

College of Agriculture and Life Sciences

CALS

magazine

2020



COLLEGE OF
AGRICULTURE AND
LIFE SCIENCES
VIRGINIA TECH.

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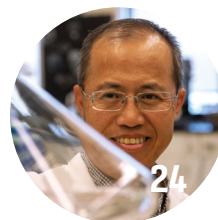
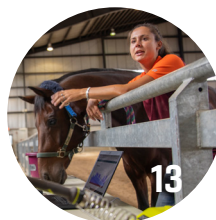
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PHOTOGRAPHERS Zeke Barlow '18, Jillian Broadwell '19, Erica Corder, Sam Dean, Christina Franusich, Jeff Greenough, Tim Skiles, Erin Williams, Ashley Yanego '20 | **CONTRIBUTING WRITERS** Jillian Broadwell '19, Suzanne Irby, Kristin Rose, Travis Williams, Ashley Yanego '20, | **ASSISTANT DEAN OF ADVANCEMENT** Vernon Meacham '83, '87 | **DIRECTOR OF COMMUNICATIONS AND MARKETING** Zeke Barlow '18 | **DIRECTOR OF ALUMNI RELATIONS** Jamie Lucero | CALS Magazine is published by the Office of Communications and Marketing, Office of Advancement, in the College of Agriculture and Life Sciences at Virginia Tech.



from the dean

What an exciting time to be a Hokie. We have much to be grateful for and much to look forward to.

Your support and involvement make an impact by:

- Providing study abroad, internship, research, and scholarship opportunities for our students.
- Empowering our scientists to make bold new discoveries.
- Enabling our faculty to disseminate knowledge to citizens across the commonwealth and around the globe.

As we embark on a new year, I believe the best is yet to come. A new strategic plan, coming in the spring, will guide our vision for a bold new future – a future that envisions thriving communities throughout the commonwealth. The SmartFarm Innovation Network is bringing together the very best information, research, and resources we have to offer, providing systematic, streamlined, and practical solutions to many pressing problems. Boundless Impact: The Campaign for Virginia Tech, which launched last fall, will ensure our ability to continue educating the next generation of leaders, attracting and retaining exceptional faculty, and providing world-class facilities. Inside the pages of our second annual CALS Magazine, I invite you to read about each of these initiatives.

Thank you for your thoughtful support.



AROUND THE AG QUAD

PRESIDENT SANDS ANNOUNCES GAP REPORT

The Global Agricultural Productivity Report, an annual accounting of agricultural productivity, explores opportunities for producers around the world and calls for an increase in yield to meet the needs of growing global populations. Virginia Tech President Tim Sands announced the 2019 report at the World Food Prize event, which offered students new global learning and engagement opportunities.



MIKE ELLERBROCK EARNS DIVERSITY AND INCLUSION AWARD

Mike Ellerbrock was this year's faculty recipient of the CALS Diversity and Inclusion Service Award. The agricultural and applied economics professor's role in supporting diversity and inclusion occurs daily in the classroom, with his colleagues, from the pulpit, and on government-backed councils. He is a diligent advocate of environmental justice, giving voice to marginalized groups at both state and national levels.



SOIL JUDGING TEAM EARNS SECOND PLACE

The Virginia Tech Soil Judging Team took second place among 26 teams at the National Collegiate Soil Judging Championship in California last April. This was the second consecutive year in which the team has earned second place.



PRESIDENTIAL TURKEYS RETURN TO ROOST AT VIRGINIA TECH

For the fourth consecutive year, the Presidential Turkeys traveled from the White House to Gobblers Rest, where they will spend the rest of their days. The two birds – Bread and Butter – joined Peas and Carrots, last year's lucky turkeys. Poultry makes up the largest sector of Virginia's agricultural portfolio, with more \$1.1 billion in annual cash receipts.



NEW AGRICULTURAL, LEADERSHIP, AND COMMUNITY EDUCATION DEPARTMENT HEAD NAMED

Tracy Rutherford was named head of the Department of Agricultural, Leadership, and Community Education in July. In her previous position at Texas A&M, she led highly productive undergraduate and graduate programs composed of more than 1,100 students. She has won numerous awards, including a VIP citation from the National FFA Association, and was named a North American Colleges and Teachers of Agriculture Teaching Scholar in 2018.



EXTENSION AGENTS VENTURE TO SENEGAL TO MEET WITH 4-H'ERS

Southwest Virginia Extension agents Kim Butterfield and Susan Prillaman visited Senegal to learn about its food and farming, and share insights from their work. The duo met with 4-H youth of all ages, engaging the youngest students in hands-on food science activities to demonstrate concepts such as the chemistry behind rising bread and how emulsifiers work.



STUDENTS CONDUCT INTERNATIONAL DEVELOPMENT WORK IN ECUADOR

Seven students traveled with professors in the Department of Agricultural and Applied Economics to participate in a six-week, USDA-funded project examining sustainable farming practices in Ecuador. After preparing for the trip during a course last spring, the students applied their analytical, survey, and coding skills by surveying local farmers to learn about regional agricultural practices.



SAVE THE DATE

100th Virginia 4-H Congress
June 22 - 25, 2020



Watch videos from the Ag Quad stories at



cals.vt.edu/magazine

+ + + +

+ SEIZE THE DAY!

+ +

See what our students are up to in their free time
and how they are preparing for the workforce

By Ashley Yanego

GABI MARTINEZ

Biological Systems Engineering (2020)

Research, Lab, and New Eyes

"I worked in a lab that focused on cataracts research. Beforehand, I never thought that the phrase 'Have the eyes come in yet?' could be real. More importantly though, I learned so much about the ocular lens and how it can be impacted. I can't wait to see how the field of lens biomechanics expands and what new cataracts therapies will be discovered because of the research being done there!"

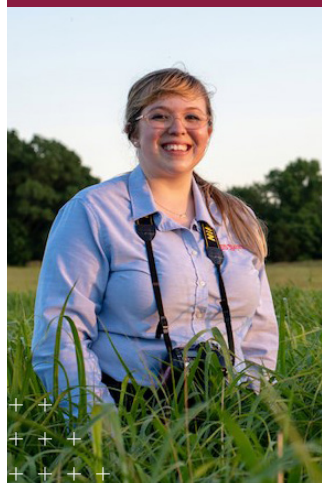


SARAH THOMAS

Dairy Science (2020)

Dairy, Writing, and A Dream

"I had the opportunity to serve as an editorial intern for Hoard's Dairyman, the national dairy farm magazine. The publication began in 1885 and aims to provide new, innovative ideas for today's dairy producers and professionals. My duties included sorting through recent dairy-related research, focusing on the youth portion of the magazine, writing articles on farms, and compiling information relating to the nation's dairy cooperatives and four-year colleges."



i am VTCALS

NATHAN MCDONALD

Agricultural and Applied Economics (2021)



Leadership, Camp, and Service

"I spent a week working with about 30 high schoolers in my small group, and 103 students total, at the 2019 Virginia FFA Association State Leadership Camp. We spent our time diving deeper into various leadership concepts, as well as doing community service projects around the area."

