laboratory."

To accommodate more of those studies, the researchers turned to the University of Nebraska Foundation. Roughly \$5 million in private support later, the researchers were

celebrating the opening of the Gnotobiotic Mouse Facility on East Campus.

“We’re the only food science department in the United States that has a gnotobiotic mouse program,” Ramer-Tait said. “You typically find these facilities at major medical schools.

“I would say this puts us in the top 15 around the world for footprint and scale.”

Because virtually all gut bacteria die when exposed to oxygen, the facility’s laboratory houses a sealed, oxygen-free chamber to culture individual bacterial species or preserve an entire gut microbiome. The mice got upgraded digs, too. Ramer-Tait’s team once relied on sealed isolators whose cages were not isolated from one another, so that mice kept in the same isolator had to be fed the same bacterial species to prevent cross-contamination — limiting how fast the researchers could test new ones.

The team has since purchased a system that can hold more cages, each of which acts as its own isolator. That’s increased the rate at which studies can progress. And the extra 3,500 square feet devoted to housing mice has likewise pushed the pace while allowing the team to take on more collaborative projects.

“We are incredibly fortunate to have this resource,” Ramer-Tait said. “There should be a lot of pride in the fact that we have something like this in Nebraska.”



Computer Power, Microbiome Research Combined to Fuel Genomic Science Innovation by Food Science and Technology Department

Geitner Simmons, IANR Media

The University of Nebraska–Lincoln’s investments in high-capacity computer power are enabling important research by faculty and students in multiple academic disciplines. The Food Science and Technology Department, headquartered at Nebraska Innovation Campus, is exploring one of the most promising research areas: the study of biological materials known as CRISPRs and anti-CRISPRs.

Those microscopic materials were discovered only in the past decade, but they already are pointing the way to a revolution in gene editing.

The CRISPR method for modifying genomic makeup is reducing difficulties in time, complication and financial cost. This progress is incremental but, scientists say, it is opening the way to potential long-term benefits in areas including medicine (through new options for combatting viruses and treating diseases and genetic disorders) and agriculture (through greater crop yields and other possibilities).

Cont’d on page 15



Congratulations to the Graduates

December 2021

Bachelor of Science

April Johnson

Master of Science

Elizabeth Drey

Yutong Liu

Dana Solcz

Yafan Yu

Ph.D.

Car Reen Kok

Keting Li

Rhaisa Crespo Ramirez

Mallory Van Haute

Qinnan Yang

May 2022

Bachelor of Science

Yichen Bai

Kexuan Chen

Yiming Gao

Mohan Li

Xiaohan Li

Qiannan Lu

Yuxiao Lu

Hanh Nguyen

Weixi Pan

Joel Parker

Bo Peng

Gaurav Rajeev

Ruixiang Ren

Katerina Roberts

Ellenor Sell

Yiqi Shang

Chenxin Wang

Siyao Wang

Xiaoyan Wang

Erin Willats

Emma Williams

Hanqi Xie

Zeyu Xing

Zhaoyang Yi

Shiyu Zheng

Peilin Zhu

Master of Science

Leslie Pearl Cancio

Ph.D.

Travis Burger

Carmen Cano Roca

Chen Shimin

Student Awards and Recognition

Car Reek Kok – Early Career Researcher Award from ISAPP

Tengfei Li – AOAC International Testing for Life Student Award

Where Are They Now?

As a senior at Weeping Water High School, Suzy Hammons was set on attending the University of Nebraska–Lincoln as an engineering major – until an introductory food science class changed her career trajectory.

“As a senior I was one of two high school students who took Dr. Rupnow’s food science 101 class, which was offered online to high schoolers for the first time that year,” Hammons said. “He actually came out to visit us students and kind of recruited me into the department. At first, I didn’t think much of switching from engineering to food science in high school because I figured I’d switch it again in college, but I never did.”

Three degrees later, Hammons is a senior microbiologist at the USDA Food Safety and Inspection Service in Washington, D.C.

