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College of Agriculture and Life Sciences

2017

Food Digest

Department of Food Science and Technology

FST-248

Joe Marcy

Message from the department head

Greetings,

I write this in the quiet time between Christmas and New Year's. I do not know if the Hokies will win their bowl game, but I do know this will be the 24th consecutive bowl appearance for Virginia Tech, the longest active streak in the nation (update: They won!). Go Hokies! I hope you will enjoy reading about the many changes, accomplishments, and success of our students, staff, and faculty.

One of the new buildings on campus is a Classroom Building that opened August 2016. The $42 million, 73,400-square-foot building contains 15 state-of-the-art classrooms and four interdisciplinary teaching laboratories with seats for more than 1,450 students, as well as study rooms and group meeting space. The new learning spaces are designed to support increasingly interactive and technology-driven learning experiences.

The classrooms have features that include moveable furnishings, wall-mounted writing spaces, and multiple screens for projecting shared material and student work. Some rooms were configured as SCALE-UP (Student Centered Active Learning Environment- Upside-down Pedagogy) classrooms, a specific design that facilitates team-based, active learning as an alternative to lectures, even for large classes. You can learn more about SCALE-UP classrooms at: http://www.lib.vt.edu/instruct/classrooms/scaleupclass.html

The finishing touches have been put on the SCALE-UP classroom in the Food Science Building. FST Room 27, which was originally constructed as the dairy pilot plant (approximately 3,000 sq. ft.), has been converted into a classroom for a maximum of 68 and has all the audio visual equipment found in the new Classroom Building. The FST classroom is equipped with a Crestron AirMedia wireless presentation system that allows you to broadcast your laptop or tablet screen to the projectors without any cables. Windows, Mac OS X, iOS and Android are supported. The FST classroom has three 80-inch HD flat-panel screens and a HD projection system that can project an image from a single source or multiple sources simultaneously. The electrically controlled screen is 144-inches wide and 53 inches high when fully extended. Twelve recessed ceiling mounted speakers provide high quality audio. Freshly painted walls along with new carpet and furniture make FST 27 a great space to teach our classes. We may have old walls, but everything else in the FST classroom is high technology and state-of-the-art for teaching.

This renovation has been a team effort. A lot of hands have been involved in making this dream a reality. Many in the FST department worked tirelessly to get the room ready for the renovation and planning the functionality of the classroom. The department enjoys beautiful labs in HABB1 and now a beautiful teaching space in FST 27. Thanks to all for your continued support and encouragement to our department. We hope to see you in the coming year.

Best personal regards,

Joe Marcy

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Deschutes Street PUB

In August, Virginia Tech's brewing team won the competition with the Roanoke Star City Brewer's Guild by brewing the best Black Butte Porter at the Deschutes Street Pub at Elmwood Park.

Students James Dale, Tim Pote, John Seminatore, and Amy Nelson, helped with brewing. Brian Wiersema, Herbert Bruce, Sean O'Keefe, Ann Sandbrook, and Doug Moyer assisted with organization and producing a scientific poster. James Dale provided the starting recipe and John Semintore helped with the second brew. Judges said that Tech's Porter was a bit thinner and needed more malty roasted flavor, but otherwise was amazing and very close to Deschutes' famed Black Butte Porter.

Students and faculty from FST also demonstrated the chemistry behind off-flavors of fermentation with aroma samples that result from poor brewing processes and practices. More than 22,000 people attended the event and nine local non-profit organizations split $81,000 in donations.

Deschutes, a Bend, Oregon based brewer established in 1988, announced in 2016 that they were opening a location in Roanoke. The Street Pub was both Deschutes and Virginia Tech's brewhouse's first big public appearance in the region. The department has established a working relationship with the company to do profile matching and process and flavor testing. A student internship program is also being set up.

Fermentation and pilot plant update

Adjunct professor Herbert Bruce taught the applied brewing and malting class 2016 spring semester. The class is using the professional grade brewing system that can produce 66 gallon batches of beer. The brewhouse equipment was approved for use in research by the Federal Alcohol and Tobacco Tax and Trade Bureau which is the agency that regulates the research facility. Now that licensing is completed, the brewhouse has begun producing student-made batches of beer.

Producing beer is a small portion of the broader goal for the program to strengthen how students and industry professionals learn about fermentation. Last fiscal year, craft brewing had a more than $8 million economic impact on Virginia and generated almost $2.9 billion in tax revenues for the state.

In March 2016, several regional craft brewers came to Blacksburg to tour the facility and begin discussing what the brewhouse could do for them. The brewers included Richmond's Stone Brewing and Devil's Backbone Brewing Company.

Blacksburg brewery Rising Silo owner Greg Zielske said the campus brewhouse will have a heavy influence on the small farm brewery that he operates. Zielske said he hopes to hire an intern who has learned on the machinery. Roanoke based Deschutes Brewery uses almost the same equipment as Virginia Tech. The two collaborated to brew Deschutes beer with Carvins Cove water to see if changes to the recipes need to be made. Part of the reason Deschutes chose their new Roanoke location was because of the developing fermentation option that is being offered to food science majors.

Evaluating hops


Brewing equipment

The fermentation option will expose students to new techniques that will define the industry in the future. Larry Griffin, a senior in the program said, "It's good to know that coming out with this degree, you're going to have a job."

Professional brewers will use the brewhouse to take and teach extension classes. They will also be able to use Virginia Tech's facilities for research projects to experiment with different types of beer without slowing production at their breweries. The department will be adding a distilling class in spring 2017.

