

ALUMNI

NEWSLETTER

UNIVERSITY OF NEBRASKA-LINCOLN

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Department of Food Science and Technology
The Food Processing Center



Looking Toward the Future: Updates from the Department of Food Science and Technology and The Food Processing Center

It's been a wonderful year so far! We've been very busy since we moved to the Food Innovation Center at Nebraska Innovation Campus in July 2015. The move itself was a huge success – it was completed in just 10 days, and 20 days later, our operation was running at 70% capacity. We've had some time to reflect in the time that we've been at NIC and are excited to share our progress with you.

Recently, we've been completing exit interviews with graduating seniors. The interviews have showed that our graduating seniors are impressed and have enjoyed working in our facilities in the Food Innovation Center. Their feedback has reinforced just how fortunate we are to have such wonderful facilities – and students! Combined, they have put us into a position where we're constantly thinking about how far we can take our work from here. We're continuing to grow in terms of numbers, but we know that we need to continue delivering high quality research, teaching, and service to the food industry.

Beyond our new facilities, many exciting things have been happening in the department and The Food Processing Center. We've been continuing to hire new talent. Our two newest faculty members are Kaustav Majumder and Jacques Izard. Angela Anandappa was named the founding director of the Alliance for Advanced Food Sanitation (AAFS). With her guidance, we'll be better positioned to reach the benchmark for the alliance, bringing more companies on board, as well. Two faculty members, Jeyamkondan Subbiah and Andreia Bianchini, were promoted. Andrew Benson, W.W. Marshall Distinguished Professor of Biotechnology in our department, gave the Nebraska Lecture in April titled "Guts, Germs and Stainless Steel: Creating Winners and Losers in Food."

I also wanted to mention how delighted we are with the selection of Dr. Ronnie Green as the next chancellor of the University of Nebraska-Lincoln. Ronnie is familiar with and supportive of our program, and he will have the experience necessary to help us double our commitment and efforts to impact our future success as leaders in food science in Nebraska and the world.



The food industry and our food-consuming world are facing bigger challenges than ever. We are committed to taking them on. The key to success in taking on these challenges is diligent collaboration and thinking differently. We think as a department at NIC, but we also have 55 students in Jangling, China, through the 3+1 program between UNL and Northwest Agricultural and Forestry University (NWAUFU). In so many ways, our reach is growing.

We're excited to open our doors once again for a fall open house. More information can be found in this newsletter.

As you know by now, I began my position as dean of the College of Agricultural, Consumer and Environmental Sciences at New Mexico State University in Las Cruces, New Mexico on August 1. I would like to close this letter with a few final words of reflection. Thank you the faculty, staff, students, alumni and university administration for all of the support over the last 10 years. In that time, we've experienced growth in all areas, including the numbers of faculty, undergraduate students and graduate students. We have many new programs in place and are experiencing greater levels of output that culminated with the move to our new home at NIC. We've also increased industry collaborations and the presence of The Food Processing Center and Nebraska globally. I'm deeply thankful for the opportunity to serve as the head of the Department of Food Science and Technology and Director of The Food Processing Center and I wish the very best for my successor.

Thank you again for your support!

Best wishes,

A handwritten signature in cursive script that reads "Rolando A. Flores". The signature is written in black ink and is positioned above a thin horizontal line.

Rolando A. Flores

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



National
Food
Entrepreneur
Program

GENERAL

Program helps entrepreneurs move from recipe to profit

New entrepreneurs often don't have the resources and experience necessary to successfully launch a business in the food industry. Since 1989, the National Food Entrepreneur Program has helped more than 2,000 entrepreneurs nationwide move forward on their dream of starting a food business. The National Food Entrepreneur Program can help entrepreneurs navigate through the phases of starting a food business – all the way from an idea for a product to a plan to introduce it to the marketplace. The Food Processing Center offers this two phase program to entrepreneurs throughout the country.