“Food science made me curious,” Hammons said. “The micro side of it in particular made me curious. I really appreciated that I was doing science in the real world.”

Hammons graduated with her major in Food Science and Technology from the University of Nebraska–Lincoln in spring 2011. She then went on to earn her master’s and Ph.D. in food science from Purdue University, before taking a job at the USDA.

In her role, Hammons applies her background as a microbiologist and food scientist to governmental policy and public health issues.

“On a day-to-day basis, I’m part of a team of people who review products that could cause illness or harm and determine if the product is dangerous and if we have the legal authority to recall or recommend recalling the product,” she said. “I also work on strategic projects, such as my current project where we’re looking at our microbiological sampling procedures to see if there is a way that we could collect samples faster, safer and cheaper.”

Outside of work, Hammons enjoys exploring Washington, D.C.

“On a Saturday I can just decide I want to go down to the American Museum of Natural History or I want to go sit on the (National) Mall or go see cherry blossoms. These were experiences I saved up for a year and a half for in high school and now it’s just a Saturday for me and my friends. It’s lovely. There’s so much culture and history and opportunity to absorb.”

Hammons facilitates meetings and manages projects with large teams of people from diverse backgrounds. In

addition to applying science to real-world situations, she spends time in the Office of Public Health Science reviewing scientific journals and summarizing the technical information for her teams so that others can make policy and practical decisions. Hammons enjoys making decisions and finding solutions that work the best for all stakeholders working together.

“I love seeing change happen,” she said. “I thrive on this project management, and I love working with a diverse group of people. We have all these different backgrounds, from veterinarians to lawyers. There’s such joy in me being able to be confident in my individual expertise and what I bring to the table while also knowing that I don’t have to know everything about animal health, legal, etc. because we have that sense of collaboration and everyone is working towards the common goal of food safety.”

Before working at the USDA and before attending graduate school, Hammons was an undergraduate trying to gain as many experiences as she could during her time at Nebraska U.

My favorite part was the friends I made,” she said. “I have a close intimate friend group and we were all part of the charter class in the agricultural sorority Sigma Alpha. We are scattered across the globe now, and we’re still close friends.”

The food science program gave Hammons the freedom and tools to explore through experiences with the Food Processing Center, technical electives where she experienced manufacturing, guest speakers from various companies and strong incentives to get industry internships. She was able to study abroad in Costa Rica for a semester, and France for two weeks. Suzy worked in a research laboratory for four years and she credits that lab experience with giving her the confidence to go to graduate school.

“I was never the kid who said I wanted to be an astronaut,” she said. “I didn’t know what I wanted to be when I grew up, so UNL gave me the great opportunity to dabble and be involved in the food science club, be an ag ambassador, be in the Honors Program and study abroad.”

“Those experiences helped me understand what I wanted to do with my life,” she said. “I look back and have a favorable impression of most of my experiences in Nebraska.”



Suzy Hammons



Snigdha Guha

Introducing Graduate Student Snigdha Guha

Doctoral student Snigdha Guha made a home for herself in Lincoln while studying cardiovascular disease prevention.

Guha studies pure and isolated gamma glutamyl peptides derived from food as potential preventative measures for vascular inflammation. Vascular inflammation commonly leads to cardiovascular disease, the number one cause of death worldwide.

“We are trying to find dietary interventions that can be used to prevent or reduce the number of people who reach that extreme stage where they’re taking pharmaceuticals with strong side effects or expensive procedures,” she said.

The peptides have shown positive effects both in vitro and in vivo. In a mouse model of atherosclerosis, the peptide showed reduction in plaque formation and lipid accumulation in the aortas of the mice.

These peptides are naturally present in foods such as beans, onion and cheese. The peptides are present in low quantities, requiring extraction methods to concentrate the peptides for use in a pill or enriched food.

Once she earns her Ph.D. in August, Guha will move to California for a postdoctoral position at UC Davis Health, where she’ll continue studying inflammation and metabolic diseases.

