COLLEGE OF AGRICULTURE AND LIFE SCIENCES VIRGINIA TECH

2018

Food Digest

Department of Food Science and Technology

FST-280

Joe Marcy

Message from the department head

Greetings,

Last year, I told you about the new classroom (FST 27) on which we were putting the final touches so we could use it beginning in the spring semester of 2017. The classroom, which holds approximately 70 students, has been a great blessing to our department. Those of you who took your food science classes in FST 132 know that the room had limitations, including pump noise from the basement, uncomfortable seats and limited space. However, it was located in the FST building, and convenient. Not having a classroom large enough for our increasing FST enrollment has meant that FST classes were scattered across campus. I really enjoyed having a chance to say hello, and the opportunity to see how our students were doing when they came into the FST building. Now that many of our classes are in the FST building once again, there are opportunities to speak with students informally, which has been great.

In addition to food science classes, classes from many other majors are being taught in FST 27 as well. Many of these students are trying to find the FST building for the first time. As many of you are aware, the Food Science and Technology major is not widely known across campus. It has been very interesting to chat with these students. Most will say they had no idea what was in this red brick building, even though they passed it often on their way to the "cage" and their cars. Now, literally hundreds of non-FST students are finding our building and major. I hope to engage this new audience by improving our messaging and information about FST opportunities. Virginia Tech is in the process of changing "branding" for the university with new logos for both digital and print materials. These changes are coming to our department too, so now is a very good time to update our information and to think about how we want our department to be presented.

We now have an alumni Facebook page open only to FST alumni and FST faculty and staff. We hope you will join us and keep up with your friends from Virginia Tech. In the coming year, we will push out some of the new materials on the FST alumni page. We look forward to hearing from you either during a visit to campus, or online.

Best personal regards,

Joe Marcy

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2017-2018 FST Industry Advisory Board Members

Bob Reinhard (Chair)
Vice President of Food Safety & Quality at Tyson Foods
Downer's Grove, Illinois

Tatiana Lorca
Manager, Food Safety Education & Training at Ecolab in the Food & Beverage Division, St. Paul, Minnesota

Steve Franzyshen
R&D and Market Development Manager at Dupont Teijin Films
Hopewell, Virginia

Keller Watts
Senior Vice President, Business Management at Smithfield Foods
Smithfield, Virginia

Tulin Tuzel
Chief Technology Officer at Sabra Dipping Co LLC
Colonial Heights, Virginia

Moira McGrath
President of OPUS International, Inc., Deerfield Beach, Florida

William (Bill) Aimutis
Global Director of External Innovation at Cargill, Inc.
Minneapolis, Minnesota

Shawn Theriot
Quality Assurance Manager at Deschutes Brewery, Bend, Oregon

Corey Berends
Vice President of Research and Development at ConAgra Foods
Omaha, Nebraska

FST Representatives:
Joseph E. Marcy
FST Professor and Department Head

Susan E. Duncan
Assistant Director of the Virginia Agricultural Experiment Station

Elizabeth Clark
FST Ph.D. Candidate

Our growing department

Molly Kelly, enology Extension specialist, accepted an enology Extension position at Penn State University. Her years of outstanding service to FST and the Virginia wine industry are greatly appreciated. The position is being advertised and will be filled as soon as possible.

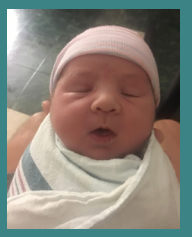
Jacob Lahne came on board as an assistant professor in sensory science. Prior to coming to Virginia Tech, he served as assistant professor in the department of culinary arts and food science at Drexel University.

Tommy Saunders (M.S. 2017) is the new food safety Extension associate for the Richmond area.

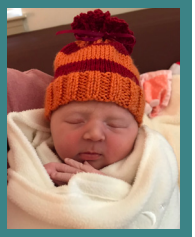
Yun Yin joined us as a research assistant professor. She completed her Ph.D. at the University of Illinois at Urbana-Champlain in 2017. Her specialty is flavor chemistry.

Dan Taylor, research associate in aquaculture research and Extension, accepted an aquaculture research position at Dansk Skaldyrcenter in Nykøbing Mors, Denmark.

And... Our Growing Family!



Thomas Jonathan Jackson Neilson was born on August 29th. He is the first child of Andrew Neilson and his wife, Ashleigh. Neilson also earned tenure and was promoted to associate professor in April.



Renee Boyer and her husband, John, had their second child. Marin Eversole Boyer was born on November 24th.

Spring award recipients

Boyd-Arline Award	Sushrruti Varatharaj
Cameron Hackney Memorial Enrichment Award	Andrea Hagan Mackenzie Knox
Corey & Charlene Berends FST Scholarship	Colleen Dommell
FST Achievement Award - Outstanding Senior	Meghan Ruppel
FST Achievement Award	Pengyu Chen Mariel Jastrebsky Hayley Lawrence Kelsey McQueen
Marvin Poster Memorial Scholarship	Meg Beatty Brianna Ong
Sabra Dipping Company Scholarship	Casey Feher
Tyson Brands Fund for Excellence	Sally Abouzied Robin Nguyen
VA Meat Processor's Award	J'Nai Phillips Roxi Smith

Students learn about global food security in Ecuador


Lester Schonberger making chicha

Lester Schonberger (M.S. candidate) spent two weeks of his summer in Ecuador learning about global food security. Professor Ozzie Abaye from the crop and soil environmental sciences department led the group of students from several CALS departments. Some of the students were taking Agriculture, Global Food Security and Health, a class that is part of the global food security and health minor. The new minor examines some of the most pressing issues that will be facing our planet as the world population swells by two billion people over the next 30 years. The class and minor are part of a push by the college to expand students' opportunities to study overseas and to see things through a global lens.

