Greetings from the Chair

To our Food Science Alumni, Friends and Family,

On behalf of the entire department, I want to introduce our newest form of communication: a biannual Food Science newsletter called, *Impact*. Derived from our strategic planning efforts this past Summer, the term Impact is a key term describing the outcomes we seek to achieve. The purpose of this newsletter is to keep each of you abreast of changes and developments in the department over the coming years.

In the wake of significant changes on campus, the College of Agricultural and Life Sciences is undergoing a period of restructuring and strategic investment in areas that represent our most significant, sustainable growth opportunities for research, instruction and outreach. Various new departmental designs are being considered across the college including the merger of some departments, dissolution of some majors and the creation of more closely tied strategic partnerships.

Within Food Science, we spent much of the summer and fall of 2018 evaluating our strengths and opportunities in this college-wide restructuring process and have crafted a five-year plan of initiatives and work to ensure that Food Science remains as strong and well-designed as we have ever been. With highly productive personnel and with the support of so many of our alumni, we have every reason to remain optimistic and excited for a bright future. With an especially strong group of junior faculty hired over the last few years and new hires slated to begin this calendar year in the areas of Food Chemistry and Fermentation, we have been able to make very real investments in our future.

While not designed to be a comprehensive collection of all that we do, please take a few minutes and read in *Impact* about some of the happenings, discoveries and accomplishments in the department. Please drop us a line sometime or drop by one of our departmental events – we’d love to hear from you.

Best wishes and *On Wisconsin!*,

Scott A. Rankin
Professor and Chair
Meet Our New Faculty

Jan Peter van Pijkeren joined the department in July, 2013. His research works at the interface of industry and medicine, with a focus on lactic acid bacteria. This fascinating group of organisms is important to the food, biotech and medical industries for their fermentation, enzyme-production and clinical applications, respectively. The development of genetic tools is currently a central part of JP's research. His expertise to efficiently edit the genomes of a variety of lactic acid bacteria species, including probiotic strains, allows us to gain mechanistic insights into probiotic-host interactions. He also exploits his genome-editing expertise to develop tailored probiotics that further enhance the health-promoting properties of these strains.

Brad Bolling joined the department as an assistant professor in July. He earned his B.S. and PhD in Food Science from UW-Madison. After graduating, he became a postdoctoral fellow at Tufts University, and later an Assistant Professor in the Nutritional Sciences Department at the University of Connecticut. Since returning to UW, his research works to understand how foods prevent chronic disease. It focuses on how yogurt, berries, and nuts act in the gut to inhibit chronic inflammation associated with obesity, colitis, and cardiovascular disease. Brad and his research group are actively working to better characterize plant polyphenol composition and their metabolism after consumption, as these may be responsible for the health benefits of certain foods. In his free time, Brad enjoys spending time with his family, biking, cross-country skiing, gardening and cooking.

Tu Anh Huynh is the most recent faculty hire for the department of Food Science. She joined us in January 2018 as an assistant professor. Dr. Huynh earned her B.S. in Food Science from the University of New South Wales in Australia and her PhD in Food Science at the University of California-Davis. Prior to moving to Madison, she was a postdoctoral fellow at the University of Washington - Seattle. Dr. Huynh specializes in food microbiology with a specific focus on bacterial pathogenesis mechanisms. She examines how bacteria adjust their cellular programs to adapt to the infected mammalian hosts and cause diseases.
Celebrations

The D. B. Hyslop Academic Award

Jonathan Sogin is the 2018 recipient of the D. B. Hyslop Academic Award. This award recognizes an undergraduate “for demonstrating intellectual curiosity and scholarly excellences while pursuing a Bachelor’s degree in Food Science”. Jonathan demonstrated his intellectual curiosity in a number of ways, most notably by participating on product development teams that focused on the application of culinary arts. Jonathan graduated in May of 2018 and is currently pursuing his doctorate at Cornell University.