Before coming to UNL, Guha earned her bachelor’s and master’s degrees in microbiology from Delhi University in her home country, India. She completed a second master’s program at the University of Reading in the UK, where she shifted her focus to food science.

Guha’s eyes were set on the United States even before her undergraduate education, so when the time came to look for Ph.D. programs, “I don’t think I chose Nebraska,” she said. “I think Nebraska chose me.”

When looking for food science programs, Guha applied to Nebraska because of its high-quality programs. Then, Dr. Kaustav Majumder saw her profile and reached out as she fit his research well due to her biology and chemistry background.

Now at Nebraska, Guha has found a home away from home within her department.

“I feel like all of us are here for each other,” she said. “It’s like a big family here in FIC because we have nobody else. We have a lot of department events. The people here are very friendly and people from all the labs talk to each other, which is not very common.”

Outside of the lab, Guha has immersed herself in the world of being a Husker fan.

“I really like the football here,” she said. I had never seen football before, I just started this year and I can see why people go crazy about it. The spirit and energy is so high in the stadiums.”

Since football season, Guha has continued to cheer on Husker sports teams, including basketball, volleyball and her favorite, softball.

While Guha has grown to love Lincoln, the small size was a shock at first.

“My first night here I came in at 9 p.m. and there were no people around at all. I thought I could take a taxi, like how you call a taxi in the movies.”

Four years later, Guha loves the restaurants, peace and safety that Lincoln has to offer.

For now, Guha will soak up the last of Nebraska’s summer rays while she completes her Ph.D. program before heading west to continue helping others through disease prevention.

Introducing Undergraduate Student Alisa Holst



Intrigued by the science, health focus and ability to make a difference, Alisa Holst determined her major in food science and technology before she even stepped foot on the University of Nebraska–Lincoln campus.

“I’ve always really liked learning about science and chemistry, and I’ve also always been very health conscious. There are all kinds of science in food science and my loves for nutrition and chemistry go together really nicely.”

Once on campus, the junior from Orion, Illinois, dove headfirst into learning as much as she could, and now holds multiple on-campus leadership positions and has secured internships with name-brand companies. Through her involvement, she’s preparing for her future as a food scientist, where she’ll embody one of the department’s mottos, “Impacting the world three times a day.”

This summer, Holst will be working as a product development intern in North Carolina with Campbell’s Snacks, the entity responsible for favorites like Goldfish and Snyder’s Pretzels.

Last summer, Holst was a quality assurance intern at Jackson Dairy in Hutchinson, Kansas, a dairy plant owned by Kroger.

“In that internship, I was working in the lab right next to the production floor and ensuring that all the milk products that were produced were of the right quality and were produced safely,” Holst said. “Working at a dairy plant in quality assurance was a good experience applying technical food safety rules.”

Holst has also gained experience in other aspects of food processing as a student worker at the Food Processing Center on Innovation Campus: at the dairy plant, the pilot plant and the product development lab.

“The best part is seeing how food science is applied in the real world,” she said. “It’s interesting to make the ice cream and see all of the ingredients that go into it and how things are done in a specific order. Working in the product development lab, we do a lot of reverse engineering when

a client has a product, but they want to make it with other ingredients while keeping the appearance and/or the taste of the product the same. So those experiences where I get to see how science is applied to food in real situations are really cool.”

Outside of the lab, Holst is busy recruiting new students and enriching the experiences of current students as a food science and technology department undergraduate student ambassador and president of the food science club. The food science club, a student chapter of the Institute of Food Technology, holds monthly meetings, brings in industry speakers and provides networking opportunities.

As an ambassador for the department, Holst channels her passion for food science and the department into recruiting opportunities for high school students and other undergraduates.

“I really think our department is something very special,” she said. “It provides unique opportunities to students, and I want to share that and my knowledge of our department and my passion for it, but also just teach people about food science.”

After graduation, Holst hopes to continue working in product development, where she’ll take raw materials and turn them into foods you find at the grocery store—impacting the world three times a day. For now, she’s focused on making the most of her internship and continuing to spread the word about the food science and technology department.