Fermentation career fair and cellar social

The annual fermentation internship and career fair was held in October. Industry professionals from eight brewing companies came to HABB1 to meet students and let them know about employment opportunities, summer internships and co-op opportunities. Brewery representatives from Boston to San Diego attended the event. **Joe Marcy** welcomed everyone and gave an overview of the fermentation option. Representatives were given a tour of the pilot plant and the brewing and fermentation equipment. Following the fair, a cellar social was held in the HABB1 pilot plant. The following day, on-campus interviews were held for students interested in working in the breweries.

Mini Dairy coming to HABB1

The Department of Food Science and Israel-based TESSA industries have entered into an agreement to bring the company's Mini Dairy to the HABB1 pilot plant. The Mini Dairy will enable collaborations between the dairy industry and university students and researchers.

Governor Terry McAuliffe announced the agreement between Virginia Tech and TESSA while on a trade and marketing mission to Israel to promote Virginia's many assets and resources.

"This is another example of public-private partnerships that pay dividends for Virginia and grow the New Virginia Economy in innovative ways," he said. "Virginia's dairy industry, which generates almost half a billion dollars in farm sales alone, has a long and distinguished reputation for excellence and quality. The mini-Dairy collaboration between VA Tech and TESSA represents a tremendous avenue for the industry's future."

The equipment will be used primarily to produce artisanal fermented dairy products. Dairy manufacturers will be encouraged to use the equipment to develop new products without taking their own manufacturing lines off line. Value added fermented products like yogurt, milk with probiotics, and cheeses are a growing segment of the U.S. dairy industry, and in Virginia, it brings in approximately $500 million annually.

TESSA will gift the equipment to the university. "Our collaboration with Virginia Tech is a first and promises to be exciting, as we will see new ideas from the university quickly become a reality. I cannot wait to taste the products," said TESSA CEO, Isac Nisenblat.

2016 FFA food science career development

Abbey Coleman

The department hosted the FFA food science career development event on Oct. 6. Five high school teams participated in the contest, completing an assortment of activities including a product development segment. Buffalo Gap came in third, Turner Ashby was second, and the winning team was Central High School. Elizabeth Loving, from Broadway High School was third place individual; Catherine Bulatko from Central was second; and Abby Coleman from Broadway High School was top-placing individual in the contest. The winning team went on to participate in the National contest. At the national level, the team took a Silver Emblem, and Catherine Bulatko and Jessica Myers were Silver Emblem individuals. Elizabeth Loving and Jordan Cooper were named Bronze Emblem individuals.

The National FFA Organization is a national youth organization of 649,355 student members as part of 7,859 local FFA chapters in all 50 states, Puerto Rico and the U.S. Virgin Islands.

Central High FFA Team

New position approved

A new tenure track faculty position in sensory science has been approved by the College of Agriculture and Life Sciences. The position is 30% teaching and 70% research to be recruited at the assistant professor rank. The anticipated start date is August 2017.

Staffing changes

The past year has seen some coming and going in the department.

Aili Wang joined the department as a research associate in August. She will be working with Susan Duncan on activities related to the Water INTERface Integrated Graduate Education Program (Water IGEP). She will also have a role in the department's communications areas and will be updating the FST website and Facebook page and creating materials to promote FST programs.

Vicki Keith, administrative program specialist, left the department in August for a position as program support technician in Virginia Tech's Department of Agricultural, Leadership, and Community Education. **Ann Thornhill** was hired in November to take over Vicki's duties as staff graduate coordinator and administrative assistant. Thornhill is a Virginia Tech graduate with a B.S. in communications, a concentration in public relations, and a minor in marketing.

Tina Fernandez-Plotka left the department in May. She served as a research associate since 2010. In that position, she maintained inventory and ordered supplies for the teaching laboratories and supervised graduate student teaching assistants.

David Hornack joined us in October as our new teaching lab associate. He comes from the University of Pittsburgh, where he was a laboratory instructor. In that position, he taught introductory microbiology lab classes, he supervised and trained students, coordinated supplies and equipment, managed purchasing and inventory, and maintained equipment.

Mike Jahncke, who has served as the director of the Seafood Agricultural Research and Extension Center (AREC) at Hampton, retired at the end of December. Jahncke has been an outstanding leader of the Seafood AREC and has made the unit a success. **Michael Schwarz**, aquaculture Extension specialist at Hampton, took over as director in January. He has a strong research and extension record and brings great strength in his collaborative, multidisciplinary approach to programs.

Kumar Mallikarjunan accepted the position of department head at the University of Minnesota in the Department of Food Science and Nutrition. He held a joint appointment with FST but was primarily affiliated with Biological Systems Engineering.

Chemistry of candy

Food Science Club members visited Roanoke's Science Museum of Western Virginia for their members-only Chemistry of Candy night. Undergraduates, Katy Kelly, Ashley Searing, Meredith Johnson, Andy Ly, Sally Abouzied and Jamie Shaw made cotton candy, caramel, toffee, cinnamon pecan brittle, cookies, and cream truffles for the evening event. The students answered questions about what they were making, ingredients they were using and how the sugar was changed during heating.

American Dairy Science Association annual meeting

The ADSA annual meeting was held in Salt Lake City, Utah, in July. FST participants' posters included:

Duncan, S., H. Potts, and **K.N. Amin**. Comparing fluorescent and light-emitting diode (LED) retail lighting effects on consumer acceptability of fluid milk.

Potts, H., S. Duncan, **M.L. Johnson**, **S.F. O'Keefe**, **J.E. Marcy**, and **K. Mallikarjunan**. Oxygen barrier and light interference packaging properties for controlling light-induced oxidation in milk.

Amin, K., **H.L. Potts**, **S.E. Duncan**, **S.F. O'Keefe**, **J.E. Marcy**. Differences in HDPE packaging performance under light emitting diode (LED) and fluorescent retail storage.