CARTER ROBERTS

Agricultural Technology (2020)



Fields, Tobacco, and Research

"My internship at the Southern Piedmont Agricultural Research and Extension Center was an extremely valuable experience, and I am thankful to have been given the opportunity. We would receive soil samples or plant tissue from farmers, along with a brief description of symptoms of the disease they believed were present. We then would perform an assay on the sample and provide them with information on the disease and ways to prevent it. We also performed trials onsite for herbicide and fungicide applications. I enjoyed learning from the SPAREC staff. It is a great feeling to know that the work you do is helping farmers in the community and across the state to be successful."

Read more about what our students do outside the classroom on the CALS Facebook page using [#SummerVibes](#)



MATT HEINRICH

Animal and Poultry Sciences (2020)



Sea Turtles, Rehabilitation, and Hands-On Help

"My internship and research project gave me hands-on rehabilitation experience with some of the most interesting endangered reptiles out there. Working with sea turtles helped me use my education in animal and poultry sciences, both in terms of animal husbandry and scientific inquiry."

“How can we work together to create an environment that is attractive outside of the academic context?”



Scott attended North Carolina Agricultural and Technical State University, earning a B.S. in agricultural education in 2015. She worked as a financial analyst with the U.S. Forest Service for four years in Albuquerque, New Mexico.

GRADUATE STUDENT PROFILE

Jasmine Scott '20

- M.S., Agricultural Leadership

Jasmine Scott is going places. The 26-year-old Madison, North Carolina, native was recently elected graduate student vice president to the National Society of Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS), and it's easy to see why. Effervescent and affable, impassioned and resolute, her desire to make an impact makes her an effective advocate for students and an ideal spokesperson for minorities. Scott is poised to become a change-agent for a more dynamic, diverse, and inclusive model for agricultural systems, practices, and policies that serve all.

TELL US A LITTLE ABOUT YOURSELF AND YOUR FAMILY.

I'm from a small town near Greensboro, North Carolina. I'm an only child, and I was raised on my family's 100-acre tobacco farm in an isolated area. The environment was not made for African Americans to succeed, and there were racial undertones. As a kid, I remember passing KKK signs on my school bus. I used to beg my mom to let me to live in the city so I could be around more people who looked like me and were ambitious.

My mom has always understood that education would be my ticket to success. When she asked me if I wanted to go to college, she said she wouldn't pay for it. She empowered me to manifest a scholarship or anything I wanted, and this helped me establish a clear goal. In addition to my undergraduate USDA 1890 National Scholars Program scholarship, I also earned a George Washington Carver fellowship. Now, I am so grateful that my mom allowed me to experience what I did. I learned so much.

WHAT'S THE MOST IMPORTANT LESSON YOUR FAMILY GAVE YOU?

Not to be ashamed of my faith. Faith has always been a framework for me, and I try to consider the spiritual concept and merge it with what I'm experiencing in the physical.

My grandmother was a good woman with a deep religious connection. She had a Bat-phone to God. The way she interacted with her friends, parishioners, and the larger community was inspiring. Both of my grandparents had very little education, yet

their experience gave them the framework to be successful. Now that I am also in the agricultural field, I wish I had learned from them. I missed that generational transfer of knowledge.

CAN YOU SHARE A LITTLE ABOUT SOME OF YOUR INTERESTS?

Agricultural and environmental policy, and policy as a whole. I get energized during election season. I like to get involved in politics and to ask questions, such as, “What makes a good political leader? What role do they play in inspiring ownership and agency?” I also have a background in public speaking. This past summer, I participated in Virginia Tech’s Second Annual MLK Oration Contest, and won. I have also won MANRRS public speaking competitions.

TELL US MORE ABOUT YOUR FIELD OF STUDY.

This is my second year in the agricultural leadership program. I will graduate in May 2020. I’m studying farm-to-school programming in Virginia and exploring the role state legislators play in implementing and maintaining those programs. Farm-to-school can also be about connecting kids with local farmers and connecting classroom learning with what is occurring on a real-life farm. This can also encompass nutrition education. I like seeing how local procurement is integrated into school lunch programs, and how kids are learning to grow produce in school gardens.

MANRRS IS A BIG PART OF YOUR LIFE. WHAT DO YOU LOVE ABOUT THIS ORGANIZATION?

Of all the organizations I’ve been a part of, MANRRS has helped me grow the most. This will be my fifth year as a member, including four years as an undergraduate. Given that my time is limited, I chose MANRRS because it gives me the most networking opportunities and the most workshops and trainings.

TELL US ABOUT YOUR ROLE AS A MANRRS NATIONAL OFFICER.

Being a member comes with many benefits, but being a national officer takes those to another level. The exposure, programming, and one-on-one time with corporate sponsors are things I don’t take for granted. My role is to serve as a spokesperson for graduate students’ needs and for concerns in the region, and to act as a liaison to the national office.

I worked with my undergraduate counterpart, Alexis Doon, and with our faculty advisor, Chevon Thorpe, director of inclusion, diversity and equity for the college, to design a “cluster” that was held at Virginia Tech last fall. The cluster is a conference-like event, though at a small scale. We expect diverse stakeholders from companies, graduate students, and undergraduate students from the region.

WHAT IS SPECIAL TO YOU ABOUT CALS AND VIRGINIA TECH?

Ultimately, I feel supported academically. All of my academic mentors have encouraged me to pursue my interests. They have created a climate to inspire my intellectual curiosity. Both the college and the university are making a commitment to promote diversity and inclusion.

WHAT STEPS DO YOU THINK COULD HELP REACH THIS GOAL?

There is a quote by Dr. Phil: ‘You can’t change what you do not acknowledge.’ We need to acknowledge where we are. We can examine the climate and change the way we respond. I’m proud of the institutional goal to increase diversity, but it’s a tough goal. The minority presence in Blacksburg is still small, though I hope to see it grow with the help of organizations like MANRRS. At the same time, offers will have to be more attractive to recruit and retain minority students and faculty. Coming here appeals to my academic/professional development side, and we also have to consider that everyone here is a whole person. How can we work together to create an environment that is attractive outside of the academic context?

WHAT DO YOU ASPIRE TO DO WHEN YOU EARN YOUR GRADUATE DEGREE?

I would love to secure a career in governmental relations. Whether that means I am directly supporting someone in Congress or navigating those relationships within an agricultural firm is up in the air now, but anything where I can probe into political spaces and conversations would be lovely.

WHAT ADVICE DO YOU HAVE FOR INCOMING STUDENTS AND GRADUATE STUDENTS?

I have advice for people before they come to college: Have diversity in the things you do. I believe you reach an age in high school where you are expected to know what you want to do with your life but you’ve barely had the experiences to know one way or the other. Get involved with Junior MANRRS and FFA to help you explore potential careers. And remember, no one cares about how smart you are unless you’re nice – all the time and to everyone. It’s not about what you know or what you think you know. Ultimately, people care most about how they feel in your presence.

DRONES AND ROBOTS JOIN PLOWS AND TRACTORS IN FARMERS' TOOLSHEDS

Helping farmers meet the
demands of tomorrow through the
SmartFarm Innovation Network

by Travis Williams



Hovering between the clouds and the cows, Wyatt Bunn keeps a stealthy eye on his family's cattle.