“I love the opportunities that the department gives to its students. I’m involved in so many things within, and the department makes it really easy to get involved in those things if you want to. I think that’s something unique, especially compared to other departments or other food science departments at other universities. We just have lots of opportunities available, so students can further develop themselves professionally or academically, and even personally.”

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 upcoming 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.

Better Process Control School (IN PERSON)

October 4-6, 2022

FSPCA for Animal Food (ONLINE)

October 17-20, 2022

FSPCA for Human Food (ONLINE)

November 7-11, 2022

Better Process Control School for Acidified Foods (ONLINE)

December 5-6, 2022

Recipe to Reality Seminar (IN PERSON)

August 20, 2022

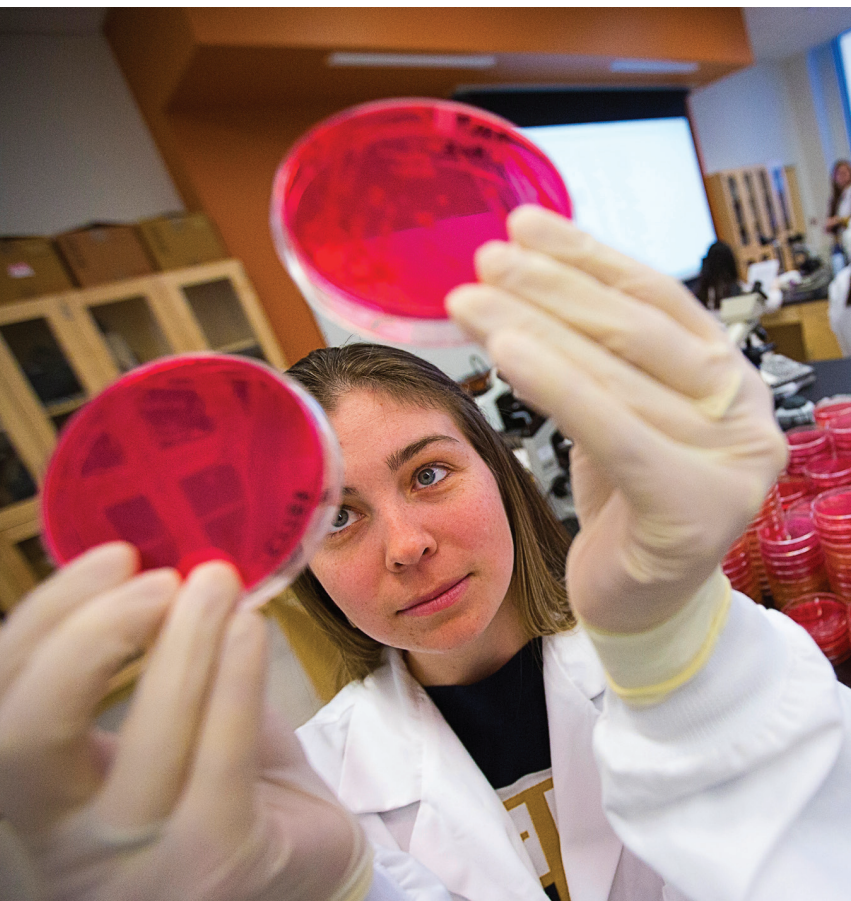
October 15, 2022

Recipe to Reality Seminar (ON DEMAND)

Available Anytime

Food Allergy Research and Resource Program

The Food Allergy Research and Resource Program (FARRP) in the Department of Food Science and Technology at the University of Nebraska–Lincoln conducts both in-person and virtual training opportunities. To view additional information about the workshop, online modules, and other training opportunities, please visit <https://farrp.unl.edu>. The website will be updated as dates and information become available.



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.