"This was the trip of a lifetime," said Schonberger, who was using the trip as part of his research. "It is the responsibility of those who went on this trip to act as ambassadors for what they learned, and to act as advocates for food security in Ecuador and beyond. This trip, the connections made, and the knowledge gained, act as the start to create lasting change."

The students visited all four regions of the country. Experiences ranged from city food systems that are similar to ours to open-air markets and subsistence living. They visited local food markets in Quito and ate live grubs (that locals eat as a source of protein) in the amazon rainforest. They visited tiny villages and drank chicha, a beverage made by women who chew cassava root and spit it out to create a fermented drink. At a banana plantation that exports more than 300 million bananas a year, they found that workers are paid $7 per truckload to put stickers on bananas. They can put stickers on a maximum of two truckloads a day. The workers must subsist on that income. In the Andes, the group ate guinea pig with a local who is fighting to hold onto his ancient culture in a rapidly changing world. After hiking on hardened lava flows on the Galapagos, the group learned the challenges of food security vulnerability when living on an island.

The students submitted daily journal entries about their experiences, as well as final reflection papers on their journey, sharing what they learned over the course of two weeks in South America.

"The world is an increasingly complex place and we want our students to experience first-hand how these emerging global issues relate to what they learn in the classroom," said Susan Sumner, associate dean and director of academic programs.

"I want them to know that everything is interconnected in the food chain, from the moment we put the seed in the ground to the moment we eat it," said Abaye. "The students are learning that people around the world have the same needs. We all need food, shelter, and clean water. I want them to understand that we are not that different from one another."

Ecuador is a prime place for the students to learn the complexities of a developing and quickly changing world. Farmers are feeling the impacts of climate change as the rainy seasons get rainier and the dry seasons get drier. Deforestation in the Amazon is changing the way the locals eat and hunt. Technology is creeping into the most remote corners of the country.

The students traveled to a remote town in the amazon accessible only by boat, where a Quechuan medicine man blessed the group in a traditional cleansing ceremony by blowing a cloud of tobacco smoke over them. A few minutes after the ceremony, the medicine man joined his grandson playing a video game on a smart phone.


Students and locals in a Quechuan village

Washington Monthly's 2017 rankings

Since 2005, the Washington Monthly has released an annual College Guide and rankings. This publication rates schools based on what they are doing for the country. They use three broad categories to evaluate their contribution to the public good:

Social mobility - recruiting and graduating low-income students

Research - producing cutting edge scholarship and Ph.D.s

Service - encouraging students to give something back to their country

Overall, Virginia Tech ranked #19 nationally and was #3 in the service category. For the full listing, visit the website: https://washingtonmonthly.com/2017college-guide#.Wam7u0U2CGY.email

Fifth Annual FST poster competition

The departmental poster competition was held in the newly renovated classroom of the Food Science building. There was a wonderful turnout of participants and attendees.

Chris Winslow (M.S. 2017) took first place in the graduate student division with his poster, "Amorphous Solid Dispersion Protects Rifapentine from Release at Gastric Ph."

Tommy Saunders (M.S. 2017) won second place with his poster, "Inactivation of Salmonella and Surrogate Bacteria on Cashews and Macadamia Nuts Exposed to Commercial Propylene Oxide Processing Conditions."

Third place was a 3-way tie:
Hyun Sik Chu (Ph.D. 2017) "Evaluation of Lipid Quality and Fatty Acid Composition of Tilapia, Oreochromis spp., Fillets Available in US Supermarkets."

Kendall Fogler (M.S. 2017) "Bacterial Diversity of Field-Grown Produce in Soil Amended with Manure and Compost from Antibiotic-Treated Cattle."

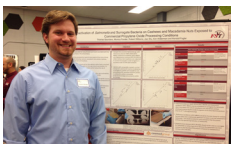
Oscar Galagarza (Ph.D. 2017) "Probiotic Supplementation for Improved Fish Health: Influence of Two Bacillus Strains on Innate Immunity of Nile Tilapia (Oreochromis Niloticus)."

In the undergraduate division, **Leilani Padilla** won first place with "Investigation of Internalization of Salmonella Newport in Tomato Plants through Root Systems Following Transplantation."

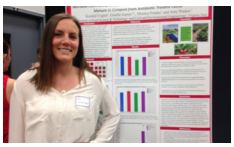
Meg Beatty received second place with "Essential Oil Content and Composition of Virginia-Grown Hops."

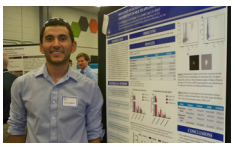
The judges were Holly Scoggins, Virginia Tech professor of horticulture; Merle Pierson, FST professor emeritus; Laurie Bianchi, Radford University professor in the Department of Health and Human Performance; Roger Harris, Virginia Tech professor of horticulture; Ann Stevens, Virginia Tech professor of biology; Dave Gerrard, animal and poultry sciences department head.