James Beard Foundation Scholarship

Bryan Quoc Le is a 2018 recipient of the James Beard Legacy Scholarship. These prestigious and highly selective awards are granted to food-focused individuals in honor of Mr. Beard’s legacy of valuing the pursuit of wholesome, healthful, and delicious food. As a graduate student in Food Science, Bryan is currently researching the anti-inflammatory properties of garlic and onion-derived compounds. He is also involved with the Science Meets Food blog, sponsored by the IFTSA. As a contributing writer and editor, Bryan shares articles about the science behind food products to online audiences and communities.

Transitions

Dairy Products Judging

Innovation in instruction is a key priority of our Department. Beth Button, MS, is taking a lead on this in her new role as instructor for the Dairy Products Judging program. Until recently, this program was managed and taught by Dr. Bob Bradley. However, after 40 years, Dr. Bradley is graciously turning the reigns over to Mrs. Button. Mrs. Button is working to transform this program into a formal course with potential to increase enrollment and prepare more students to provide this specialized form of sensory analysis for the food industry. We are grateful to Dr. Bradley for his many years of service and are excited to see the program evolve under Mrs. Button’s leadership.
First Annual Fall Harvest Fest

On November 15, the Department of Food Science held its first annual Fall Harvest Fest event. Students, staff and faculty from throughout the Babcock community - including the Babcock Hall Dairy Plant, the Babcock Hall Dairy Store, and the Center for Dairy Research - came together to celebrate the season with a traditional Fall Harvest feast. Dishes included a colorful “Three Sisters Salad” with beans, squash, hominy, and additional vegetables; various types of cooked hominy; candied hominy; wild rice pudding and hominy pudding topped with frosting and squash puree; and baked whitefish coated in ground hominy.

The event, put on in partnership with the Food Science Club and the Intertribal Agriculture Council, was both educational and fun. Under the guidance of guest chefs Dan Cornelius, Elena Terry and Yusuf Bin-Rella, attendees learned more about the traditional food of Native Peoples.

“The Fall Fest was a great opportunity to experience traditional Native American cuisines and food preparation techniques,” explains Food Science Club president Sara Feldman. “I enjoyed learning how the culture utilizes every part of a product from braiding of the corn husks to grinding kernels into meal and candying the corn kernels. I loved helping Chef Elena Terry roast locally grown squash and coat roasted corn kernels in her family’s maple syrup. The warm, sweetened kernels were hard to resist!”

The Fall Harvest Fest was an incredible success. Attendees gained a better understanding and deeper appreciation for Native foods and culture, while immersed in a community-building event. Community members are already looking forward to next year’s fest.

In Memoriam

Bill Wendorff

The faculty and staff of the department of Food Science mourn the loss of William "Bill" Wendorff who passed away on January 2, 2019. Dr. Wendorff served on faculty from 1989 until his retirement in 2008. In addition to his work in research and extension, Bill served as Program Director for the Wisconsin Cheese and Dairy Manufacturing Short Courses.

Bill was born on November 6, 1940 in Shawano and grew up on a dairy farm in the town of Richmond, Shawano County. He was a graduate of Shawano High School with the class of 1957. He continued his education at the University of Wisconsin-Madison where he received his PhD in Food Science in 1969. Bill then became employed with Red Arrow Products in Manitowoc for the next 20 years before joining the faculty at UW Madison.

We remember Bill as a scholar and a kind, gentle person.
Research Spotlight

Professor Jan Peter van Pijkeren: Fructose can trigger viruses in the gut’s microbiome

The human gut is a complex ecosystem dominated by bacteria that help digest food and keep one’s gastrointestinal tract in check. One population that lives in the gut are so-called lysogenic bacteria, which are bacteria that contain dormant viral DNA. When these lysogenic bacteria are exposed to a stressful condition, the viral DNA is activated and produces viruses. Recently, it has been suggested that diet, specifically dietary sugar, can be one of these triggers.

After nearly four years of testing, Jan-Peter van Pijkeren, a University of Wisconsin–Madison professor of food science, and his research team have unraveled a mechanism that explains how fructose—a sugar increasingly common in the diet—triggers the production of viruses in the gut. When the gut symbiont *Lactobacillus reuteri* is exposed to a fructose-enriched diet, it produces acetic acid, which in turn triggers the production of viruses.