Computer Power, Microbiome Research Combined to Fuel Genomic Science Innovation

Cont'd from page 9



Bowen Yang

Bowen Yang, a doctoral student with the Food Science and Technology Department, points to how a CRISPR-focused approach has major long-term potential to direct genetic modification in pinpoint fashion: “Chemotherapy kills not only the cancer cells, but also your healthy cells. That’s why people’s hair falls out in chemo. What if you have a treatment that only targets cancer cells and leaves your normal cells alone? That’s a huge potential, in my

opinion, for the genome editing technologies.”

Yang, the audience’s choice as winner of UNL’s first-ever Student Research Days Slam on April 14, focused his comments during that event on the bioinformatics work he and his colleagues are pursuing. Yanbin Yin, associate professor in food science and technology, is the lab’s principal investigator in overseeing complex analysis on a range of bioinformatics topics.

The central benefits from the CRISPR-based genetic editing lie well to the future because this area of science is still in its infancy. One reason: Anti-CRISPRs have high value in enabling efficient gene-editing by affecting CRISPR-Cas (bacteria-produced molecular “scissors” used to edit DNA), but only a relative handful of anti-CRISPRs are currently known.

Researchers face a second complication: Much remains to be understood about these materials’ functions and properties.

“Right now there are only 99 anti-CRISPRs published,” Yang explains. “Not every anti-CRISPR is able to inhibit the genetic editing functions of every type of CRISPR-Cas. So, actually there are various types of anti-CRISPRs as well as various types of CRISPR-Cas. One type of anti-CRISPRs is only able to inhibit certain types of CRISPR-Cas.”

As a result, scientists in this field are pursuing two central goals: Greatly expand the number of known anti-CRISPRs. And deepen the understanding of their functions.

The Food Science and Technology Department, part of UNL’s Institute of Agriculture and Natural Resources, is

advancing knowledge in this field by combining two key components: high-capacity computing power and study of the human microbiome (the large community of microbes that reside in the gastrointestinal tract).

Anti-CRISPR proteins are made by viruses of bacteria and single-celled microorganisms known as archaea, Yang notes, and “the human microbiome contains a high abundance of those. So, one potential for the microbiome would be for us to scan it for new anti-CRISPR proteins.”

Scientific research tools now have the capability to generate complex biological data at an astonishing rate. As a result, the data-crunching capability of high-capacity computers takes on paramount importance.

“The microbiome has billions of bacteria, and when you try to analyze that much data, you need computers,” Yang says. “You need bioinformatics.”

Yang and his colleagues are well equipped in that regard. They use three supercomputers supplemented by a computing cluster provided by UNL’s Holland Computing Center. “So, we have quite an exceptional amount of computational power in terms of bioinformatics work,” he says.

“When we talk about scientific research, we would automatically assume a linkage between a scientist and bench work,” Yang notes. But only one of his nine colleagues in the Yin lab needs to use the associated wet lab. All the other researchers are busy at their computer screens, scrutinizing the data made possible by the computer power. This is the nature of modern bioinformatics research.

Indeed, Yang started out years ago as a master’s degree student doing web lab research, but as he has moved into deep study of anti-CRISPRs, his focus is now computer science-centered.

In looking to the future, Yang is open to working in industry, with bioinformatics remaining his central focus. The possibilities ahead for the science are promising.

“Since every living organism is built on genetic material,” he says, “the potential of this technology is limitless.”

SPRING/SUMMER 2022

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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**.



FOOD SCIENCE AND TECHNOLOGY AT NEBRASKA

The University of Nebraska–Lincoln is home to one of the most advanced food science and technology programs in the nation. With endless industry connections, real-world experiential learning opportunities and professional mentorships, our undergrad and graduate students become experts in the field. From field to gut—our students are trained in all facets of food science and technology.



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foodsci.unl.edu/gradprograms

FOLLOW THE FOOD PROCESSING CENTER ON SOCIAL MEDIA

You can follow the activities, updates, and news from the Food Processing Center on your favorite social media channels. We are found on LinkedIn, Twitter, and Facebook.

LinkedIn will be our primary channel to communicate events, news and opportunities with food industry professionals and partner organizations. We will also distribute updates on Twitter and Facebook.

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