Recipe to Reality is a day-long seminar that provides entrepreneurs with a general overview of the issues crucial in developing a food manufacturing business. The information included in this seminar will help entrepreneurs decide if they would like to pursue developing a food business. Topic areas in the seminar include:

- Market Research and Selection
- Packaging and Labeling
- Product Pricing
- Promotional Materials Package
- Business Structure
- Product and Process Development
- Food Regulations and Agencies
- Product Introduction and Sales
- Food Safety and Sanitation

In the Product to Profit phase, teams of experts provide participants with individualized, comprehensive assistance tailored to the specific business venture that participants are pursuing. Areas of assistance include:

- Business Development
- Labeling and Regulatory Compliance
- Product Pricing
- Product Development
- Processing Facility Locations
- Promotional Materials Development

To learn more about how the National Food Entrepreneur Program can help entrepreneurs achieve their dream of starting a food business, visit fpc.unl.edu, or contact program manager Jill Gifford at 402-472-2819 or jgifford1@unl.edu.

Recipe to Reality is a day-long seminar that provides entrepreneurs with a general overview of the issues crucial in developing a food manufacturing business.

FACULTY

Two faculty members receive promotion honors

Jeyamkondan Subbiah was promoted to Professor in the Department of Food Science and Technology. Subbiah serves a dual appointment in Biological Systems Engineering and Food Science and Technology. His research interests include developing hyperspectral imaging and near-infrared spectroscopy systems for food quality and safety applications.

Andreia Bianchini was promoted to Research Associate Professor. Bianchini's appointment is in The Food Processing Center. Her areas of interest include applied research on the evaluation of ingredients, assessment of processes, and development of strategies to reduce/prevent contamination of final products with mycotoxins and bacterial pathogens, the development of quality control mechanisms, and HACCP assistance focusing on food, dairy and feed products.



Jeyamkondan Subbiah



Andreia Bianchini



Sweet Summers Since 1917

Summer - time for barbecues and bonfires, swimming and sunbathing. As long as we're getting together, it's a good idea to have delicious food to share. Take our premium handcrafted ice cream, with flavors like Scarlet & Cream and Lemon Custard, available to enjoy in a dish or cone, or in a sundae or shake. The best part? Every scoop supports student experiences. Since 1917.

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



FACULTY

Upcoming workshops at the Food Processing Center

The Food Processing Center will host four workshops in the summer and fall of 2016 for professionals in the food science industry or those interested in becoming a part of the food science industry.

July 25 - The Science Behind the Craft –

A Workshop for Craft Brewers from 8 a.m. to 6 p.m. at Nebraska Innovation Campus. Registration deadline: July 1.

The demand for craft beer is rapidly growing, and new craft breweries and local brew pubs are popping up around the region. This professional development and educational opportunity will help those in the brewing industry to learn from experts, network with peers and industry experts and participate in laboratory exercises and participate in beer sensory session. Featured speakers will include Neal Witte, Training and Technical Support Manager at Duvel USA, Boulevard Brewing Co. and Brewery Ommegang; Kara Taylor, Analytical Manager at White Labs in San Diego, CA; and Joe Baumert, Heather Hallen-Adams and Robert Hutkins from UNL's Department of Food Science and Technology. This workshop is intended for owners and employees of craft beer breweries interested in understanding the science of beer brewing and utilizing the information to improve their craft beer production.

August 13 - Recipe to Reality seminar - the first of two phased sessions in the National Food Entrepreneur Program - at Nebraska Innovation Campus. All day.

The seminar provides entrepreneurs with a general overview of the issues crucial in developing a food manufacturing business. The information included

in this seminar will help entrepreneurs decide if they would like to pursue developing a food business. Topic areas in the seminar include Market Research and Selection, Product and Process Development, Packaging and Labeling, Food Regulations and Agencies, Product Pricing, Product Introduction and Sales, Promotional Materials Package, Food Safety and Sanitation and Business Structure.

September 27-29 - Better Process Control

School. All day at the Downtown Holiday Inn. Registration deadline: September 15.

This school helps to equip participants with a better understanding of the FDA's regulations in parts 108, 113 and 114 of the Code of Federal Regulations Title 21 – designed to prevent public health problems in low-acid and acidified low-acid canned foods. This course equips professionals with a scientific understanding of thermal processes and strategies for pathogen control. The Food Processing Center's Better Process Control School is approved by the FDA for certification. Upon completion of the school, participants become certified and their names are submitted to the FDA.