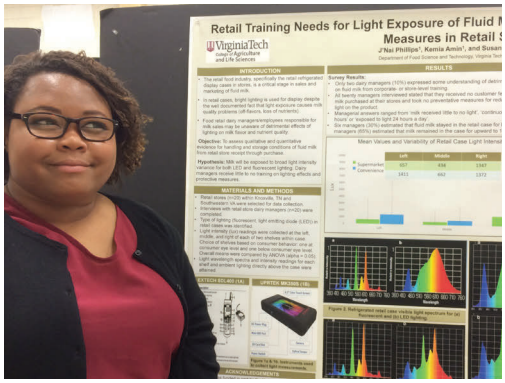
Twitter town hall

Renee Boyer, **Monica Ponder** and **Laura Strawn** led a Town Hall on Twitter in May. They fielded questions from around the country on issues about food safety, probiotics, Extension programs, research, best practices for farmers and consumers, safe barbequing, and more. The event was hosted by the College of Agriculture and Life Sciences, Virginia Cooperative Extension, and Ag is America.

New Virginia Tech hops yard

Horticulture Professor **Holly Scoggins** is leading a grant funded project to see what hop varieties might do well for Virginia growers and the mid-Atlantic region. A hops trial yard off Prices Fork Road has been established where eighteen cultivars are being grown. Insect- and disease-resistance and best cultivations techniques are being evaluated, as well as which types are most productive in this area. Once harvested, **Brian Wiersema** dries the hops in an oast in FST's pilot plant. Some of the hops will be used in the research brewery. Samples are also going to FST enology lab director Ken Hurley for chemical analyses to quantify levels of bittering agents and aroma compounds. The work is funded by the Virginia Agricultural Council and the Virginia Department of Agriculture and Consumer Services. Hops were a major crop in colonial Virginia, but later shifted to other parts of the country. There are 164 craft breweries operating in Virginia, creating a demand for hops from which Virginia growers could profit. It will take at least three years to determine how well each hops variety will do in Virginia's climate.

4th Annual FST Poster Competition



J'Nai Phillips

In April 2016, 44 graduate and undergraduate food science students presented research posters. In the undergraduate division, **J'Nai Phillips** placed first with her poster entitled, "Retail Training on Effects of Light Exposure of Fluid Milk." Meredith Johnson came second with "Electronic Nose Applications to Milk Packaging."

Chris Caver (M.S. 2016) placed first in the graduate competition with his poster, "Recovery of Salmonella from Steam and Ethylene Oxide-Treated Spices Using Supplemented Agar with Overlay." **Naerin Baek** (Ph.D. 2016) and **John di Stefano** (M.S. candidate) tied for second. Their posters were entitled, "Characterization of Hydrophobically Modified TiO2 Polylactic Acid Nanocomposites for Food Packaging Applications," and "Microbial Quality of Leafy Greens and Herbs Purchased from Farmers' Markets in Virginia and North Carolina," respectively.

The judges were **Melissa Chase**, consumer food safety program manager; **George Flick**, FST professor emeritus; **Julie (McIntire) Divis**, FSQA technical services manager at Tyson Foods; **Angela Morgan**, senior scientist at Sealed Air; **Susan Sumner**, associate dean of academic programs; and **Janet Webster**, Fralin Life Science Institute associate director of operations.

Following the competition, the department and food science club hosted the spring celebration and departmental awards ceremony. Students were recognized for another year of achievements and a picnic was held behind the FST building.

8th Annual Blacksburg Brew Do

The Brew Do is a craft beer festival that took place on Oct. 8 at the Virginia Tech Corporate Research Center. The annual festival pours more than 100 of the best brews from local, mid-Atlantic and national microbreweries and craft breweries.

The Homebrew Competition drew 32 entries in four categories: light, amber, dark and specialty. FST's Sean O'Keefe served as one of the four expert judges. The winners in each category had their entries judged a final time to determine "Best of Show." Ryan Mioduski and Evan Frazier won with their golden stout, Duping Delight.

Several FST graduate students volunteered as beer pourers at the event.

Brew Do volunteers

Interaction of iron with proteins and sugars in biological fluids and beverages

The trace element iron can cause metallic flavor and impact human and animal health by interacting with components in biological fluids such as saliva and milk. Researchers investigated the interaction between iron and lactoferrin and their effect on biological fluids. Excess iron in bovine drinking water caused oxidative stress and affected the quality of caseins and whey proteins in the cows' milk. Abomasal iron infusion caused oxidized off-flavor and partial degradation of proteins. Excess iron in whole commercial milk caused lipid oxidation during storage. Ferrous ions in human drinking water caused metallic flavor and changes in composition of salivary proteins and minerals. Lactoferrin supplementation given in daily supplements decreased salivary iron in all participants. Supplementation also decreased total abnormality score in cancer patients, which lasted at least 30 days after treatment ended.

Development of omega-3-fatty acid enriched finishing feed and value added tilapia product

Tilapia have widespread consumer acceptability due to the mild taste, low price and low mercury content. However, farmed tilapia can be detrimental to human health due to high omega-6:3 ratios and low omega-3 content specifically eicosapentaenoic acid, docosapentaenoic acid, and docosahexaenoic acid. Researchers worked to create an omega-3 enriching feed that would increase omega-3 content in tilapia and subsequently decrease the omega-6:3 ratio. During an 8 week feeding trial, tilapia were cultured in a recirculating aquaculture system on one of eight diets (control, commercial, 1, 3, 5% fish oil or 1.75, 5.26, 8.77% ALL-G-Rich {algae}). Water quality, selected fish biometrics and growth performance were recorded. Docosahexaenoic acid increased in concentration in all tissues as percent fish oil and ALL-G-Rich increased in the diets, with 8.77% ALL-G-Rich resulting in significantly greater concentrations in the fillet and mesenteric fat compared to all other diets. The 8.77% ALL-G-Rich diet resulted in greater cumulative accumulation of EPA, DPA and DHA compared to control. Study results suggest that an ALL-G-Rich finishing feed could be produced that would result in a value added farmed tilapia fillet.