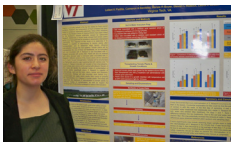

Chris Winslow

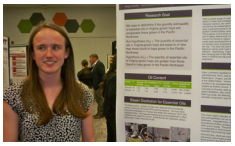

Tommy Saunders


Stephano Chu


Kendall Fogler


Oscar Galagarza


Leilani Padilla


Meg Beatty

Bardsley receives STARS Scholarship

Cameron Bardsley (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. Cameron is co-advised by Laura Strawn and Renee Boyer.

William (Bill) Aimutis

Aimutis named Distinguished Alumnus

William (Bill) Aimutis received the CALS Distinguished Alumni Award for FST. He received his B.S. (1980) and his Ph.D. (1985) in Food Science at Virginia Tech. He has been employed in leading national and multi-national companies where he rose through the ranks using his depth of science and strong business acumen. He currently serves as global director of external innovation at Cargill Inc. where his focus is on advanced chemical characterization, food material science, sensory biology, and in silico modeling. He has developed products for health and wellness through the establishment of cutting-edge research programs.

Aimutis has spent his career in industry, but he never left academia. He has been an adjunct professor of food science at Purdue for many years and has lectured in graduate and undergraduate courses, served as mentor and committee member to numerous graduate students, mentored young faculty, and been instrumental in strategic planning. Aimutis is a research collaborator and co-author on funded proposals and refereed publications. He also has been a member of, and progressive advocate for, IFT for nearly 40 years.

Duncan presents in Sydney, Australia

Susan Duncan

Susan Duncan (co-PI of Water INTERface Integrated Graduate Education Program; associate director of the Virginia Agricultural Experiment Station) traveled to Sydney, Australia to present at the 11th IWA Symposium on Tastes, Odours & Algal Toxins in Water. The title of her presentation was, "Assessment of drinking water quality and user perceptions between filling stations and water fountains on a college campus: a mixed methods approach." The study was performed by her former graduate student, Courtney Crist (Ph.D., 2016). The purpose of the study was to enumerate microbial populations on public water sources and to assess influence of water delivery infrastructure on consumer acceptability.

Focus group participants disliked using water fountains due to unsanitary perceptions and felt filling stations were cleaner, as well as more user-friendly. However, microbiological results indicated that public filling stations may provide cross contamination opportunities that could impact public health and safety.

FFA milk quality and products CDE

Team members evaluate milk samples

The Future Farmers of America Milk Quality and Products Career Development Event was held in HABB1 in June. Six teams of four high school students participated in this state contest. Various activities allowed the students to demonstrate their knowledge of the quality, production, processing, distribution, promotion and marketing of milk and dairy foods. The team from Spotswood High School (Penn Laird, VA) took first place in the contest. Sherando High School (Stephens City, VA) won second place, and Clarke County High School (Berryville, VA) came in third. Carly Carpenter from Spotswood was the high-placing individual at the state level.

The state winning team went on to compete at the national contest in Indianapolis, IN where they received Silver Emblem recognition. Team members Seth Diehl and Bailey Carpenter were Gold Emblem individuals. Emma Seekford and Carly Carpenter received Silver Emblem recognition.

Food Safety Program Launched in Armenia

After nearly two years of intensive preparation work, with support from USAID and the InnovATE/Armenia project, ICARE launched a Food Safety Systems Management (FSSM) Professional Certificate Program in Armenia. The course was held at the Agribusiness Teaching Center in Yerevan. It was conducted by renowned experts from partner U.S. universities, including Virginia Tech's Joe Marcy.

Thirty-one students gave up their break between semesters to take four weeks of classes in Food Safety. The condensed hands-on course included four modules:

- Introduction to FSSM and Food Science
- Sanitation and Food Microbiology
- Better Process Control and Acidified Foods
- HACCP & Food Defense

Marcy's needs assessment in Armenia involved talks with food-processing industry owners, government regulatory staff, farmers, veterinarians, and food-safety experts. The course included hands-on laboratory exercises and field trips to local food processing plants.

The Minister of Agriculture, the US Ambassador, the President of Agrarian University of Armenia and the Armenian head of USAID were present for the graduation and reception at the completion of the class.

Joe Marcy and students

The country has approximately 1,600 food processing companies and is in need of food safety experts and managers. Food safety is an important issue in Armenia because the country wants to expand the export of its food products and strengthen its agriculture sector. The Food Safety Systems Management course will enable ICARE students to introduce international food safety standards into Armenia's food industry. Three well-known Armenian food safety experts co-taught the course with their American colleagues and will take over teaching responsibilities next year.

Students active in IFTSA

FST Hokies brought nothing but pride to our program as they represented the department at IFT's annual meeting in Las Vegas. Master's candidates Jordan Garry and Elizabeth Brown participated in the IFTSA Chapter Leader's Workshop. Elizabeth Clark (Ph.D. candidate) spoke at both the chapter leader's workshop and the first timer's session for students. Jennifer Zornjak (M.S. candidate) was made chair of the IFTSA and MARS Product Development competition.