October 8 - Recipe to Reality seminar at Nebraska Innovation Campus. See description above.

Early registration for the workshops is required due to limited space. For more information or to register for one of the workshops, contact Jill Gifford at 402-472-2819 or jgifford1@unl.edu.

fpc.unl.edu/training

RESEARCH

Downs' research to support more accurate methods for food allergen detection

For Melanie Downs, an assistant professor in the Department of Food Science and Technology, the driving force behind her research in allergenic foods is to help the food industry communicate effectively and provide safe and efficient food products for allergic individuals. She is particularly interested in characterizing allergens, identifying proteins responsible for allergic reactions and determining how the proteins behave in various food systems. She is also interested in evaluating current methods and developing new methods for food allergen detection. Downs' current research focus is using mass spectrometry to detect food allergens with higher accuracy than current detection methods.

Mass spectrometry methods can help food scientists more definitively detect the actual protein in food allergens. When using mass spectrometry methods, scientists extract proteins from whatever food they're interested in. Typically, a type of mass spectrometry is used called tandem mass spectrometry (LCMSMS), where proteins are digested into longer chains as peptides to make them the right size to be detected. LCMSMS allows scientists to get sequence-level data from peptides so that they can tell what the peptide's amino acid sequence is, identify proteins that the peptide came from and find potential chemical modifications. Mass spectrometry has some advantages when modeling data and looking at processes carefully to understand more about the biology of food.

Mass spectrometry gives researchers more information than they've ever had before. Downs' team is challenged to

figure out what's in the data but also how to parse out what's important. To help overcome that challenge, she believes that the field of proteomics needs more data scientists that have grips on both instrumentation and data.

"Today's mass spectrometry methods produce an incredible amount of both raw and processed data. You can easily collect more information about proteins and peptides than you could in years," Downs said. "There's lots of potential now, but you constantly have to think about the data that you're collecting."

Downs' research has also opened the doors to new collaborations with the food industry. A new instrument developed by Thermo Fisher Scientific was delivered to UNL recently to help with a collaborative project to develop several new mass spectrometry methods.

"We're excited about this opportunity. It's a good advancement for us to have instrumentation in house," Downs said. "It's like getting a giant Christmas present."

While new technology can have benefits, Downs stresses the importance of long-lasting collaborations like the Food Allergy Research and Resource Program (FARRP), which is supported by food industry members. FARRP was created in 1995 at a time when there were no detection methods of any kind for food allergens. The food industry had a need for detection methods along with education and training on food allergens. FARRP members came together as a group to develop



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Melanie Downs

new education for the industry and set a foundation for research. As a result of constant feedback from the food industry, FARRP researchers are able to develop research questions internally. As more and more research questions are collected, they form larger research questions that drive research like that led by Downs.

“We are currently working with a few industry partners to put together specific research questions that they have,” Downs said. “Those questions will help us develop methods to help target the problems that they experience in their particular circumstances.”

Downs believes that the food industry has come a long way in allergen detection in the past 20 years.

“We’re working on a number of different aspects with the food industry to improve and maintain their food allergen management practices,” Downs said. “The analytical piece comes in to make sure that they can validate everything effectively.”

An increasing amount of research is being conducted on the thresholds for allergenic foods, which Downs said plays an important role in the precautionary labeling statements on packaging. She—and food scientists across the globe—are working on creating more consistency and best practices in the industry, while figuring out what communicates well with food-allergic consumers. Downs believes that modern regulations like the Food Safety Modernization Act (FSMA), which has a critical focus on allergens, can be a big step forward for many companies.

While Downs believes that a confirmatory method like LCMSMS is the direction that the industry is moving, she said that it will be a while before it’s perfected. Once it’s perfected, she believes that LCMSMS will be a first-line test that can provide higher accuracy than what’s currently available.

ALUMNI

Quintero, UNL '11 and '14 ensures food ingredient safety as quality auditor at Kerry Americas

In order to create food products the right way, producers and manufacturers must consider a wide range of factors. Food must be visually appealing and tasty, but also safe and of high quality. As a supply quality auditor, Maria Quintero knows that well. Quintero is a member of the corporate global supply quality team for Kerry Americas – a branch of the international Kerry Ingredient Company. Kerry buys ingredients for food production companies.