"When I fly by, they don't notice it, but if I get down too low, they do," said the third-generation Pulaski County farmer as he guided a tiny quadcopter drone from hundreds of yards away.

"It's just fun," said the 10-year-old pilot.

Using a tablet connected to the drone's remote control, Wyatt surveys the herd, checking for injured or lost animals.

"Wyatt is able to do before school what usually takes us an hour to do," said Doug Bunn, Wyatt's grandfather. "He'll take the drone and check all the cattle. He'll do it in about 10 minutes, and he can even zoom in on them enough to read the ear tag."

Keeping an eye from the sky on 600-plus cattle is just one example of how the Bunn family uses

advanced technology to manage their 1,000-acre farming operation in Dublin, Virginia.

Although tapping into the technology trend isn't a new concept for individuals and families in the agriculture industry, the opportunities for connectivity from the field directly to the research lab may lead to game-changing innovations for growers around the globe and right here in Virginia.

According to the Bunn family, deciding to add some sophisticated digital devices to the more traditional tools of their trade grew out of their relationship with the Pulaski County office of Virginia Cooperative Extension.

"The Extension service lets us know about lots of things that we really don't know about," Doug Bunn said. "When I first got into farming, cabs on tractors and air conditioning were the big things, and we didn't have that. Now, you know, they're coming out with drones that I think will eventually have sprayers on them and will go out and identify a weed on their own."

five-percent increase in farmable land. The impending need calls for an intensification of crop production, as well as an increased stewardship of natural resources, and leans on technology to produce those results.

On the local farm, that translates to providing opportunities to expand from cows and plows to include drones, global positioning systems (GPS), and wearable exoskeletons. It means embracing tools that capture big data and leaning on skilled researchers to translate and communicate information across the commonwealth in real time. It means working hand-in-hand with producers of all levels to discover practical applications for innovations and research that will allow farmers to work smarter, longer, and with a better quality of life.

And it means developing the SmartFarm Innovation Network.

"For years, we have had in place an extensive network of people and programs around the commonwealth between our Agricultural Research and Extension Centers, our local Extension offices, and the university," said Alan Grant, dean of the college. "The SmartFarm Innovation Network will collaboratively streamline and expedite our research, workforce development, and outreach in a way that will boost our largest industries – agriculture and forestry – and position them as global leaders in solving not only today's most pressing issues, but the issues of tomorrow as well."

THE SMARTFARM INNOVATION NETWORK

The Food and Agriculture Organization of the United Nations estimates the need for a 70-percent worldwide increase in crop production by 2050 and with only about a



Brandon Bunn and his family are already using some of the technology from the SmartFarm Innovation Network on their Pulaski County farm.

With about 120 interconnected locations that reach every corner of the state, the Virginia Tech-led SmartFarm Innovation Network will provide faster data; allow for real-time, geographically specific decision-making; and streamline statewide collaboration. The platform will allow researchers and industry leaders to weave together what happens in the fields and forests with emerging technologies in areas that range from biodesign and artificial intelligence (AI) to cybersecurity. And it provides a fertile ground for applying the cybersecurity and data science advancements generating from Virginia Tech's growth in the greater Washington, D.C., metro area and the historic launch of the Innovation Campus, as well as the revolutionary biomedical work of the Fralin Biomedical Research Institute at VTC in Roanoke.

The SmartFarm Innovation Network is expected to push limits and challenge the status quo in order to leverage Virginia Tech's strengths in ways that empower the commonwealth's agricultural industries and farming communities to solve the needs of tomorrow.

"When you think about what's happening around the world with climate change, urbanization, and related issues, you wonder, how do we help producers evolve to address these issues?" Grant said. "By working together, we're going to find ways to prepare people to deal with these emerging problems, while at the same time use the network as a resource to prepare students to go out into the real world and become global leaders in solving those problems."

FERTILE GROUND FOR ADVANCEMENT

Agriculture and forestry combine to make up what is by far Virginia's largest industry, with a joint annual economic impact of more than \$91 billion and more than 440,000 jobs, according to 2017-18 figures from the Virginia Department of Agriculture and Consumer Services.

In April 2018, stakeholders from across the commonwealth gathered at the Virginia Agriculture and Natural Resource Summit to discuss the challenges facing Virginia's agricultural industry and workforce.



During the two-day event, participants endorsed a plan that would develop an infrastructure to access Virginia Tech's resources and expertise, as well as provide a platform for real-world utilization. By streamlining the connections and programing on Virginia Tech's Blacksburg campus, the 11 strategically located Agricultural Research and Extension Centers and the extensive VCE network, the SmartFarm Innovation Network will create a statewide incubator of data and applications.

Access to such information is important for companies like Novozymes Biological Inc. in Salem, Virginia, which is working to develop microorganisms that will optimize a crop's ability to absorb nutrients, increasing both productivity and sustainability.

"This is really an application of big data and data science agriculture at home, just like we are developing in other parts of the world," said Chris McDowell '92, head of operations for Novozymes. "The SmartFarm Innovation Network will provide the infrastructure and methodologies to run really meaningful experiments, get even more data, and discover how to leverage it to best improve agriculture."

In addition to engaging researchers, the network will tap into the university's growing population of students who are skilled in global system sciences, artificial intelligence, and data analytics. This encourages diversity of perspective and transfers fresh ideas to the network while equipping students with the information-gathering and problem-solving skills required by real-world employers.

One such project, officially announced in June, connects the college with weather-intelligence provider WeatherSTEM. The partnership, which includes each of the 11 ARECs as well as the Urban Horticulture and Turf Grass Centers in Blacksburg, will produce real-time, geographically pinpointed forecasts. Automatically uploaded to the WeatherLink Cloud, the information is accessible both online and via a mobile app. This provides producers, residents, researchers, and members

of the public with up-to-the-minute weather information, including skycam images and weather alerts about the timing and location of such phenomena as lightning.

"The SmartFarm Innovation Network will collaboratively streamline and expedite our research, workforce development, and outreach in a way that will boost our largest industries – agriculture and forestry."

-Alan Grant, dean of the college

"For researchers who are involved in analyzing weather conditions and patterns through computer-simulated modeling, retrieving data from multiple sources in various locations across the state is critical to understanding those patterns," said Saied Mostaghimi, associate dean for research and graduate studies.

SOWING SEEDS OF RESEARCH

Across the SmartFarm Innovation Network, many Virginia Tech researchers are excited about the potential impact of having their work elevated and expanded across the state.

"It's the type of program that's kind of limitless," said Robin White, an assistant professor whose work has focused on the cross-section of data and animal science for the past five years.





Working with colleagues in the College of Engineering at the Middleburg AREC, White plans to merge data from radio-transmitting halters on horses and cattle with information from sensors planted in the animals' pastures. This sensor network provides authentic data, without any type of human or external interference, which are transmitted to the cloud where they can be accessed for use in animal behavior studies and to analyze the impact of herds on the environment in real time.

"This will help us better understand how livestock interact with their broader ecosystem," said White, adding that the information would benefit the goal of finding production practices that are mutually beneficial to producers, animals, and the environment.

Once fully operable, the SmartFarm Innovation Network will provide a platform for expanding such research to all ARECs. This will boost data collection, add the diversity of regional landscapes to the equations, and accelerate the timetable for turning research into working solutions for Virginia producers.