Elizabeth Clark was inducted as president of the IFTSA Board of Directors and Elizabeth Brown is now member-at-large for the 2017-2018 term. Jordan Garry placed second in IFTSA's Thesis Video competition sponsored by Campden BRI. And of course, the department had two product development teams make it to the finals which were held during the IFT meeting.

These students' involvement offers excellent opportunities to boast about the great things going on in our program.

Jennifer Zornjak; Elizabeth Brown; Elizabeth Clark; Jordan Garry

Blacksburg Beer Festival

The Virginia Tech Alumni Beer Festival was held on the lawn of the Holtzman Alumni Center in June. The FST faculty and staff fermentation team had a booth that displayed a variety of grains and hops that are commonly used for brewing. The team spoke to attendees about FST's undergraduate fermentation program and research opportunities in the department.

FST fermentation team

Fermentation program approved by the MBAA

The Virginia Tech fermentation program in FST has been recognized as approved by the Master Brewers Association of the Americas. Virginia Tech is one of eight academic institutions in the United States and Canada to meet or exceed guidelines established by the MBAA in the first year of its formal recognition process. The recognition status is valid for three years.

"The courses we are teaching net outcomes employees need," said Brian Wiersema, pilot plant manager. "This recognition puts Virginia Tech up there with peer institutions that have been doing this a lot longer. We're really proud and really happy. This is a new program for us. To earn recognition in the first year is a major milestone."

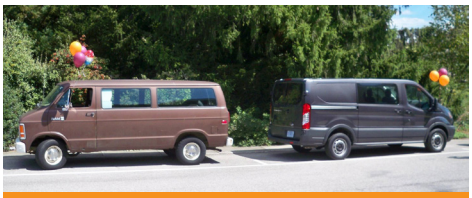
Since the brewhouse opened last year, many local and national brewers have partnered with the department to test their products. The MBAA recognition stems from teaching students how to make beer. It will expose more students to the opportunities at Virginia Tech and will help to expand the program.

"If you are interested in brewing, there are only a handful of places to get that education, and now we're on that list," Wiersema said. "Students from our department are 100 percent placed in jobs by graduation. There's a huge need for food science and brewing science right now."

"Earning Master Brewers recognition is a great opportunity for programs and academic institutions to stand out in a competitive and growing education market," said Master Brewers Higher Education Committee Co-Chair Susan E. Welch. "The badge of recognition is a useful tool for both prospective brewing and fermentation science students and professional brewers to assess programs. Master Brewers want to ensure the future of the brewing industry by establishing the requirements for the most robust and effective training available to students in the world today."

Virginia Tech was one of only six U.S. universities to be approved. The other recognized U.S. institutions were: Appalachian State University, Metropolitan State University of Denver, Oregon State University, Southern Illinois University, University of California at Davis, and the University of South Florida at St. Petersburg.

The Master Brewers Review Board brings practical, scientific and academic excellence to the process of guiding and recognizing new and existing brewing and fermentation science programs at colleges and universities throughout and beyond North America. The Board is comprised of recognized brew masters and leaders in brewing academia.



Department Says Goodbye to the "Tootsie Roll"

After 30 years, the beloved departmental van, affectionately known as the Tootsie Roll, was sent to the auction block. A gathering was held in September to mark its parting and to welcome the new 2017 Ford F150 transit van to the department. We can only hope that the new van, which has no name yet, will last as long as the Tootsie Roll. The old brown van was sold at Virginia Tech's surplus property auction where the highest bidder offered $2,500!

Product Development Team takes first place!

Congratulations on a first place win at the 3rd annual Ocean Spray Cranberries Student Product Development Competition. The team created Cran'n'Crunch - a single-serving snack that combines cranberry salsa with twenty oven-toasted quinoa and brown rice crackers. The product was designed in a snack pack for portability and convenience for the on-the-go "healthy striver." It is low in saturated fat, low in sodium, gluten-free, dairy-free, vegan, qualifies for kosher, and contains no cholesterol.

A product portfolio was submitted that included formula and production details, nutrition profile, food safety and marketing plans, and a short commercial highlighting the product and product prototypes. Prior to submission, the team developed the product and packaging, and conducted sensory and microbiological analyses, and marketing surveys. Ocean Spray executive judges commended the team for their highly marketable and tasty entry, and praised them for their marketing strategy. They received a cash prize and a mounted, hand-crafted wooden cranberry scoop as a trophy. Fifteen schools submitted proposals and three were selected to go to the final round. Penn State and Ohio State were the other two finalists.

Graduate students Elizabeth Brown and John di Stefano were the team captains. Laura Jacobs, Anna Solemani, and Rose Yim were the undergraduate team members. The competition was held in Middleborough, Massachusetts, which is the cranberry capital of the world and Ocean Spray's world headquarters. While there, the team toured the Craisin factory and was impressed with the equipment, cleanliness and automation in the plant.

left to right: Ocean Spray representative, Anne Solemani, Rose Yim, John di Stefano, Elizabeth Brown, Ocean Spray representative

Flick receives CALS Hall of Fame award

George Flick, Jr., University Distinguished Professor Emeritus, was inducted into the Virginia Tech College of Agriculture and Life Sciences Hall of Fame during the annual college alumni awards ceremony. Flick has spent his entire career bringing academia, industry, and government together to advance the seafood industry.