“Approximately 50 percent of the viruses that we carry along in our gastrointestinal tract are derived from those lysogens,” explains van Pijkeren, whose research focuses on understanding the mechanisms that underlie bacteria-host interactions. “Up until this point, we had no understanding of what the underlying mechanisms were that contribute to this [activation of viruses].”

The role of bacterial viruses in the gut remains unclear. While the new findings demonstrate that the production of viruses reduces intestinal survival of *L. reuteri*, it is possible that these viruses can still help *L. reuteri* by killing other competing bacteria. Further research defining the ecological role of lysogenic bacteria combined with van Pijkeren’s latest findings could provide new avenues of research to tailor the composition of select organisms in the gut, including probiotics.

*L. reuteri* lives in many vertebrates, including humans. The van Pijkeren laboratory developed several genome-editing tools, which allowed them to develop *L. reuteri* as a model to study its viruses. They found that the normally dormant viruses of *L. reuteri* become activated as they move through the digestive tract, resulting in the production of viral particles.

The next step was to investigate to what extent dietary sugars promoted virus production. The team decided to focus on fructose because of its abundance in the food chain. Since the development of high-fructose corn syrup as a cost-efficient sweetener in the early 1970s, average fructose consumption has increased fourfold.

Mice were fed high-fructose diets along with *L. reuteri*. The research team found that mice that ate fructose experienced a significant increase in the production of *L. reuteri* viruses in the gut when compared to animals fed glucose.

“That was an exciting observation,
but we wanted to know what the mechanism was by which fructose increased virus production. So, we basically searched the DNA sequence of L. reuteri to find genes whose products could be involved in fructose metabolism. These results predicted that L. reuteri can metabolize fructose to subsequently produce acetic acid using a pathway that is conserved among bacteria.”

Focusing on the metabolic pathway, the research team found that consumption of fructose and L. reuteri increased acetic acid production in the gut of mice. When the research team inactivated the pathway responsible for acetic acid production, virus production by L. reuteri was nearly abolished. “These results could mean that acetic acid itself is a trigger for virus production,” explains van Pijkeren.

Acetic acid is a member of a group of chemicals known as short-chain fatty acids, which cells can use for energy. The dominant short-chain fatty acids in the human colon include acetic acid along with propionic and butyric acid. The researchers tested each of these chemicals and found that exposure to each type of fatty acid promotes the production of viruses via the same pathway that L. reuteri uses to produce acetic acid.

“So not only does fructose metabolism promote the production of viruses following acetic acid production by L. reuteri, but it’s also the exposure to short-chain fatty acids that is a trigger,” explains van Pijkeren.

Van Pijkeren’s report paves the way for future studies aiming to understand how the metabolism of a bacterium is linked to virus production, and how this can be influenced by our diet. Important questions remain, including what role these viruses play in the gut. Understanding diet-induced virus production is expected to ultimately allow researchers to tailor the robustness of select organisms, such as probiotics, in the gut and develop better ways to alter gut microbial communities.
Participation in student organizations is among the best ways to get involved and enrich one’s college experience. One of the Department of Food Science’s most notable involvement groups is the Product Development Team. A subdivision of The Food Science Club, the UW-Madison Product Development Team competes in various product development competitions across the country sponsored by well-known organizations such as Pepsi-Co, Mars and the Institute of Food Technologists. These competitions usually consist of a 10-15 minute product pitch, a question and answer panel, and a research poster presentation of scientific details.

During the school year, both upperclassmen and underclassmen with ranges of product development experience prepare for competitions by meeting outside of the classroom. Product development teams from many other universities participate in competitions as part of their course curriculum. However, students at the UW submit their ideas to competitions without the instruction of a specific course or professor.

“We don’t have a product development course here in the department but we learn all the concepts that can be applied to it,” explains Emon Khadeem, Product Development Team co-chair. “Other schools come in with products that they’ve had class time to work on and we do everything completely outside of class.”

Instead, students use collaboration, prior internship experience, and assistance from industry professionals when preparing their proposals.

“Starting this year, we tried to mix people with experience and without experience,” notes Ingrid Zhou, co-chair of the Product Development Team.