Food Science Club update

2016 Officers:

Micah's Backpack

President: **Tommy Saunders**
Vice President: **Jennifer Zornjak**
Secretary: **Megan Delene**
Philanthropy/volunteer chair: **Kendall Fogler**
Fundraising chair: **Amy Moore**
Social chair: **Sally Abouzied**
Industry liasons: **Razieh Farzad** and **Nicole Arnold**
Dining committee: **Chris Howell** and **Mariel Jastrebsky**

The Food Science Club had another busy year filled with activities.

Representatives from the Hershey Company visited in early 2016 to tell the club about internship and career opportunities available with their company. In April, a representative from Andros Foods in Mt. Jackson, Virginia, visited and spoke to the club. Andros specializes in fruit processing, frozen desserts, dairy and confectionary. Supreme Core Cider visited in September; PepsiCo came in October for informational sessions and interviews. Tyson Foods representatives visited in October to recruit for internships and employment positions.

Fundraising activities included a percentage night at Moe's Southwest Grill, where the club earned 20% of the proceeds purchased from Moe's. And in November, there was profit night at Panera Bread where a portion of each customer's purchase was donated to the club.

FSC held a St. Patrick's Day T-shirt sale on campus and donated 50 percent of the profits to Feeding America in Southwest Virginia. The club also visited Feeding America in Salem in October to assist with organizing food donations for distribution. FSC volunteers helped out at Micah's Backpack in September. This organization provides direct assistance with food donations for children from low income families in Blacksburg.

Feeding America;

The first FSC meeting of the fall semester was held on Sept. 7. There was a lot of interest and a fantastic turn out.

Food Science Club hosts IFT area meeting

In April, the Virginia Tech Food Science Club hosted the annual Institute of Food Technologists Student Association Area Meeting for the Central Atlantic Region. Students from N.C. State, the University of Maryland, Penn State, and the University of Delaware attended the town hall style meeting and college bowl competition. Congratulations to N.C. State – the competition winners! Students also participated in networking events, and gave club chapter updates. View the video at https://www.youtube.com/watch?v=GuFZKKBPOu4&feature=youtu.be for a complete recap of the event.

Susan Sumner, Amanda Marx, and Dean Alan Grant

CALS Outstanding Ambassador Award

Amanda Marx, FST senior from Oakton, Virginia, was recognized as the 2016 Outstanding Ambassador for her leadership and service to the College of Agriculture and Life Sciences Ambassador program and to the college. Within her major, she is active in the Food Science Club and FST product development teams. She completed an independent study on HACCP with George Flick.

Marx is a member of the university crew team and was a member of the Corp of Cadets for three years. She emerged as a leader in the college as the current president of CALS Ambassador Program and a member of the College Advising Committee.

Pack expo trip

In November, a group of seven graduate students, led by **Brian Wiersema**, attended Pack Expo International in Chicago. There were more than 1,800 packaging and processing exhibitors and 45,000 attendees. In addition to attending the trade show, the group visited Alltech Brewing and Distilling in Lexington, Kentucky. It is part of the legendary Kentucky Bourbon Trail, and the group enjoyed a tour given by Mark Phipps, who is technical director for the company. Buffalo Trace Distillery was also a stop on the trip. Kevin Nowaczyk, distillery research chemist gave the group a comprehensive tour of company where their signature bourbons are filled, sealed, labeled, and packaged by hand.

Pack Expo Buffalo Trace

Pack Expo group with Mark Phipps

FFA milk quality career development

In June, the department hosted the milk quality career development event that was held during the 90th Virginia State FFA Convention. The team from Sherando High School took first place, Spotswood placed second and Clarke County came in third. **Nicole Masiello** (Sherando) was the top placing individual. The event is a competitive activity that allows students to prove their knowledge about the recognition, selection and management necessary for quality dairy foods. Participants complete a written exam on milk production and marketing, evaluate milk samples for flavor and quality, identify milk fat content, evaluate cheeses and perform mastitis analysis. Sherando went on to the national FFA convention in Indianapolis where they placed 10th in the nation. This earned the team a gold emblem. Team member David Ames was a Gold Emblem individual, while Emily Walker and Nicole Masiello earned Silver Emblems. Cailea McDonald earned a bronze emblem.

International Association for Food Protection participants

The International Association for Food Protection annual meeting was held in St. Louis, Missouri , July 25-28. The department was well represented.