Flick set standards for safety, quality, processing, and packaging for a significant percentage of the world's fishery products. Many of those processes and practices are still the benchmark against which new ideas are judged.

He also brought together faculty from five of Virginia Tech's colleges to form the Commercial Fish and Shellfish Technologies group and carved out Virginia Tech's place in Virginia's Sea Grant Consortium. He made great contributions to the development of sustainable, environmentally-responsible recirculating aquaculture. He is a luminary in multiple professional organizations with prodigious research grantsmanship and a curriculum vitae that runs for miles.

In addition to many awards received at Virginia Tech, Flick has been recognized as a Fellow of the American Association for the Advancement of Science, and a Fellow of the Institute of Food Technologists. He was awarded the Myron Solberg Award from IFT, given to the person who has been instrumental in bringing academia, industry, and government together to solve food industry problems. Service to others is the characteristic that carries through Flick's career. He has been a tireless advocate for the seafood industry and has been instrumental in forming lasting relationships that bring industry and government together to solve problems and create opportunities. George Flick's work has had lasting benefit to the U.S. seafood industry and the state of Virginia.

George Flick, Jr. (Center)

Effect of soil amendments from antibiotic-treated cows on antibiotic-resistant vacteria and genes recovered from the surfaces of lettuce and radishes

Cattle are commonly treated with antibiotics that may be excreted in their urine or feces. Application of manure or composted manure containing antibiotics or antibiotic resistant bacteria as a soil amendment may result in transfer to plants. This study was conducted to determine the effects of antibiotic administration and soil amendment practices on microbial diversity and antibiotic resistance of bacteria recovered from the surfaces of lettuce and radish taproots grown in fields using recommended application rates.

Vegetables were planted in field plots amended with raw manure from antibiotic-treated dairy cows, composted manure from cows with different histories of antibiotic administration, or no amendment. Culture-based analysis, 16s rDNA amplicon sequencing, qPCR and shot-gun metagenomics were utilized to acquire an overarching view of the effect of soil amendment on the vegetable bacterial communities and associated resistance genes. Biological amendments resulted in distinct separation of bacterial communities on both vegetables compared to no amendment. Increases in clindamycin-resistant bacteria, a class of antibiotics administered to cattle, were noted on lettuce grown in manure-amended soil, but were reduced on compost-grown plants.

Additionally, growth in manure was associated with increased abundance of specific ARG copies and resistance genes to additional classes of antibiotics detected on the vegetables. Growth in compost resulted in fewer ARGS on vegetables compared to manure-amended soils. This study demonstrates that raw, antibiotic-exposed manure may alter microbiota and the antibiotic-resistance genes present on vegetable surfaces. Proper composting of soil amendments as recommended in the Produce Safety Rule may offer a strategy to mitigate some types of ARGs.

International symposium on dairy cow nutrition and milk quality

Susan Duncan and Aili Wang attended the 5th International Symposium on Dairy Cow Nutrition and Milk Quality held in Beijing, China. Duncan, previous president of The American Dairy Science Association, presented the opening speech of the conference. Conference attendees had the opportunity to share their experience and research with over 400 dairy scientists.

Inactivation of salmonella and surrogate bacteria on cashews and macadamia nuts exposed to saturated steam and proplyene oxide treatments

Two methods that are used to improve microbiological quality and safety of tree nuts are saturated steam treatments and propylene oxide fumigation. It is not desirable to introduce human pathogens to food processing facilities, so this research was conducted to identify surrogates whose inactivation was comparable to pathogenic bacteria. The objective was to investigate the suitability of Enterococcus faecium, Pediococcus acidilactici, and Staphylococcus carnosus as surrogate bacteria for Salmonella spp. on whole cashews and macadamia nuts, processed with SS or PPO.

Cashews and macadamia nuts were inoculated with a cocktail of Salmonella enterica and one of three potential surrogates. Nuts were dried, packaged, and commercially processed using vacuum assisted steam or PPO fumigation. Salmonella and the potential surrogates were recovered and plated.
Based on mean log reductions of Salmonella and each potential surrogate, P. acidilactici may serve as an adequate surrogate for Salmonella on macadamia nuts and cashews processed using SS. E. faecium and P. acidilactici may function as surrogates for Salmonella on macadamia nuts and cashews processed using PPO. St. carnosus is not a suitable surrogate for Salmonella using either processing intervention.

Long chain n-3 PUFA and oleic acid modification strategies to enhance fillet quality in tilapia, oreochromis species

Tilapia are freshwater fish that are important in aquaculture as a global source of seafood. However, tilapia may be considered nutritionally undesirable because of their high n-6 to n-3 fatty acid ratios. A market study was conducted to determine fatty acid compositions in tilapia fillets in different U.S. markets.

Research was then carried out to enhance the nutritional value of tilapia by improving the n-3 and oleic acid contents in fish fillets without compromising fish growth or feed conversion ratios. Eleven diets were formulated with combinations of high and low n-6, n-3, and oleic acid levels using soybean oil, fish oil, algae oil, and high-oleic sunflower oil. A commercial diet was also included. A Recirculating Aquaculture System (RAS) was used to grow the fish for eight weeks. The fatty acid compositions of the tilapia fillets were determined, and samples were vacuum packed and stored frozen to test oxidative degradation and fatty acid compositional changes.