“Our goal is to allow the students to immerse themselves in real industry product development and mimic what they would do in the food industry. We take our ideas and try to make them real from a processing standpoint, a safety standpoint, etc.” explains Emon. “It’s a great opportunity to get yourself out there and showcase real talent in undergraduates.”

The UW Product Development Team is surely not lacking in talent. This year, their submission to the American Society of Baking Competition as well as their submission to the National Dairy Council competition have been accepted to the final round. In addition, the Trinipea team has earned the opportunity to present their product idea to the Wisconsin Alumni Research Foundation on March 4.

Emon and Ingrid agree that the experience gained by participating in the competitions is the most rewarding part of being involved in the Product Development Team. “The things I learn in the Product Development club just gradually show up in my classes and it gets me excited. I've actually
Student Spotlight (continued)
done this before and I know what’s going on [in class],” says Ingrid.

“In your classes, you’ll come about concepts that you’ll realize the Product Development Team has prepared you for,” continued Emon. “There’s just so much to say about Product Development and what it does for us all.” It’s evident how much of an impact Emon’s and Ingrid’s experience has had on their personal and professional development. The two are looking forward to competing on behalf of their respective product teams this spring and are hoping for first place. Be sure to follow the Department’s social media accounts for updates on the team’s competition performance.

(Above) Trinipea meringue cookies created by the UW Product Development Team. The team will present their product to the Wisconsin Alumni Research Foundation on March 4 and compete in the IFT Mars Product Development Competition in June.

(Below) Some members of the Trinipea Product Development Team (from left Yesha Shah, Will Northway, and Christie Cheng) working on the Trinipea prototype. Trinipea is a meringue cookie made with water from canned chickpeas known as Aquafaba. Aquafaba is an often discarded functional ingredient rich in protein. When whipped, it creates a foam similar to meringue.

MAKE A GIFT

To mail a donation to support the Department of Food Science, include the fund number (132399840) and the designation “Department of Food Science Fund.” The check should be made payable to the University of Wisconsin Foundation.

Mail
UW Foundation
U.S. Bank Lockbox
P.O. Box 78807
Milwaukee, WI 53278-0807

To make a donation online, supportuw.org/give

Thank you!
The Department of Food Science is the hub of Fermentation Sciences at the University of Wisconsin-Madison. For the past several years, we have been building a comprehensive program of instruction, industry outreach and research. We work in partnership with Wisconsin breweries, wineries and bakeries to design educational experiences that prepare students for careers in fermentation sciences while simultaneously celebrating Wisconsin’s rich and growing industry in fermented food and beverages.

For the past year, we have focused on the instructional component of our fermentations program that includes a formal course on food fermentation, a certificate program, internships and opportunities for independent research. The next phase of program development will include a new faculty hire in fermentation sciences and collaborations in research and instruction with the departments of Genetics, Chemical Engineering and Bacteriology.

**Swarm to Table**

Hear Chef Joseph Yoon’s presentation on edible insects, and then come see the cooking process for yourself!

Presentation: April 25, 2019
Cooking with Insects: April 26, 2019
Visit www.swarmtotable.org
Meet Our Interns

Welcome Amelia and Erin

The Department of Food Science is excited to welcome our Marketing Interns, Amelia Liberatore and Erin Thames. Amelia and Erin are seniors here at UW-Madison, obtaining degrees in Marketing and International Business, as well as Communication Arts and Digital Studies, respectively. They joined the department in October of 2018 to help shepherd our Branding and Marketing program. Working in partnership with our administrative support team, Amelia and Erin have been instrumental in creating a number of communication materials that showcase the success of our department. In fact, this inaugural issue of Impact is one of their products. Other materials include press releases, a new website, flyers for online courses, and an information packet for prospective students. Amelia and Erin have also increased our presence on social media through Twitter, Facebook and Instagram.

Marketing Interns Amelia Liberatore (left) and Erin Thames (right)

Upcoming Events

Swarm to Table Presentation: Chef Joseph Yoon
April 25, 2019

Swarm to Table: Cooking with Insects
April 26, 2019

Food Science Club Wine and Cheese Reception
April 25, 2019

Senior Picnic
May 2, 2019

Graduation Celebration
May 11, 2019