Poster presentations

di Stefano, J., R. Boyer, M. Duong, B. Chapman, M. Ponder, and L. Strawn. **Microbial quality of leafy greens and herbs purchased from farmers' markets in Virginia and North Carolina.**

Pulido, N., V. Dharmarha, M. Ponder, A. Pruden and R. Boyer. **Effect of sanitizers on the survival of antibiotic-resistant bacteria applied to raw carrots through contaminated compost.**

Stark, M., S. Pollard, R. Boyer, J. Boron, J. di Stefano, M. Ponder, and R. C. Williams. **The prevalence of antibiotic-resistant bacteria in fresh produce purchased from farmers' markets and grocery outlets.**

Brown, E., J. di Stefano, M. Duong, L. Yang, R. Boyer, G. Gu, and S. Rideout. **Antimicrobial-resistance of Salmonella enterica environmental isolates from the Eastern Shore of Virginia.**

Caver, C., Williams, R., Ponder M., Eifert J. and J. Newkirk. **Recovery of Salmonella from Steam and Ethylene Oxide-treated Spices Using Supplemented Agar with Overlay.**

Guron, G., Pruden, A. and M. Ponder. **Assessing the Potential for Antibiotic Resistant Bacteria to Carry Over from Soil Amendments to Vegetable Surfaces: A Greenhouse Study.**

Oral presentations

Ponder, M., Newkirk J., Wu, J., Caver C. and R. Williams. **Survival of Salmonella enterica and a Surrogate Microorganism, Enterococcus faecium, on Whole Black Peppercorns and Cumin Seeds Subjected to Ethylene Oxide Fumigation.**

Yang, L., M. Duong, B. Chapman, T. Archibald, R. C. Williams, M. Schroeder, N. Arnold, R. Boyer. **Use of focus groups to assess consumer knowledge and behaviors related to safe handling of mechanically tenderized and enhanced beef products.**

Schroeder, M., Yang, L., J. Eifert, R. Boyer, M. Chase, and S. Nieto-Montenegro. **Evaluation of how difference signs affect poultry processing employees hand washing practices.**

Society of Sensory Professionals annual meeting

In October, **Susan Duncan** and her group of students attended the Society of Sensory Professionals Conference in Atlanta.

Courtney Crist (Ph.D. 2016) presented her poster entitled, "Application of automated facial expression analysis and qualitative analysis to assess emotional and descriptive responses to off-flavors in milk beverages."

Alexandra Walsh presented her poster and gave an oral speed poster presentation: "Integrating implicit and explicit emotional assessment of pleasurable meal experiences."

National Dairy Council new product competition

Food science and technology students formed a team to participate in a National Dairy Council competition to create a dairy product to act as the go-to food or beverage for 15 to 25-year-old consumers who want physical and mental energy. The team developed JAVA CHILL, an instant iced coffee drink that would provide a morning boost when energy lags. Unlike other iced coffees, Java Chill provides 10 grams of protein per eight-ounce serving from whole and reduced fat milk. It is flavored with cocoa and instant espresso powder and lightly sweetened with Stevia for a clean label. Consumers simply take Java Chill from the freezer, add hot coffee and shake until the frozen cubes are completely melted and hands feel the chill.

The team created a proposal that moved them to the top six teams. Their product samples and presentation failed to move them on to the top three, but the team was happy because it was their first year participating in the competition. **Kayla Moberg** (M.S. candidate) was captain, **Hyun Sik Chu** (PhD candidate) was co-captain, and the team was rounded out with undergraduates **Colleen Dommel**, **Haley Huffard** and **Meghan Ruppel**.

2016 International Conference on Recirculating Aquaculture

The 11th International Conference on Recirculating Aquaculture and Aquaculture Innovation Workshop was held August 19-21 at the Hotel Roanoke and Conference Center in partnership with Virginia Tech and The Conservation Fund. Over 250 participants from 20 countries participated from the recirculating aquaculture industry, finance, government, and academia. The conference featured presentations and poster sessions from leading experts in recirculating aquaculture from around the world. More than 80 papers were showcased.

The conference and workshop focused on the technical, biological and economic performance of land-based recirculating aquaculture systems for production of market sized fish. Each program was designed to support the active engagement of researchers, commercial -scale producers, industry suppliers, regulators, the market, environmental organizations and investors interested in the growing opportunity in sustainable aquaculture. In addition to leading experts in recirculating aquaculture, the largest production and manufacturing firms were represented during the conference with presentations and roundtable discussion.

Thirty global companies and organizations participated in the trade show, and 14 sponsored the event. The trade show enabled equipment manufacturers, producers, researchers, regulators, investors, and others to discuss the challenges and breakthroughs in recirculating aquaculture, while connecting emergent companies and technologies to the larger community.

Conference participants had the opportunity to tour the Conservation Fund's Freshwater Institute in Shepherdstown, West Virginia. Participants visited the wet lab where research is conducted on ultra- intensive, large-scale recirculating systems, with a particular focus on the needs of cold- and cool- freshwater species, centered around a fish culture module built on a one-tenth commercial scale, with an annual production capacity of 50 tons of market-sized product.

Awards and honors

John di Stefano (M.S. candidate) was awarded the Southeast Produce Council STARS scholarship. The scholarship is available to outstanding students who are agriculture majors in Southeast based land grant universities.

Diana Woodrum (B.S. 2016) was selected to be a member of the Mu of Virginia chapter of Phi Beta Kappa.

Roxanne Smith, a freshman, was a participant in IFTSA's Food Communicator's Workshop, sponsored by CanolaInfo. Based on her short video and essay entries, judges selected her to join a cohort of ten individuals to learn how to discuss food topics and issues in an effective way to a variety of audiences. The workshop was held in April 2016 at IFT headquarters in Chicago.

Michelle Stark (FST minor, 2016) won second place in the undergraduate poster competition at the International Association for Food Protection annual meeting in St. Louis in July.

Nick Poe, an undergraduate researcher under the guidance of **Monica Ponder**, was awarded a travel grant to present his poster at the Virginia branch meeting of the American Society for Microbiology in November. The poster was entitled, "Assessing Antibiotic Resistance Genes in Manure-Amended Soil for Greenhouse Lettuce Production."

Linda Granata received the Favorite Faculty Award from the Virginia Tech Division of Student Affairs, Housing and Residence Life.

Laura Strawn received the John and Shirley Gerken Professional Development Award from Virginia Tech Foundation.