The market survey data showed that U.S. samples had ideal n-6:n-3 ratios while samples from Southeast Asia had higher n-6:n-3 fatty acids ratios. Algae oil incorporation increased DHA levels, and fish oil incorporation increased both EPA and DPA in fillets. High-oleic sunflower oil-based diets improved oleic acid levels and reduced linoleic acid compared to the soybean oil-based diets. Sensory evaluation found that lipid source did not impact overall fillet quality. There was no observable oxidation during long-term frozen storage. It is possible to improve tilapia's nutritional quality through diet to provide consumers with value-added products that maintain quality during frozen storage.

Tapping into Extension Series: Beakers and Brews

Parkway Brewing Company in Salem, Virginia teamed up with Virginia Cooperative Extension to launch a series of monthly seminars that investigated the science behind beer, wine and cider.

Sean O'Keefe, FST professor, was the first speaker in the series. He spoke about the role our senses play in experiencing complex flavors and how brewers measure that flavor for the best experience possible.

Brian Wiersema, FST pilot plant manager, reviewed the malting process and technology, and gave an update on the current regional status of barley varietal breeding, farming, and malting for brewers and distillers.

Amanda Stewart discusses the U.S. wine and cider industry

Holly Scoggins, Virginia Tech associate professor of horticulture, spoke about the challenges of growing hops in our region.

Herbert Bruce, FST adjunct faculty, presented common brewing errors and what is seen, smelled, tasted or measured as a result.

Amanda Stewart, FST assistant professor, spoke about the U.S. wine and cider industry.

Virginia Tech chapter of Phi Tau Sigma

Virginia Tech has reactivated its Phi Tau Sigma Chapter and was featured in the honor society's newsletter. Phi Tau Sigma is the international honor society for food science and technology.

FST Ph.D. candidate Nicole Arnold was a member at NC State. She worked with faculty and food science club officers to obtain approval for reactivation. As a result, seven graduate students, one undergraduate and three faculty members were initiated.

Renee Boyer and her lab group were highlighted in the newsletter last fall. The article outlined Dr. Boyer's background as an Associate Professor and Extension Specialist and her past and current research interests.

For the complete article, go to: http://164.107.52.52/pdf/newsletters/Phi%20Tau%20Sigma%20Newsletter%202017%2012%20December.pdf

Chase is Virginia Cooperative Extension State Program Leader

Melissa Chase (Consumer Food Safety Program Manager; State Coordinator, Master Food Volunteer Program) accepted a three-year appointment as state program leader for Virginia Cooperative Extension. In this newly formed position, she will collaborate with a team of six other state program leaders and with the associate directors and program team leaders to support faculty in facilitating the VCE program teams. There are currently eleven VCE program teams. The state program leaders will also facilitate cross-team communication and collaboration fostering integration. They will assist in the identification of programming needs and trends, provide internal and external communication, and build partnerships and collaborations with other institutions, associations, and agencies to strengthen VCE programming efforts.

Product development teams reach the final round

The department was represented at the 27th annual **MARS-IFTSA Product Development Competition** held in Las Vegas at the IFT annual meeting. Undergraduates Chris Howell and Roxi Smith led the team, with members Megan Delene, Megha Vyas, Elizabeth Brown and Sally Abouzied. Six teams were selected to progress to the finals based on written proposals that they submitted. Virginia Tech's team submitted ViaLift, a pre-workout chew with a strawberry and date base that incorporates the benefits of CocoaVia® and matcha with a dark chocolate drizzle on top. ViaLift appeals to health-minded consumers looking for a quick, healthy pre-workout product that can power them through a workout while supplying maximum flavor.

The team received an honorable mention at IFT. Cornell won the competition with Jack'd Jerky, a vegan jerky with the fresh flavor of a summer garden.

Another food science team was one of five chosen to present at the **Disney-IFTSA Nutritious Food for Kids Product Development Contest**. The contest was held in Las Vegas as part of the IFT annual meeting.

MARS team members left to right: Megha Vyas, Sally Abouzied, Chris Howell, Roxi Smith, Megan Delene; **Disney team members** left to right: Jennifer Dorick, Jennifer Zornjak, Sophie Pinton, Kendall Fogler, Dajun Yu;

Their product was Kion's Pride PAWps, a frozen, ready-to-eat, after-school snack that represented Kion from the animated TV series, The Lion Guard. The product, shaped like a lion's paw, contained a tropical fruit filling finished with a protein-packed Greek yogurt.

The team's captain was Jennifer Zornjak. Team members were Kendall Fogler, Dajun Yu, Jennifer Dorick and Sophie Pinton. The team received an honorable mention for its efforts. Penn State won the contest with Snow White's Apple Delights, an apple wafer and fruit leather sandwich.

Women in Agriculture and Life Sciences Panel Discussion

The CALS Alumni Organization and the CALS Diversity Council partnered to host a panel discussion on women in agriculture and the life sciences. Six outstanding recent alumni, who were recognized at the annual alumni awards program later that afternoon, were featured. Alumni, faculty, staff, and students from across the college heard the experiences of these women on topics ranging from their experiences with controversy and the consumer mindset around agriculture and food, to advice for students entering the industry.