Quintero has always had a strong interest in food processing, although she wasn't sure exactly which path of study to take after high school. A native of Colombia, Quintero visited Universidad de La Sabana in Chía and was introduced to its Agricultural Industrial Production Engineering program. Quintero didn't want to just study engineering or biology but rather something that combined many areas of study. Because of that, the program at La Sabana was a great match.

As part of her undergraduate degree, Quintero was offered an exchange with UNL for a four-month internship to work in Robert Hutkins' lab. She was eventually given the opportunity to apply and stay for graduate school. After being involved in research, she decided to further her education and graduated with both a master's degree (2011) and Ph.D. (2014) in Food Science and Technology from UNL.

At Kerry Americas, Quintero primarily works with ingredient suppliers and visits ingredient processing plants to ensure food safety. She conducts food safety audits, which examine the quality and safety standards that are in place for every supplier that Kerry buys ingredients from.

Part of her work is to develop internal auditor guidelines for ingredient categories including basic microbial guidelines.

Quintero is thankful for the opportunities and culture that Kerry Americas provides.

"Kerry is a growing global company that provides lots of opportunities to grow professionally. Every person has a different work culture and it's a good challenge to overcome hurdles like language barriers," she said. "As an auditor, you learn something new every day. You also get the chance to see the same products in many different ways."

While she's a member of a global team, Quintero works from home in Lincoln. She spends a lot of her time traveling in the U.S. and Canada – around 70 percent of her time at work. She travels by herself but works with teams of auditors from all over the world. They have weekly online meetings to discuss audits and findings.

"We really have to thank technology for providing closeness when working remotely. It allows people to remain engaged so that they don't get forgotten," Quintero said.

Even with the closeness, she believes that working remotely can be difficult at times.

"It gives you a different perspective. Internet connections and time differences are challenging sometimes. I often have meetings at 8 or 9 p.m."

Quintero also has to constantly adapt to changing food industry regulations. Even with the constant changes, she remains on top of new advances by maintaining a scientific approach.



Maria Quintero





"I read a lot of FDA, USDA and other food safety publications," Quintero said. "Food safety news like daily recalls and why they happened are also important to read."

The biggest lesson that Quintero has learned during her time in the food industry is that making food isn't as easy as people think it is. She believes that food science is often taken for granted – especially the science behind quality, texture, and safety.

"It never gets boring making food," Quintero said. "Food science is a whole world full of joy, frustration and excitement every day."

GENERAL

OPEN HOUSE for Food Innovation Center September 30

The Department of Food Science and Technology and The Food Processing Center will be hosting an open house at the Food Innovation Center on Nebraska Innovation Campus (NIC) Friday, September 30 from 1:00-4:00 p.m. The open house will give guests the opportunity to see all of the services, facilities and assistance available to the food manufacturing industry at the Food Innovation Center. The event will kick off with a welcome at 1:00 p.m., followed by a presentation by keynote speaker Shane Farritor, professor of Mechanical and Materials Engineering.

Tours of the Food Innovation Center and refreshments will be provided from 2:00-4:00 p.m., following Farritor's presentation. Unlike the Nebraska Innovation Campus open house held in the fall of 2015, the whole Food Processing Center will be open for tours, and guests will be able to explore the pilot plants, sensory labs, product development labs, research spaces, classrooms and other areas.

Farritor's research interests include space robotics, surgical robotics, and biomedical sensors. He has co-founded two startup companies and has been a leader in developing the Maker Space at Innovation Campus. His presentation will be titled "Making Innovation."

The open house is free, but we encourage all interested guests to register online. Parking will be available in lots around NIC and the Food Innovation Center, and buses are available between City and East Campus and NIC.

For more information and to register to attend the open house, please visit foodsci.unl.edu/open-house.



Shane Farritor



Shannon Rezac

STUDENT

Rezac's studies, work experience bring her closer to food industry dreams

Senior food science and technology major Shannon Rezac's childhood dream was to become a professional ice cream taster. While her interests have changed over time, her passion for food hasn't changed one bit.