Renee Boyer, **Stephanie Pollard**, **Thomas Archibald**, **Monica Ponder** and **Steven Rideout** placed second in the Applied Research category of VCE's Showcasing Scholarship Poster Competition.

Bruce Zoecklein received the 2016 Extension Distinction Award from the American Society of Enology and Viticulture.

J'Nai Phillips, FST undergraduate, was recognized for her research with Susan Duncan at the annual Biomedical Research Conference for Minority Students in Tampa, Florida.

Kemia Amin (M.S. 2016) received the department's Extra Mile award.

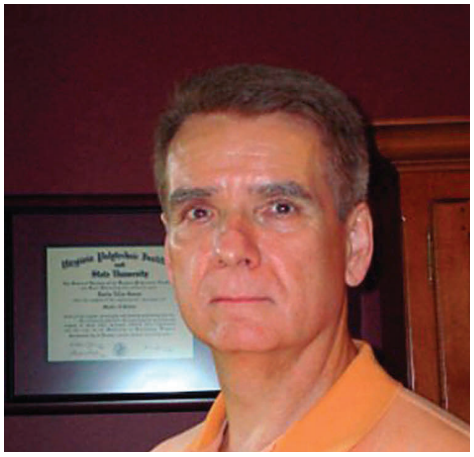
IFTSA & MARS product development competition

FST's product development team went to the finals at IFT in July. Their product, Faux Pho, was a savory, vegetarian, Asian-inspired noodle soup with a twist. The team made an original broth based on several Pho recipes. The non-fried noodles were made from spiralized vegetables (zucchini, squash, and daikon radish) that were dehydrated into small nests. The powdered broth was packaged into a film synthesized from carboxymethyl cellulose and soy protein isolate, that dissolved in water. Team members were Chris Winslow, Chris Howell, Roxanne Smith and Robert Gunter. The team received an honorable mention at the final competition.

IGEP tour

The Water INTERface IGEP (Interdisciplinary Graduate Education Program) toured the HABB1 research facilities to learn how water quality influences food processing. **Dr. Dave Kuhn** (pictured) talked about aquaculture with IGEP faculty and students.

FST's Outstanding Alumni



Les Smoot (M.S. 1977, Ph.D. 1981) received the 2016 FST Outstanding Alumni Award. He is a senior advisor in the Office of Food Safety at FDA/CFSAN. He has led the development of food safety programs and policies for Nestle SA and Nestle USA, assuring compliance with global regulatory agencies for their consumer packaged goods. He developed guidelines for validation of thermal process for hermetically packaged low acid foods. Smoot served on Nestle USA's executive crisis management special situations team for product safety and factory recalls, and he developed policies for allergen management in factories. He also collaborated with Nestle Research Center's head of food safety microbiology to develop and implement the internal program that currently governs all microbiological method approval for Nestle worldwide. He has served as chair of the ILSI Technical Committee on Food Microbiology and Chair of the NFPA Laboratory Research Committee.

Renee (Felice) Dupell (M.S. 2011) received the 2016 Outstanding Recent Alumni Award. She is a food scientist and product steward analyst in convenience packaging at DuPont Teijin Films. She has encouraged and promoted the advantages for collaboration between DTF and the Department of Food Science and Technology, and she has assisted in the development of promotional material for DTF-VT collaboration. She actively encourages individuals and client companies to look to FST for research needs. Dupell connected HillPheonix, a major Virginia retail refrigeration company, with FST. As a result, HillPheonix offered refrigeration equipment for FST research studies. Dupell has also acted as judge for the annual FST poster competition and has attended the departmental awards ceremony.

New laboratory skills course

Beginning this spring semester, FST will be offering a new lab skills course to food science sophomores. The purpose is to teach students basic skills needed to be proficient in research and course work. It is a one credit, three-hour lab that will cover topics that include keeping a lab notebook, titrations, microscopy and gas chromatography. Students will also complete an experiment in food microbiology, food analysis or food chemistry. This course will replace the organic chemistry lab requirement.

FST undergraduate fights hunger

Zach Ewen, of Fincastle, Virginia, received his food science and technology bachelor's degree in December. As a student, his personal mission was to reduce hunger among Americans by volunteering with groups that included the Virginia Tech Campus Kitchen, Wesley Foundation's 209 Manna Ministries, Micah's Backpack and Feeding America.

Ewen has worked to raise awareness of food security issues and provide access to food resources for those in need. He also recognizes the cultural significance of food.

"People come together over food, and memories are made at meals," he said. "When access to food is disrupted, not only does it impact an individual's physical well-being, it has a significant impact on familial, personal, and cultural relationships."

As a student, Ewen participated in several service-based learning trips, including a study-abroad trip to South Africa. The trip focused on how race and apartheid have shaped the culture of the region. Ewen is the recipient of the CALS John and Pat White scholarship, and he is part of the Multicultural Academic Opportunities Program, an academic success community founded upon the principles of self-efficacy, mentoring, and peer support. He was also recognized with an Aspire! Award for embracing Ut Prosim (That I may serve) as a way of life.

Enology Extension program

The Enology Extension Program, directed by Extension Specialist Molly Kelly, has been involved in many activities in the past year. In May, Kelly collaborated with Loudon county food safety extension agents by offering a training session to five agents on winery sanitation. This included a site visit to a local winery to tour and to receive an explanation of best-practices.

In June, the third annual Wine Analysis Workshop was held. Twenty attendees received classroom and laboratory hands-on training in juice and wine analysis. Sensory sessions were included. And in September, Agricultural Workforce Development and Education Training in berry sensory analysis was held. The aim was to train winegrowers in a standardized method to assess berry maturity. The training included both classroom and field evaluation. This training was held in collaboration with Loudon Economic Development and the course was offered in English and Spanish. Twenty-five people attended, including 15 Hispanic winery/vineyard employees in northern VA.