Panelists in the photo with Dean Alan Grant from left to right:
Bridgett McIntosh (2003, 2006), equine Extension specialist at Virginia Tech
Julie McIntire Divis (2013), quality manager at PRE-Brands in Chicago, IL
Gabriela Lopez (2010), senior microbiologist at 3M Food Safety in Minnesota
Katie Olson (2008), global director of dairy product development at ABS Global in Wisconsin
Laura Siegle (2012), associate Extension agent, Virginia Cooperative Extension
Carmen Byer Shanks (2011), assistant professor at Montana State University

Dean Grant and panelists

FSMA preventative controls for human food workshops for food processors

A mandate of FDA's Food Safety Modernization Act requires many food processors to have a food safety plan in place that includes an analysis of hazards and risk-based preventative controls to minimize or prevent the identified hazards.

Robert Williams, Laura Strawn, Joell Eifert and Abigail Villalba conducted workshops in three states (Virginia, West Virginia and Pennsylvania), representing over 100 training hours. More than 45 regulatory agents from the Virginia Department of Agricultural and Consumer Services and the West Virginia Department of Agricultural and Consumer Services were trained. In addition, over 90 food industry partners were educated - many free of charge due to a generous grant through Virginia Department of Agriculture and Consumer Services. At least three other workshops will be held in Virginia during the first half of 2018 to ensure that the commonwealth's food industry is well prepared for the new regulatory requirements.

Workshop attendees

FSMA produce safety rule workshops for growers

A second mandate of FSMA is the Produce Safety Rule, which seeks to establish science-based minimum standards for safe growing, harvesting, packing and holding of produce on farms. The classes take a "risk based" approach that looks at "high risk" practices that occur on farms.

Since November 2016, eleven Produce Safety Alliance Grower Training classes have been held in Virginia and over 300 growers and packers have attended. One train-the-trainer PSA class was conducted for produce safety educators and others who work with fruit and vegetable growers. As a result, more than 20 Virginia Tech and Virginia Cooperative Extension personnel are now trained. Robert Williams, Renee Boyer, Laura Strawn and Joell Eifert spearheaded these training efforts.

State and National FFA Food Science Career Development events

The State FFA Food Science CDE was held in October. Four teams participated in a variety of exercises, including written and problem-solving exams and sensory evaluation. Individuals responded to five general consumer inquiry scenarios, and in another activity, they were given a data set and were asked to determine if specification requirements were in compliance for a jerky product. There was a food safety activity where each team worked together to evaluate a situation and complete a sanitation report, and a product development exercise where each team developed an exclusive shelf-stable dessert targeting high-end consumers.

The team from Broadway High School won the contest with Turner Ashby's team from Bridgewater, Virginia following a close second. Broadway High School went on to compete at the 90th National FFA Convention and Expo in Indianapolis, IN. The national contest followed the same general format as the state contest. Overall, the team received a Bronze Award. Team members Sean Ewell and Elizabeth Loving were silver individuals, and team members Shelby Killeen and Allison Mongold were bronze individuals.

Food Science CDE winning team

Graduate student spends month in Hawaii

Hassan Masri

Hassan Masri (Ph.D. candidate) spent a month in the Kona coffee belt which is located on the Big Island of Hawaii. The island is two miles wide and 26 miles in length, and it has more than 700 farms that range in elevation from 500 to 3,000 feet. Kona coffee is internationally known and commands some of the highest coffee prices in the world. Most of the farms are less than five acres in size and are operated by individual families. The Kona Typica variety is grown almost exclusively here.

The primary objective of Hassan's visit was to collect data on coffee drying rates for his doctoral research. Even though producers can consistently dry their coffee to 9-12 percent final moisture, the drying rate and drying time for batches of coffee beans can vary greatly. Controlled and consistent drying procedures for green coffee may improve coffee quality and safety. The drying rate of beans that were sun-dried and/or mechanically dried for different lengths of time was evaluated. Hassan measured the moisture content, water activity, and relative humidity on a daily basis of coffee beans from several farms. He chose farms that used a variety of drying practices, and where drying may occur at different elevations and for different lengths of time. Reducing the water activity to below 0.75, especially in the first week of drying, is important to improve coffee quality and safety.

Coffee-drying facility

Lopez-Velasco receives Outstanding Recent Graduate Alumna Award

Gabriela Lopez-Velasco

Gabriela Lopez-Velasco (Ph.D. 2010) received FST's Outstanding Recent Graduate Alumna Award. After completing her doctorate in Food Science at Virginia Tech, she pursued a postdoctoral research program in produce food safety at the University of California, Davis. She is currently a senior microbiologist at the 3M Corporation in the food safety research and development department, Global Technical Service Group. In this capacity, she coordinates evaluations of innovative products in food safety testing within food processing plants and in field applications. She serves as an advocate for researchers and assists in the development of food safety testing methods that will accelerate the time needed before a public health threat is identified.

Lopez-Velasco has been involved in extension education activities to improve the safety of fresh produce since 2010. She is a trainer for leading food safety programs: ServSafe for restaurant workers, and Good Agricultural Practices in the fresh produce industry. She has also continued to serve as a resource for undergraduate and graduate researchers in the department.