Rezac didn't have the opportunity to take a food science class in high school, but she did take a variety of upper level physics, chemistry and nutrition classes. She enjoyed the classes, but eventually became interested in finding a way to apply the skills that she had learned to real-life situations. A family friend working in the food industry noticed her interests and encouraged her to look into studying food science. As soon as she started researching majors as a high school senior, she knew that food science and technology would be a perfect match.

"The turning point was when I realized that I liked to cook and bake and that I could connect my interest in science to that," Rezac said. "I was excited to learn that I could make those connections every day."

continued on page 15

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 Josh Egley at josh.egley@nufoundation.org or 402-458-1202 or give online at nufoundation.org/foodscience.



**OUR
STUDENTS
OUR
FUTURE**



Allie Tobin, Food Science Technology undergraduate



Eric Oliver

STUDENT

Graduate student brings industry experience to classroom

First-year graduate student Eric Oliver ended up in the food industry somewhat by accident. He had originally worked in microbiology and thought about going into the medical field, but the best job he could find was in the food industry.

A Utah native, Oliver graduated from the University of Utah in 2005 with a BS in biology. He later obtained a master's degree in food science and technology. After working in biology, chemistry, and quality assurance in the food industry, Oliver met a UNL professor at a seminar in Iowa who encouraged him to go back to school, and in 2013, he came to Lincoln to pursue his Ph.D. in food safety under the guidance of Jayne Stratton. Oliver's focus is high pressure processing (HPP) and low moisture foods.

When he first came to UNL, Oliver didn't know what to expect.

"I had been out of school for a long time, even working as a lab director at one point," Oliver said. "Being 'in charge' and then becoming a student again and getting used to the environment was challenging. Re-learning the mental process and workload, how to study for an exam, and experiencing a different lifestyle was totally different."

Oliver enjoys the diversity and culture in the Department of Food Science and Technology.

"The culture among food science grad students is dynamic," Oliver said. "It's great working with people from around the world who are all coming together for higher learning. People are very friendly, and it's a nice community. People are also protective of the Huskers – it's a part of the culture here."

Outside of his research, Oliver was part of the move committee for the Department of Food Science and Technology's relocation to NIC, helps Stratton teach workshops to students and industry professionals and plays intramural basketball.

After graduation, Oliver plans to pursue a job as a food regulator as a third-party auditor or for the government.

FACULTY

Food sanitation alliance forms new relationships, drives research

A new alliance between UNL researchers and the food industry will open the doors to improve food sanitation methods. The Alliance for Advanced Food Sanitation (AAFS), whose foundation is in the Department of Food Science and Technology, will support the food industry with new sanitation techniques, materials and overall cost and utility use reductions.

Faculty member Steve Taylor, professor, co-founder and co-director of the Food Allergy Research and Resource Program, proposed the alliance on September 4, 2013. Faculty initiated discussion of the goals and development strategies, and a series of meetings were held with various interests in the alliance in 12 companies including Kellogg, Mars, Nestle, Johnsonville, Cargill, Neogen and Ecolabs. In 2015, member companies made their initial contributions, and the recruitment process for the position of founding director began. The founding director of AAFS will be in charge of consolidating AAFS, carrying on the day-to-day tasks and projects, recruiting new members to the alliance, heading research projects and acting as the face of the alliance.

The alliance has plans for research that has the potential to make an enormous impact on the future of sanitation in the food industry. The alliance's research interests include the removal of condensation, reconditioning of water in manufacturing systems, novel cleaning methods, developing easy to clean surfaces, validation of cleaning methods, ecology and utility use reduction and cost analysis of condensation, among other interests.

The alliance is a work in progress, but has already formed valuable university-private sector relationships and hopes to continue to attract new members. With a foundation set in the Food Innovation Center on Nebraska Innovation Campus, the alliance is optimistic for the future. More companies are in the process of becoming members, and 80 percent of the original member companies are still in the alliance today.