Four pre-harvest workshops were conducted at wineries throughout VA in August. Forty-seven people attended the workshops and learned about nitrogen adjustments, use of enzymes in fermentations, and many other topics. Participants brought wines for sensory analysis and discussions were held about ways to improve quality.

In October, approximately 70 attendees from six states attended the Wine Compliance Seminar presented by the Alcohol and Tobacco Tax and Trade Bureau and Williams Compliance, sponsored by VT Enology Extension. The seminar was held at the Inn at Virginia Tech. Topics included: changes after original qualification, taxes, recordkeeping and reports, labeling, formulation, custom crush, and state compliance laws.

Middle schoolers visit HABB1

Twenty, 8th grade students from Fincastle's Central Academy Middle School in Botetourt County visited the department in November. Students made grape freezer jelly that they compared with a commercial brand during a sensory test. The consensus was that the recipe they used produced a much tastier jelly than the store bought. Andrew Neilson made strawberry ice cream using liquid nitrogen, and Brian Wiersema gave them a tour of the HABB1 pilot plant. There was a discussion about food packaging and bags of cookies were vacuum packaged. At the end of the day, each student was given a jar of the grape jelly that they made and a package of the cookies.

FST student increases food access and safety in the NRV

In 2015, Virginia Tech was one of three schools to win a $5,000 grant to start a chapter of Campus Kitchen. Since then, 328 volunteers and more than 3,500 hours of student-led service have diverted nearly 10 tons of surplus food from Virginia Tech Dining Services. The food is delivered to five local nonprofit partners, increasing their capacity to address food needs in the New River Valley.

Lester Schonberger and Lily Yang

Several food science and technology students volunteer at the Campus Kitchen, but Lester Schonberger has made it the focus of his research. Schonberger is working on a master's degree under Renee Boyer, and he acts as a graduate assistant for the kitchen.

"From a learning perspective, the issue of food insecurity is ideal for interdisciplinary work. It opens a conversation on the variety of reasons why hunger exists and how it might be addressed," said Schonberger.

As the graduate assistant, he is responsible for working with student leaders to coordinate diversion, delivery, and cooking shifts. He is part of the strategic planning process and program development to ensure that student leaders and volunteers have meaningful experiences.

Schonberger's connection to food access and hunger relief work enabled him to identify various questions and topics that could be addressed through university supported research. His project is to identify food safety education needs for food pantries and food access organizations as well as the capacity of various groups to meet those needs, such as through Virginia Cooperative Extension.

"The nutritious dishes delivered to our kitchen by Virginia Tech students are a very necessary component in our meal preparation," said Donna Fern, director of Radford-Fairlawn Daily Bread, a Campus Kitchen partner. "Without the funding to purchase food, we rely on the delivery of diverted food to prepare approximately 100 meals each weekday."

The program has brought students, faculty and staff together to talk about sustainable food practices. Student volunteers coordinate their operations with Dining Services, and faculty members can link course content to the program. The Department of Human Nutrition, Foods and Exercise has connected the nutrition expertise of its faculty and students to the Campus Kitchen and has allowed students to use its Wallace Hall kitchen space to add meal preparation to the food diversion efforts.

Impact of juice clarification processes on chemical composition of hard cider

Cider production has increased over 800% in the past 5 years in North America. Rapid industry growth, coupled with a historic craft approach to cider-making, necessitates increased research on apple chemistry, processing, and fermentation strategies for cider production.

A common problem in cider is the production of sulfur off-aromas by yeast during fermentation. Fermentation of cloudy juice is often associated with sulfur off-aromas in white wine, so pre-fermentation juice clarification is an important and routine step in white winemaking practice. However, cider makers are reluctant to clarify juice pre-fermentation because they believe the process will reduce the concentration of yeast assimilable nitrogen (YAN) and polyphenols which would negatively impact cider quality. In this study, different clarification methods were applied to York apple juice before raw and clarified juices were fermented into cider. Impact of pre-fermentation juice clarification treatments on the juice and finished hard cider was assessed by comparing YAN concentration and amino acid composition in juice, and polyphenol concentration and composition in juice and cider. Different clarification treatments affected the YAN concentration and amino acid composition differently. Polyphenol concentration in juice was decreased and individual polyphenol composition was significantly different after the clarification, but these changes did not persist into the finished cider.

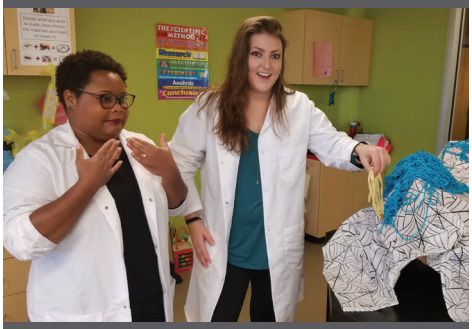
Alumni Updates

Jeff Hamilton (M.S. 2012) and Kerri Martin (M.S. 2012) were married in Christiansburg, Virginia, in fall of 2015. They live in Chicago. Martin was promoted to corporate food safety and quality manager at Tyson Foods in Chicago in December 2015. Hamilton is food safety lead for FONA International, which creates and manufactures sweet and savory flavors for the food and beverage industry.

Georgianna Mann (M.S. FST 2013, Ph.D. HNFE 2016) and Matthew Schroeder (M.S. 2012, Ph.D. 2015) were married at War Memorial Chapel on May 28, 2016. Mann is an assistant professor in the Department of Nutrition and Hospitality Management at Old Miss. Schroeder is head coach of the high school and junior varsity lacrosse teams at Briarcrest Christian School.