Sensory Laboratory helps researchers read emotions

The sensory lab in HABB1 was covered in a feature article in the Roanoke Times in September. The article described the state-of-the-art facility and the laboratory's facial recognition software. It also outlined the types of studies that are currently being conducted in the lab, and the potential impact of findings on the local food and beverage industry. The complete article can be viewed at the following link: *http://www.roanoke.com/business/news/blacksburg/virginia-tech-food-sensory-lab-helps-researchers-read-emotions/article_a0915c11-e69a-572d-9fba-6feeb8792c6c.html*

Impact of cocoa (Theobroma cacao L.) fermentation on composition and concentration of polyphenols: development of fermentation model system and utilization of yeast starter cultures

Consumption of cocoa and dark chocolate products has been associated with positive health outcomes, including reduced onset of cardiovascular disease, inflammation, diabetes, obesity, and platelet disorder. Cocoa polyphenols, putatively responsible for these beneficial activities, are highly impacted by cocoa variety, agronomic and processing history. However, the difference in polyphenol concentration and composition between cocoa products originating from different hybrid clones (selected for high yield), or from different fermentation conditions is not fully understood.

Detailed polyphenol characterization, including determination of total polyphenol and total procyanidin concentrations, and qualitative and quantitative analysis of degree of polymerization was conducted. Significant differences in total polyphenol and procyanidin concentrations were observed between the five genetic clones. To facilitate cocoa fermentation research in laboratories distant from cocoa harvesting sites, a laboratory-scale cocoa fermentation model system was developed. This model system used dried, unfermented cocoa beans and simulated pulp medium as the starting material. The model system was effective in that it supported growth of the essential succession of cocoa fermenting microorganisms and generated similar chemical changes to those observed in on-farm cocoa fermentation.

Using this model system, the impact of inoculation with proprietary yeast strains Saccharomyces cerevisiae Lev F and Saccharomyces cerevisiae Lev B on cocoa polyphenol concentration and composition was evaluated. Inoculation with both yeast strains resulted in increased fermentation rate and Lev B inoculation resulted in higher total polyphenol and procyandin content at the end of fermentation. This work addressed the influence of cocoa variety selection and fermentation process conditions on the composition and concentration of polyphenols. These findings will contribute to continued efforts to develop cocoa products with optimized bioactivity and maximum disease preventative effects.

Divis Named Outstanding Recent Undergraduate Alumna

Julie McIntire Divis (B.S., 2013) of Chicago, Illinois, was named FST's Outstanding Recent Undergraduate Alumna.

Divis worked with Hillshire Brands (now Tyson Foods) until August 2016. She moved on to a position in a small startup company called PRE-Brands that afforded her more oversight and responsibility. Divis now has company-wide responsibility for safety, quality and regulatory compliance.

During her time at Tyson Foods, Divis brought new funding into the department to support research by creating opportunities for collaboration on product testing and process validation. She also led a campus recruiting

Julie McIntire Divis (Center)

program at Virginia Tech. Every year, undergraduate and graduate students have completed summer internships with Tyson. Due to these connections, Tyson currently employs many of our students.

Divis went on to receive Outstanding Recent Undergraduate Alumna recognition at the college's annual alumni ceremony.

Annual Apple Picking Foray

A big group went on the apple picking trip to Kentland Farms last fall. The apples were used in the food processing class for the pressing, filtration and cider laboratories. The participants had a great time while they picked crates upon crates of golden delicious and rome apples.

Food Science Club update

2017-2018 Virginia Tech FSC officers

President: **Jordan Garry**

Vice President: **Megan Delene**

Secretary: **Elizabeth Brown**

Treasurer: **Laura Griffin**

Industry Liaison: **Jennifer Zornjak**

Fundraising: **Anna Solemani**

Social: **Kelsey Trimble**

Volunteer: **Sophie Pinton**

Members of the Food Science Club showcased the club's activities at GobblerFest as well as at a new event for CALS students called "Hokie Hello."

Meetings have been designed to incorporate new and exciting things to interest new and prospective members. The first meeting of the semester was a welcome back cookout. A second meeting paired the club with the Food Science Honor Society, Phi Tau Sigma. This meeting introduced professional development to our members through a resume building workshop given by Virginia Tech's Career Services. Another get-together featured a graduate student panel that provided undergraduates with the opportunity to ask any questions they had for our FST graduate students. Questions were fielded about applications, what it is like to be a graduate student, and individual research. The graduate student panel ranged from first year Masters' candidates to final year Ph.D. candidates.

Club members enjoyed a fall social event at Sinkland Farms in Riner, VA where they picked pumpkins and petted farm animals. They also competed in the first ever Hay Bale Decorating Contest promoting agricultural literacy. Their hay bale was decorated as the Cookie Monster with this message: "Americans eat 7 billion cookies annually. Cookies puff up when baking soda is heated and releases carbon dioxide."

Volunteer events included helping out at the Blacksburg BrewDo (a craft beer festival). Club members took shifts pouring beer and acted as general event staff, stamping hands, checking IDs and selling tickets. Members spent an evening at Micah's Backpack, packing backpacks with food for the children of low-income Blacksburg families.

The club also had several industry visits and presentations from representatives from Waffle House, Cargill, Hershey, PepsiCo, Smithfield and Tyson.

Decorating the hay bale; Gobblerfest display; pumpkin picking at Sinkland Farms; fall welcome back picnic

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Food Digest

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