The founding director of the alliance is Angela Anandappa, who accepted the position in June. Anandappa received her BS in biology, MS in food microbiology and Ph.D. in food safety systems from the University of Kentucky. She also received the Lean Systems Certificate from the True Lean Program at the University of Kentucky Center for Manufacturing. Anandappa comes to AAFS from the KraftHeinz Company in Chicago, Illinois where she was the section manager in the Supply Chain Safety Assurance division. She provided expertise in Food Safety Modernization Act (FSMA) compliance, developed and communicated the long-term vision for the Kraft Food Safety Assessment program, helped support Kraft's policy and corporate requirements, led Kraft's Ingredient Specifications and Verification program and supported overall growth and innovation of the company.

It is expected that an annual meeting will have taken place, a meeting of the advisory board will have taken place and the Alliance will be working at full speed by September 2016.



Steve Taylor



Angela Anandappa



FSPCA Preventative Controls for Human Food Course

GENERAL

Workshop to provide assistance with new FDA regulations

The Food Processing Center will be introducing a new workshop to provide FDA-approved training to food companies to help them comply with regulations in the area of preventative controls for human and animal food published in August 2015.

The course was developed by the Food Safety Preventative Controls Alliance (FSPCA) and is the standardized curriculum recognized by the FDA to meet the training requirements under Title 21 CFP Part 117.8(c)(1). Successful completion of this course is one way to meet the requirements for a “preventive controls qualified individual.”

Employees of FDA-regulated food manufacturers including owners, production supervisors, quality assurance managers, other food safety team members, FDA state health inspectors and compliance officers are encouraged to attend this workshop. The workshop is led by qualified FSPCS Lead Instructors from The Food Processing Center. The workshop includes two lunches, break refreshments and a workshop book. Upon successfully completing the workshop, each attendee will receive an official certificate of completion.

SESSION TOPICS INCLUDE:

- Introduction to the Course & Preventative Topics
- Food Safety Plan Overview
- Good Manufacturing Practices & Other Prerequisite Programs
- Biological Food Safety Hazards
- Chemical, Physical & Economically Motivated Food Safety Hazards
- Preliminary Steps in Developing a Food Safety Plan
- Resources for Food Safety Plans
- Hazard Analysis & Preventative Controls Determination
- Process Preventative Controls
- Food Allergen Preventative Controls Determination
- Sanitation Preventative Controls
- Supplier Preventative Controls
- Verification & Validation Procedures
- Record-Keeping Procedures
- Recall Plan
- Regulation Overview – GMP & Hazard Analysis & Risk – Based Preventative Control for Human Food

For more information on upcoming dates and registration, visit fpc.unl.edu/training.

Employees of FDA-regulated food manufacturers including owners, production supervisors, quality assurance managers, other food safety team members, FDA state health inspectors and compliance officers are encouraged to attend this workshop

RESEARCH

New high pressure processing tools expand research opportunities

Some of the newest equipment that's been added to the pilot plant at the Food Innovation Center includes two new high pressure processing (HPP) units. When pasteurizing food products, HPP allows food manufacturers to work in a wider range of conditions, higher pressures and different temperatures as compared to pasteurization by heat.

Steve Weier, manager of The Food Processing Center's pilot plants at the Food Innovation Center and on East Campus, believes that the new HPP equipment sets the Food Innovation Center apart from facilities at other universities.

"We aren't the only university that has HPP equipment, but we have a lot of in-house capabilities that many other universities don't. Many only have small two- to five-liter capacity units and don't always have the means to scale up or begin to market products," Weier said. "We can make food grade products in a manufacturer's packaging and get feedback from consumers about their entire experience with the finished product."

Pasteurization by heat can change the properties of a food product like color and flavor. With HPP, food manufacturers can achieve similar pasteurization results without losing important food properties. Guacamole is an example of an early adopter of HPP because of its sensitivity to enzymes that cause browning and its risk of microbial contamination if no pasteurization process is in place. If temperature is used to pasteurize guacamole, its color changes to brown,

and consumers may not like the use of chemicals to preserve its flavor. By using HPP, bacteria cell walls are damaged, proteins are denatured and bacteria die, leaving a safe and pasteurized product with vivid colors and fresh flavors. The product's shelf stability can also increase two to three times what it would be without a pasteurization process.