Halloween Spooktacular

On Oct. 22, FSC members participated in Science Spooktacular at the Science Museum. Activities included a demonstration of non-Newtonian fluids by making "oobleck" from cornstarch and water. They also made a Halloween Feel Box that included peeled grapes for eyeballs and cold spaghetti noodles for worms.



Spring awards celebration

The Department of Food Science and Technology's annual awards recognition ceremony was held on April 21, 2016.

Departmental and industry awards

Sushrruti Varatharaj	Boyd-Arline Award
Diana Woodrum	FST Achievement Award Outstanding Senior
J'Nai Phillips	Corey & Charlene Berends Scholarship
Deepak Poudel	Paul Large Scholarship
Meg Beatty	R. F. Kelly Award
Nick Poe Jenna Angell Mariel Jastrebsky	Marvin Poster Memorial Scholarship
Kelsey Trimble Cecelia Erwin	Cameron Hackney Memorial Enrichment Award
Laura Jacobs	Virginia Association of Meat Processor's Award
Roxanne Smith	Mid-Atlantic Dairy Food Boosters Award
MacKenzie Knox	Sabra Dipping Company Scholarship
Anna Lee Ware	Tyson Brands Fund for Excellence
Joshua Lee	Cyrus McCormick Scholarship
Courtney Crist	Extra Mile Award

Evaluation of the impacts of water, extraction procedure and origin on extracts and freeze-dried hibiscus anthocyanins and volatiles compositions

Due to increased consumer interest in nutraceutical products, more research is being conducted on many African medicinal plants such as Hibiscus Roselle (*Hibiscus sabdariffa L.*). However, beverages made from hibiscus have a short self-life due to anthocyanin and flavor degradation. This makes it very difficult to ship, transport, and commercialize hibiscus products into global markets. This study investigated the effect of origin, water, and temperature on the anthocyanin contents and aroma compounds of hibiscus instant powder obtained from freeze-dried Hibiscus extracts. Results showed that origin and temperature had a significant effect on the anthocyanin content. Freeze-drying did not affect anthocyanins when cold extract was made. In contrast, results showed a significant difference between the hot extract and its freeze-dried product. For the flavor compounds, the aromas profiles were different while comparing cold and hot extracts to their respective instant powder as well as between the hot cold extract, even though many volatiles such as hexanal, nonanal, furfural, were found in each of them. Globally the results of this study can help in the optimization when processing hibiscus derivatives.

Spring and Fall 2016 Dean's Lists

Sally Abouzied, Junior, Fall

Jenna Angell, Senior, Fall

Megan Beatty, Senior, Spring and Fall

Chad Berl, Senior, Spring and Fall

Alec Bonnoront, Sophomore, Spring and Fall

Leah Caggiano, Freshman, Spring

Kevin Carney, Senior, Spring

Johnathan Cochran, Junior, Spring and Fall

Kaitlyn Collett, Junior, Fall

Allison Cox, Sophomore, Fall

Sayeh Darvish, Freshman, Spring

Patricia Deavers, Junior, Spring and Fall

Hannah Del Guercui, Senior, Fall

Megan Delene, Junior, Fall

Colleen Dommel, Sophomore, Spring and Fall

Jennifer Dorick, Junior, Fall

Khaila Ellis, Junior, Spring and Fall

Cecelia Erwin, Senior, Spring and Fall

Cassandra Feher, Sophomore, Fall

Gina Gasparotto, Junior, Fall

Larry Griffin, Senior, Spring and Fall

Alexa Grobelny, Senior, Fall

Julia Horrocks, Junior, Fall

Alvis Huynh, Senior, Spring

Helen Hylton, Junior, Fall

Laura Jacobs, Senior, Fall

Mariel Jastrebsky, Junior, Spring and Fall

Amanda Johns, Senior, Fall

Jasim Khan, Senior, Fall

Virginia Kelly, Senior, Spring

Jeremy Kim, Junior, Spring and Fall

Elijah Kirkland, Senior, Fall

Mackenzie Knox, Junior, Spring and Fall

Hayley Lawrence, Senior, Spring and Fall

Amanda Marx, Senior, Spring

Jeanette Litschewski, Senior, Fall

Leqi Liu, Junior, Fall

Kelsey McQueen, Junior, Fall

Amy Moore, Junior, Spring and Fall

Sean Munkacsy, Senior, Fall

Robin Nguyen, Senior, Spring and Fall

Lauren Ogren, Senior, Fall

Brianna Ong, Junior, Spring and Fall

Sophia Pinton, Junior, Spring and Fall

Nicholas Poe, Senior, Spring and Fall

Deepak Poudel, Senior, Spring and Fall

Brianna Quaranta, Sophomore, Fall

Alexandra Royer, Freshman, Spring

Meghan Ruppel, Senior, Spring and Fall

Claire Schrunk, Senior, Fall

Amanda Singh, Freshman, Fall

Roxanne Smith, Sophomore, Spring

Jessica Stanford, Junior, Fall

Elizabeth Tiedemann, Senior, Fall

Kelsey Trimble, Senior, Spring and Fall

Caitlin Truong, Junior, Spring and Fall

Sushrruti Varatharaj, Junior, Spring and Fall

Meghan Vyas, Freshman, Spring

Anna Ware, Senior, Spring and Fall

Diana Woodrum, Senior, Spring

Jennifer Zornjak, Senior, Spring

**To be eligible for the Dean's List, students must achieve a GPA of 3.4 or higher.*

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Food Digest

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Home Address: _____

Employer: _____ Job Title: _____

Work Address: _____ E-mail Address: _____

News about Yourself (attach additional pages as needed): _____