At the Eastern Virginia AREC in Warsaw, Virginia, Superintendent Joseph Oakes has already identified some early benefits of the SmartFarm Innovation Network.

The enhanced real-time, site-specific forecasting and monitoring resulting from the collaboration with WeatherSTEM have increased the efficiency of certain projects, such as Oakes' research on the use of nitrogen as a fertilizer to maximize wheat and barley production.

"It gives you the ability to know what's going on at your station and helps determine things like growing degree days, when crops will emerge, and how fast they will grow," Oakes said.

Using drones, Oakes is able, in minutes, to inspect large sections of wheat and barley in the field that would take hours to observe on foot. A multi-spectral sensor on the drones, which collects visible and invisible wavelengths of light, is able to pinpoint specific nitrogen needs for a

particular area of growth. Nitrogen is commonly considered to be one of the most important components for plant growth.

"In the past, a person would have to go out on foot and count the tillers to determine how much biomass was present," Oakes said. "You would count a square foot and create an estimate for the rest of the field."

Like White's work, this project has the potential to be quickly disseminated through the AREC and VCE branches of the SmartFarm network. And while the heightened connection will benefit Virginia farmers, the expedited feedback from growers and producers will aid researchers concurrently.

"In a lot of ways, the technology then becomes a new tool for our Extension agents to do a better job of serving the stakeholders of the commonwealth, but this integration with stakeholders also helps our research," White said. "We can design the perfect sensor tool, but if it does something unexpected like scare the animal, it's not going to work in real life."

HARVESTING AN IMPACT

Exposure to innovation, access to research, and assistance moving from concepts to working applications are advantages that many farmers throughout the commonwealth glean from the amalgam of Virginia Tech, the ARECS, and local Extension offices.

"I've used them greatly since I started farming," said Jay Hundley, who has been producing some combination of corn, soy, wheat, and other products in Essex County since the 1970s. "Whether it's chemical research or identifying a weed species, you could call and talk with them to try to make a plan to deal with it. I've always learned a lot from them."

Hundley utilizes an array of precision agriculture technologies, including variable-rate fertilizers, section controls, GPS mapping, and auto-steer for tractors across his 9,000-acre farming operation. The devices are critical to pinpointing specific needs across large chunks of land.

"It's much more economical because we're now farming by the acre and not by the whole field," Hundley said.

Hundley's experience with technology is common, according to Mike Broadus '89, Caroline County Extension agent.

"If you're not using GPS, you're either overlapping, or you're not doing a good job covering," said Broadus about spraying crops.

This is also true for planting, where over-seeding an area can not only create waste on the front end, but will produce lower yields as crowded plants compete for limited nutrients from the soil and sun. GPS-guided planting prevents both problems.

"The benefits will more than pay for the equipment, but people don't realize it," Broadus said.

Back in Pulaski County, the youngest farmer in the Bunn family, Wyatt, is already tapped into aspects of the SmartFarm Innovation Network through his ongoing participation in various youth programs. Meanwhile, his grandfather, Doug Bunn, and father, Brandon Bunn, stay connected with Pulaski County Extension Agent Morgan Paulette to learn about new technology and help the Extension office test their applications in real life.

For the Bunn family, incorporating GPS auto-steer on their tractors has helped them arrive at an answer as to the usefulness of networking with Virginia Tech, the ARECs, and VCE.

"The first time I used it, I was sold on it. I tell you, it was the greatest thing since sliced bread," Doug Bunn said.

Watch SmartFarm videos at



cals.vt.edu/magazine

Left to right: The Bunn family use drones daily as part of their farming operation; Song Li and his students drive a robot through a crop to measure nutrients and growth; one of the monitors that are part of the WeatherSTEM system; Bo Zhang collaborates with others in the SmartFarm Innovation Network to develop new strains of edamame to grow in Virginia.



RECIPE FOR SUCCESS

Young alumna brings community, food, and conscious commerce together to create jobs and empower entrepreneurs

By Amy Painter

Samuel Taylor Coleridge famously stated, “Nothing is so contagious as enthusiasm.” Unfiltered and infectious, this delectable, if often overlooked quality, is an essential ingredient when it comes to Jessica Schultz’s recipe for local entrepreneurship – an emerging business model based not on competition, but on cooperation, connection, and community.

Though she graduated less than a decade ago, Schultz, 31, (’12 agricultural sciences, and human nutrition, foods, and exercise) is leading a bold vision. The young alumna is employing her passions for baking, locally-sourced agriculture, and connecting other aspiring entrepreneurs to support a

sympiotic, grassroots model for commerce.

Schultz is the founder of an eclectic baking and crafts business called Find A Way, Bake, and Crochet, which she opened while she was in college. Her next commercial venture was the highly successful Blacksburg Bagels, which she opened in 2013 and sold earlier this year. Now, Schultz is expressing her gifts while helping to build a vibrant community in the New River Valley.

“I wanted to create connections with others around food,” said Schultz. “I get excited about a certain crop that comes in, or a certain recipe. I want to share that with

others and to share that sense of joy and connection.”

Engaging and thoughtful, sensitive and cerebral, the Erie, Pennsylvania, native has a taste for learning and a passion for activism that have guided her pursuits. As a student, she earned numerous awards, including the college’s highest honor, Outstanding Graduating Senior, and participated in international initiatives such as Students Helping Honduras and Ut Prosim El Porvenir, a student-led honors class in the same country. While in the town of El Porvenir, she presented nutrition classes and exercised with local women to the music of Enrique Iglesias – a

Schultz and her border collie-mix dog, Max, pause for a breath of fresh fall air in front of a mural at the former Price’s Fork Elementary School in Blacksburg. The renovated building is now home to Millstone Kitchen.

After Schultz returned from Montana, she worked for AmeriCorps VISTA based at the Blacksburg Farmers Market, where she helped promote the USDA Supplemental Nutrition Assistance Program. There, she helped families in need purchase healthy food, and ran a free market gardening program that enabled kids to sell their produce at the market. Schultz was then hired by the Blacksburg Farmers Market to research ways to increase low-income residents’ access to local produce. This effort, funded by the USDA’s Sustainable Agriculture Research and Education program, culminated in a final report and evidence that supported the development of what would ultimately become Millstone Kitchen.



memory that still elicits a smile. However, she credits her work on a small-scale organic farm in Dixon, Montana, seven years ago as seminal to her understanding of how to transform a hobby into a viable local business.

"I went to Dixon to work on two farms that were owned by two badass women farmers. One of them let me use her kitchen to bake bagels," said Schultz. "I started showing up at the farmers market in Missoula. Then, the locals found me. I was waking up at 3 a.m. to make 12 dozen bagels, and they would sell out in an hour-and-a-half."

During her Montana adventure, Schultz also met her beloved border collie-mix dog, Max, a former stray who now enjoys sampling recipes from her kitchen counter and exploring Heritage Park and Pandapas Pond, two of the duo's favorite local hiking areas. Schultz credits her experiences in big sky country with bolstering her confidence as a grower and a baker while underscoring the value of collaboration and leveraging resources, lessons she took to heart during her five years as co-owner of Blacksburg Bagels, and in her current role as manager of Millstone Kitchen, a fully equipped, shared-space commercial kitchen that may be rented for affordable rates.