When using HPP equipment, food products are placed into a flexible and watertight package like a plastic bottle, tray, bowl or bag that can withstand high pressure. The package is placed into a carrier which is loaded into the unit. The unit seals itself, floods the chamber with water and pressurizes. The water itself acts as the pressure medium in the unit. Food products then run under pressure between 60-86,000 PSI for three to four minutes. When the time is up, the chamber depressurizes, the water is drained and the carrier comes out. Following the HPP process, a drying process takes place to eliminate excess water, and the product is sent down the line for labeling and packaging.

Many products can undergo HPP, including vegetables, purees, fruits, juices, pasta dishes and casseroles, beverages, whole muscle meat, eggs and other foods that lack a definite shape. Some limitations exist: HPP is not as effective in solid foods with a definite shape and foods with a lower water content.

The Food Processing Center is mainly using HPP equipment to research and develop longer shelf lives for products like eggs and muscle meats and secondarily on dairy and beverage products. The



"We aren't the only university that has HPP equipment, but we have a lot of in-house capabilities that many other universities don't. Many only have small two- to five-liter capacity units and don't always have the means to scale up or begin to market products," Weier said. "We can make food grade products in a manufacturer's packaging and get feedback from consumers about their entire experience with the finished product."



George Cavender

Steve Weier

Food Processing Center has also demonstrated the HPP process on different types of seafood including lobster and oysters in the shell.

The new 55-liter HPP unit added in September 2015 and the continuous HPP system added in early 2016 have opened the doors to research that wouldn't have been possible with the original two-liter HPP unit in the pilot plant. For food manufacturers looking to try HPP on an even larger production scale, Universal Pasteurization in Lincoln is a nearby option. Universal Pasteurization is the largest co-

manufacturer of HPP in the United States, and in Nebraska, it's the only option for co-manufacturing without having to ship products long distances.

"Because of our proximity to Universal Pasteurization, we have a straight-through pipeline," Weier said. "The process can now go from concept to product development, testing to sensory testing, and to marketing and large-scale production right here in Lincoln. UNL has the tools and partnerships for every step of the process for food manufacturers."

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Rezac's studies, work experience bring her closer to food industry dreams

Rezac works as a student research assistant at the product development lab in The Food Processing Center under the guidance of Julie Reiling. She's currently working with a variety of small food businesses. For Rezac, the best part about working in food science is the creativity that you can express in product development.

"I get to go there and work on a variety of products. Some of the products you don't have any kind of base to go off of," she said. "You have to be creative and ask yourself what to try next. You want to create the best product. You want to create an innovative product. You want to be groundbreaking."

Outside of the classroom, Rezac is an ambassador for the Department of Food Science and Technology and co-publicity chair for the UNL Food Science Club. She is also a resident assistant in Neihardt Hall and trumpet player in the Cornhusker Marching Band.

Rezac worked at ConAgra Foods as a Research, Quality and Innovation Intern over the summer and hopes to find a job at a food company in research or product development after graduation next May. She also wants to pursue a master's degree but plans to work in the industry first.

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Harlan Vice Chancellor, Institute of
Agriculture and Natural Resources
Ron Yoder

Interim Department Head,
Department of Food Science
and Technology, and Director
of The Food Processing Center
Curtis Weller

The importance of alumni contributions

Private support is essential to recruit outstanding undergraduate and graduate students, provide timely and applicable research findings and expand our outreach to small businesses and entrepreneurs across the state. In these times of shrinking budgets and decreasing state support, donations from our alumni and friends are critical. We hope you will consider making a gift to assist us in these efforts. Contact the University of Nebraska Foundation to contribute to the following funds:

Food Science & Technology Student Scholarship

Fund No. 1359: This fund provides much needed financial support to our undergraduate students, an invaluable aid to our recruitment and retention efforts.

Food Science & Technology Research Fund No.

1452: This fund sponsors research activities with the Department, including undergraduate student research and travel support for graduate students to attend scientific meetings.

Food Science & Technology Development Fund

No. 4312: This fund provides general support to the Department and is specifically used to enhance undergraduate student recruitment efforts (high school visitations, etc.)

To make a gift, contact Ann Bruntz at 402-458-1176 or abruntz@unfoundation.org.

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