Located at the former Price's Fork Elementary School in Blacksburg, Millstone Kitchen is available to small businesses such as caterers and food truck owners who can produce food without needing to invest in their own operations. The venture, owned by the non-profit Live, Work, Eat, Gather, Inc., has been open since July and is supported by donations.

"Millstone is a place where people can practice," Schultz said. "It's safe to try new things, to fail, and they won't lose their shirts as they might with a brick-and-mortar operation. People can play and experiment with ingredients. That is very special and quite appropriate considering we're located in the old kindergarten room. It's still within the capitalist realm, but there is an opportunity to be creative. So, it's low-risk and collaborative. We are encouraging the use of locally grown or raised ingredients to support community farmers and helping to create jobs for people who want to open their own businesses."

The opportunity is also allowing Schultz, a self-starter and a "systems-oriented person," to guide and empower other aspiring entrepreneurs while mastering many new skills, a process that feeds her drive for growth and continuous learning.

"To step into a role like this where I could be a part of food safety, local food systems development, and small business

development is really appealing," said Schultz, who has been a long-time vendor for two businesses at the Blacksburg Farmers Market. Most recently, she sold succulents as a side-gig.

"The farmers market lends itself to so much transparency. There is so much interaction, and I am such an introvert. But, it's nice to share these things," she said. "My customers trust me and that what I'm making is good for them and worth spending money on. That kind of trust is humbling and really nice."

"I wanted to create connections with others around food."

Schultz shares credit for her success with many. At Virginia Tech, she cites HNFE professors William Barbeau, Frank Conforti, both of whom retired from the Department of Human Nutrition, Foods, and Exercise in 2013, and Susan Clark, a professor with the School of Plant and Environmental Sciences, as mentors who inspired her love for agriculture and ecology, or agroecology – a systems approach to agriculture that considers environmental, social justice, and economic elements – Schultz's guiding framework.

She remains in touch with many of her professors, several of whom are working on collaborative projects at Millstone Kitchen. And fittingly, one of her prized possessions is a textbook in which she affectionately recorded Barbeau's most amusing Bostonisms, including "stahhch" (starch) and "cahhbohydrate" (carbohydrate).

As a young girl, there was also her grandmother who taught her the basics of

Millstone Kitchen is designed as a space where people can practice cooking using commercial grade equipment.



baking pastries, and her grandfather whose diabetes piqued her interest in nutrition. "His illness was my introduction to this field," said Schultz. "Then, I began to ask questions about where nutrition stops and where foods come from, what kind of system are these foods a part of, who grows them, and what are their lives like?"

Schultz has taken what she's learned to formulate the principles and practices she now lives by, while also honoring life's tougher lessons with grace and humility, as grist for the mill. Although young, she seems wise beyond her years. She understands the impact that a small business can and should have on a community. She cares about intentional growth, responsible sourcing, and the importance of community connection. She has also learned how a business can run an owner versus the other way around. The outcome? Balance is a priority in her life.

For aspiring entrepreneurs, Schultz has some words of advice. "Be aware of the impact your business can make – either positive or negative – and how you can help the world through your decisions. It's a responsibility, and you have the power to shape the community around you. You can have a big impact, so make sure it's good."

At the end of the day, Schultz's commitment to people may be both her greatest gift and her most powerful source of inspiration.

"People and their stories inspire me. Passion is contagious. That's why I like my work so much," she said. "Everyone has an idea of what they want life to be, how they want to shape it, and how they want to define what they do. I'm glad I can help them and that there's a non-profit like Millstone Kitchen dedicated to this process."

We're glad, too.

 facebook.com/millstonekitchen



HORSE SENSE

By Amy Painter



MEET THE TEAM BEHIND VIRGINIA TECH'S EQUINE SCIENCE PROGRAM

What makes Virginia Tech's equine research program distinctive? Our people. We are proud to feature four uniquely specialized scientists who are at the top of their fields. Individually, they are as dynamic and diverse as they are accomplished. As a transdisciplinary team, they are leading a bold vision for Virginia Tech's equine science program – one that offers students leading-edge research opportunities along with a contemporary and compassionate grounding in equine wellness and training. Meet the all-star team: Erica Feuerbacher, Sally Johnson, Robin White, and Caroline Leeth.



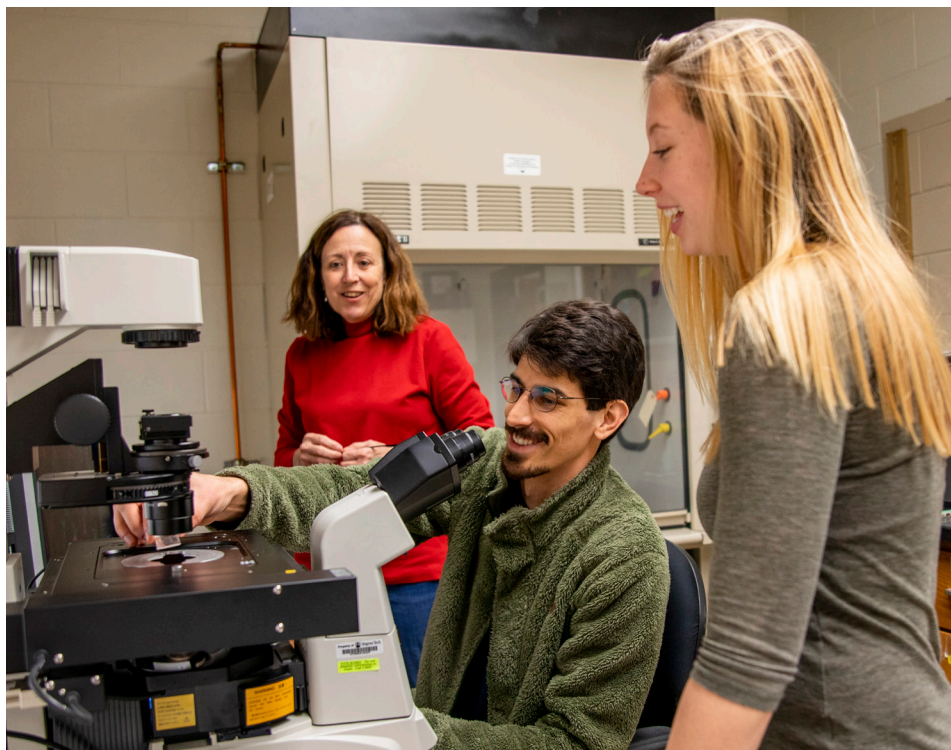
JOHNSON

For Sally Johnson, “laboratory” is an expansive term. The researcher and horse enthusiast may often be found knee-deep in sawdust at one of the university’s barns instructing students in equine physiology. Then, there is the Middleburg Agricultural Research and Extension Center, where her duties include putting 14 off-the-racetrack thoroughbreds through their paces on a state-of-the-art treadmill. On the Blacksburg campus, in a more traditional lab outfitted with an array of high-tech microscopes, flasks, and flow cytometers, she investigates equine skeletal muscle growth and development. Each venue provides data that are central to Johnson’s efforts to accelerate horses’ recovery time following races and other strenuous activities.

The professor of animal and poultry sciences and Paul Mellon Distinguished Professor of Agriculture is internationally recognized for her work in adult stem cell biology. Now, she is equally proud of the multidisciplinary equine research team she has helped assemble – a team of like-minded horse enthusiasts, each with specialized skills and abilities, who are working and teaching together to support students and horses.

“The college’s equine research team offers a strong education component because we are trained in different disciplines,” said Johnson, who has been at Virginia Tech for seven years. “We love horses, and are all horse owners. Each of us can identify a strength and apply it to multiple species. And, because of our different specialties, we complement one another. That is the beauty of such a well-rounded group.”

Johnson, a nutritional biochemist, and Caroline Leeth, a veterinarian and immunologist, work primarily with horses. Robin White, a nutritionist and modeling expert, works with cattle, sheep, and horses. Erica Feuerbacher, a psychologist, focuses on dogs and horses, and also holds an Extension appointment.



The team collaborates to design experiments and interpret results. As the senior member, Johnson is considered the leader and a trusted mentor, though she eschews the former designation. It is precisely her modesty, generosity, and desire to create a strong, egalitarian unit that contribute to the team’s strength and esprit de corps.

“The college has one of the larger groups of tenure-track scientists who work with horses,” said Johnson. “In addition, we are fortunate to be part of a larger university equine team with many colleagues who contribute to Virginia Tech’s research, teaching, and Extension mission.”

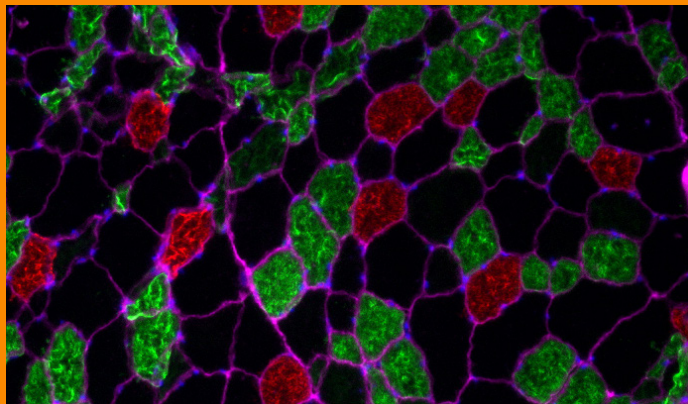
In addition to strong, long-term partnerships with immunologists, stem cell biologists, and other specialists in the Virginia-Maryland College of Veterinary Medicine, the foursome is aided by a supportive team within the college including Beth Sheely, equine science instructor, along with Natalie Duncan, who manages the two equine centers, coordinates more than 40 volunteers, and assists with classes. Youth Equine Extension Associates Sandy Arnold and Leona Ransdell provide 4-H instruction, aid in recruitment efforts, and play a vital role in the college’s research and equine-related projects.

“We count on them to help us with all aspects of the equine program,” said Johnson. “They are part of our decision-making processes that have to do with horses, classes, and programming.”

As a result, undergraduate and graduate students are able to understand the whole horse, and to gain both a practical and a scientific perspective.

“The students who come through this program are excited to learn about the horse, not necessarily just to ride,” said Johnson. “They want to understand what makes the horse work, and what makes the horse tick. Having students who are so eager to learn about nutrition, behavior, exercise, and immunology is rewarding. They are very engaged.”

In addition to her research responsibilities, Johnson serves as the graduate program director for the Department of Animal and Poultry Sciences. Both the size and overall quality of the



Above: Sally Johnson works with two of her Ph.D. students, Nicolas Busse (middle) and Madison Gonzalez (right), to observe muscular development in horses after strenuous activity. Left: Multiplex immunostaining is used to classify the individual fibers within a muscle. The results allow for determination of the energy generating systems used by the muscle, a determinant of athletic performance.

department's graduate program have increased since she became chair in 2014, and she has enhanced the recruitment of traditionally underserved and underrepresented students into the animal and poultry sciences graduate program.

Like her peers and many of her students, Johnson grew up with a love for horses. The Michigan native got her first horse at the age of 12, and has a quarter horse named Ziva in her backyard. Her daughter also rides.

Professionally, she is fascinated with skeletal

muscle growth and development, and guided by a desire to understand how muscle repairs itself following a strenuous event such as a horse race.

"Muscle is very unique in that you can administer damage to it, and it will completely regenerate tissue loss because of stem cells," said Johnson. "In people, stem cells become active within 24-36 hours after exercise. We see peak stem cell activity in horses about seven days after arduous activity. Horses are exercise machines, yet they take time to recover."

With little information available on the cell

biology behind horse muscle, the researcher is keen to understand how to control rates of recovery and how to use nutrition as a primary aid to expedite the rehabilitation process.

"It is a great opportunity to work in an area that is new and unique. Everything I'm learning has application to the industry, and it's an industry I enjoy," said Johnson, who has identified two promising supplements, known as nutraceuticals, that show potential to activate muscle stem cells and speed recovery. "That's pretty rewarding."

A growing program

Along with the state funding allocated for upgrading our animal facilities, we hope to leverage philanthropic support for further enhancements to the project. Our goal is to provide best-in-class facilities and state-of-the-art equipment for our teaching, research and outreach missions.

Plans are underway for



New stable for
equitation horses



On-site equine
laboratory & space
for examinations



Recruitment of
students & faculty



Renovations to
Smithfield Farm
and Campbell
Arena



WHITE

During her five years at Virginia Tech, Robin White has taken a lead role in harnessing technological advancements that convert big data into practical applications for producers. Her research on horses, cattle, and sheep aims to better understand how livestock respond to feed and management in order to identify practices that are beneficial to animals, industry, and the environment.

White's work with researchers at Purdue University and Pennsylvania State University on a "rumen robot" will help producers optimize animal health and reduce waste. Her leading-edge horse and cattle halter sensors are providing a big-picture perspective that is critical to the systems-oriented approach that governs White's work. These projects have the potential to expand the SmartFarm Innovation Network and benefit not only the state's livestock industry, but society as a whole. Learn more on page 7.

Part of White's work focuses on the intersection of animals and big data.

FEUERBACHER

Erica Feuerbacher's first horse was an off-the-racetrack thoroughbred mare with an unfortunate predisposition for bolting and depositing her 10-year-old owner into the uncompromising desert flora surrounding the youth's Tucson, Arizona, home. Following a series of spontaneous "races" that did not end well for the rider, the mare was replaced by Ookie, an Appaloosa gelding whose engaging personality and gentle disposition solidified Feuerbacher's affection for horses in general, and for the distinctive spotted breed in particular.

"If I knew then what I know now, I could have done a lot more for my thoroughbred mare and managed her behavioral issues better," said Feuerbacher, an assistant professor in the Department of Animal and Poultry Sciences.

Like her Virginia Tech equine research colleagues, Feuerbacher has never been one to shy away from a challenge. During her first two years at Virginia Tech, the Extension specialist and animal welfare expert has made a name for herself partnering with canine rescue organizations along the East Coast to enhance the lives and adoptability of shelter dogs by establishing innovative and therapeutic overnight foster opportunities that have been proven to reduce the canines' stress levels. Now, she is teaching Virginia Tech students to train horses using novel, positive reinforcement techniques that engage the animals' innate perspicacity and problem-solving abilities.

While Feuerbacher's demeanor is warm and patient, and her methods measured and heuristic, her approach is as progressive as her mission is ambitious. Through her research, teaching, and outreach, she aims to enhance the relationship between humans and animals to enhance our communication and understanding, one step at a time.

"In the equine world, we often ask the horse for more than they know. They don't have the prerequisite skills, and this can be frustrating for both horse and trainer," said Feuerbacher. "When this frustration arises, behavioral issues often crop up. My goal is to teach the student to ask for what the horse knows how to do, and then to gradually increase their skill set. This way, when we request a bigger behavior, the horse has the basis of understanding."

As prey animals, horses are sensitive to all forms of pressure. They are also quick studies who learn by making associations between one thing and another. Breaking tasks down into small, measured steps is foundational to Feuerbacher's work.

During her fall Equine Behavior and Training class, she taught 16 upperclassmen, all animal and poultry sciences majors, a sequential, patient, and practical approach to training. Over the course of the semester, the students attended a weekly lecture class and worked with yearlings at Smithfield Farm during labs held four days per week. Working in pairs, they introduced their yearlings to stimuli ranging from brushes and lead ropes to plastic flowers and tarps, taught them to lunge, and introduced them to tack, among other achievements.

"We start gently. We never put the horse in a position where it cannot give more than it's capable of, or feels as though it cannot escape," said Feuerbacher.

Haley Rae, a Massachusetts native who will graduate this year, took the class to learn new training techniques and to build her confidence working with young horses. The senior learned to deconstruct larger requests into small, discrete tasks – called shaping – in order to build her yearling's confidence. For instance, when instructing her protégé, Aston, a good-natured chestnut gelding, to move at different gates, Rae first asked the yearling to move out to the rail, rewarding the behavior until he understood her request. Once Aston mastered this first step, Rae was able to move onto the next request, building on each over time.

"Horses are fast learners, and they take to rewards-based training. We see quick behavior change," said Feuerbacher, who has successfully used rewards-based methods on her own horse, Magic, a spirited Appaloosa/Percheron gelding. "So much training is couched in the idea of using pressure, or negative reinforcement. However, changing this so the horse wants to work, and is not just escaping pressure, is really powerful."

Using grain as a reward, Feuerbacher taught her students how to elicit affiliative behavior — in essence, motivating the horse to work, versus asking the animal to move away from pressure.





Feuerbacher (left) and graduate student Lindsay Isernia have been working with Dede, a mare prone to bolting from handlers. Now, the mare halts herself.

She has found that horses respond well when they are earning something, and that they will work for a long time for a small food reward.

While inclusive of more traditional training methods, she wants her students to understand the science of behavior and to question “trainer lore,” some of which is unsubstantiated. The idea is that when students understand the science, their training can become more flexible. She notes that many in the companion animal industry are transitioning to positive reinforcement training, using rewards to offer animals an incentive.

“The methods I’m teaching are adaptive. Students are taught to adjust according to each horse’s needs,” Feuerbacher said. She and graduate student Lindsay Isernia are currently conducting applied behavioral research to explore the effects of different training methods on horse behavior, and the efficacy of different interventions on behavioral issues. In another study being conducted by graduate student JoAnna Platzter, Feuerbacher is examining the relative efficacy of different types of food rewards on horses. Undergraduate students, including Rae, also play an important role in this research; not only do some work as research assistants, their work with the horses helps Feuerbacher and her graduate students identify meaningful research questions from observing the horse-handler interactions.

“The most important takeaway I got from this class was to focus on working with the animal as a unique individual,” said Rae, who plans to work with horses professionally. “One behavior that’s exhibited in multiple horses, such as bucking, may be caused by different situations – so, there’s not one blanket fix. You have to find an individual solution for each horse by changing the reinforcers. My partner and I focused on rewarding Aston every time he exhibited the behavior we wanted with a reinforcer (positive reinforcement), and then revoking the privilege of the reinforcement if he didn’t exhibit the behavior we wanted (negative punishment).”



As Feuerbacher watches, Haley Rae free lunges Aston.

Rae and her classmates discovered that the training process requires patience, time, listening and observational skills, and a gentle touch. In addition, Feuerbacher’s methods place principles such as respect, and most particularly, trust, at the center of the human-horse relationship.

“The methods I’m teaching are adaptive. Students are taught to adjust according to each horse’s needs,” Feuerbacher said.

“When I think about trust, I think about saying something to a horse that means the same thing every time so that the rules are consistent,” said Feuerbacher. “So, if I allow a horse to graze while holding his lead rope, I can’t be angry when he equates the lead rope with the opportunity to graze. Trust comes from consistency – the animal knows the rules of the game, and the rules stay the same. That forces us to think about what we do and do not want to encourage in terms of terminal behavior.”

Rae’s hard work was rewarded by mid-October, when Aston’s transformation into a well-schooled yearling was evident. While he will be used for Feuerbacher’s class again next year, the majority of the students’ yearlings were sold during October’s Hokie Harvest, with each pair helping to show their young trainees.

“Adding more tools in their toolkit is helpful. Now, when they face issues that cannot be resolved with traditional methods, they can be more flexible and adaptable, and work with horses who respond differently to different techniques,” said Feuerbacher. “Whatever fields the students choose, they will have to interact with animals, so understanding what controls

behavior and how to effectively modify it, is really important.”

In the future, Feuerbacher would like to expand her classes to include more mature horses with behavioral issues. This dovetails with her shelter mission, which aspires to rehabilitate animals of all ages.

“We want our students to become good trainers, and the horses to gain meaningful skills. Meeting both of those goals can be challenging in the timeframe we have,” said the researcher, who also hopes to continue working with the Smithfield Farm yearlings. “My goal is to get both horses and students to a certain level simultaneously.”

Feuerbacher believes that behavioral problems stem from an animal’s inability to feel safe. Her own work with troubled horses has resulted in feats that many would consider miraculous. She and her graduate student Lindsay Isernia have been working with a mare named Dede who often bolted from her human handlers. Now, the mare halts herself and has learned to trust Isernia and Feuerbacher. At the end of the day, however, it’s about helping students transform their beliefs about animals, and about what is possible.

“Working with students and seeing the behavior change in their horses is always reinforcing. They are learning to teach in a way that gives horses a fair chance of getting it right, and offers instruction in a humane and effective way,” said Feuerbacher. “I always hope the skills they get from training, including compassion, empathy, and kindness, are attributes they will take with them and apply to any interaction they have. The training skills they learn are not just for horses, they are applicable to all species.”

LEETH

As a girl, Caroline Leeth enjoyed horseback riding during family visits to her grandparents' farm. The Norfolk, Virginia, native began to ride more regularly during high school, and as a first-year veterinary student in the Virginia-Maryland College of Veterinary Medicine, Leeth bought her first horse at Hokie Harvest. She and VT Flexible "Flex" Flyer spent seven years together until injury forced the gelding's early retirement.

These days, the equine enthusiast, researcher, and mother loves putting her Oldenburg, Gatsby, through his paces. She also enjoys riding in hunter competitions and watching her seven-year-old daughter, Eleanor, take up the sport.

Leeth received her Ph.D. in biochemistry and molecular biology from the University of Maine in 2011 through a joint program with the Jackson Laboratory, and her doctorate of veterinary medicine from Virginia Tech in 2001. Five years ago, she returned to Virginia Tech as an assistant professor of animal and poultry sciences.

Her research, role as equine committee chair, and partnerships across the university make her a crucial member of the college's equine science team. She is also a double-hitter with a portfolio that includes both human and animal health. For the former, Leeth focuses on adaptive immune response in health and disease, and specifically the role of B lymphocyte maturation in two autoimmune diseases: type 1 diabetes and systemic lupus erythematosus.

For the equine component of her research program, Leeth and several fellow Vet Med immunologists and pathologists are working together to address equine protozoal myeloencephalitis, a serious pathogenic disease that can be debilitating to horses and ponies. By grafting the tissues of EPM-susceptible and EPM-resistant horses into mice, she is able to study individual immune responses.

"Horses who get sick appear to have a different immune response than horses that appear to be resistant, but this is difficult to study in the horse," said Leeth. "We need control of environmental conditions, which is extremely difficult on a farm. For this reason, we use mice to model equine disease. We can study reliable data more efficiently. For EPM, this is important since this disease has lots of variability in response."

In addition to understanding what makes certain horses EPM-resistant, the goal is to identify horses with a genetic susceptibility to the disease in order to take preventive measures.



Jing Zhu (right), an animal and poultry sciences Ph.D. candidate, works Leeth (left) primarily on systemic lupus erythematosus.

"If we can identify horses who are vulnerable, we can put them on low-dose medication to keep them well," said Leeth. "Current research with susceptible foals has shown that if their food is dressed with a low-dose medication, they remain protected from infection."

Her work has also revealed that the organism that causes EPM hides from the immune system. Current medication used to treat this disease enables sequestration of the organism. When Leeth's mice were taking the medication, they remained healthy, but once the medication was removed, they became sick.

In a new study funded by the Virginia Horse Industry Board, Leeth is investigating immune modulators designed to support the equine immune system. She is working with a drug available in Europe that shows promise in encouraging cells to secrete more protective interferon gamma in order to bolster immunity. Stay tuned.

"We hope this is just the beginning," said Leeth.

Virginia residents can improve water quality and protect the Chesapeake Bay, one new behavior at a time

By Suzanne Irby

When Laurie Fox takes visitors through the demonstration gardens at the Virginia Tech Hampton Roads Agricultural Research and Extension Center in Virginia Beach, she breaks the rule of “look but don’t touch” that defines other well-maintained grounds. She brushes a hand on rain chains made of iron flower bulbs and fish and describes how they do a better job of slowing runoff from a roof. She taps on rain barrels that collect stormwater for use in watering plants, filling bird baths, or washing cars. She shows visitors the 12-year-old rain garden, or a “puddle with plants that act as a powerful biofilter,” as Fox will describe the landscaped area.

Among the center’s 28 demonstration gardens, all there to show the public the range of plants and practices they can try in their own yards, four are dedicated to landscaping for water quality and conservation. In rain chains, rain barrels, and rain gardens, Fox sees easy, affordable steps toward a lifestyle that limits impact on the water running through Virginia and into the nearby Chesapeake Bay. And she finds that these practices are more feasible to people when they can look at examples, ask questions, and see solutions to problems that affect their lives.

“Start with just one new practice,” she said. “There are a million-and-one things people can do. The bottom line is: everybody can do something, and it all adds up.”

That mentality guides Fox’s broad set of research and Extension roles at the

Hampton Roads AREC. There, she uses her expertise in sustainable landscape design and phytoremediation – the use of plants to clean polluted water – to translate the latest research into actionable information for the public, city officials, engineers, environmental and gardening organizations, plant producers, and more. Much of what she shares focuses on human impact on water.

“Everything you do in your landscape affects water quality, in some way, shape, or form,” said Fox. “Whether you live in an urban or suburban area, on the water or not, everything is connected. All activities have an impact.”

In Virginia Cooperative Extension publications like “What is a Watershed?” Fox shows people how their actions – like fertilizer use on their lawns or the way their roof contributes to runoff – directly affect Virginia waters and the larger Chesapeake Bay watershed. Using different educational outlets, she highlights ways people can use their landscapes to improve water quality, conserve water quantity, and help reduce flooding.

Fox has co-written a six-part series on stormwater management solutions for homeowners to explain the practices of rooftop redirection, rain barrels, permeable pavement, grass swales, rain gardens, and buffers. Homeowners can download the publications, visit the demonstration gardens at the AREC to observe those practices in place, and attend classes, workshops, and demonstrations conducted by Extension Master Gardeners all over the state to learn more.

“It’s about trying to find the best way to connect with people,” said Fox. “What we do research-wise has to go through some translation to make it interesting and usable to the public. I can talk about bioretention and not make the connection, but if I talk to you about rain gardens, that sounds more interesting. If I say that a rain garden is a puddle with plants used to clean up pollution in stormwater, that’s more effective.”

Fox’s Extension publications and other educational efforts fold in research from Virginia Tech. She frequently collaborates with researchers like David Sample, an Extension specialist and assistant professor in the Department of Biological Systems Engineering.

The two were part of a team of Virginia Tech researchers that studied how well floating treatment wetlands can work to reduce nutrients in runoff from commercial nurseries. The researchers focused specifically on nitrogen and phosphorus, two pollutants that directly affect the Chesapeake Bay and are regulated by the Environmental Protection Agency. Floating treatment wetlands involve the use of floating rafts to hold plants above the surface of water with their roots hanging down. The plants act as filters to improve water quality in systems like drinking water reservoirs and stormwater retention ponds. Floating treatment wetlands remove nutrients through the processes of plant uptake, denitrification (breakdown by bacteria), and the trapping, binding, and settling to the bottom of soil and organic matter particles to which the nutrients are attached.



HOME GARDENING PRESERVE THE



Laurie Fox uses creativity, ingenuity, and best practices to educate Virginia residents about water quality and conservation.

“Laurie has always been very focused on what’s the most practical – what people can gain from that kind of research,” said Sample. “In this case, we had to also consider the nursery owner’s concern: making a profit.”

When looking at solutions for improving water quality, Fox continues to reflect on the perspectives of homeowners and other potential users, and how they’re changing. She recently mentored Biological Systems Engineering graduate student Daniel Robinson, who surveyed people working in municipal stormwater management in the Hampton Roads area. His goal was to learn about stormwater management practices they were or weren’t using, find out why, and seek feedback on how Extension resources could better serve them.

“The project was meant to connect knowledge, practices, and resources,” said Fox.

Fox finds that though the water quality solutions she recommends are relatively easy and inexpensive to adopt, she’ll always be in a battle with apathy – a sense among people that their individual behaviors won’t make a real difference. She said it’s essential to find ways to connect practices to a person’s interests. For instance, if a homeowner isn’t interested in using a rain garden for stormwater management, she might connect by showing how a rain garden could save the homeowner money and increase property value. Whether emotional or practical, the connection helps motivate people to take action.

“We need to overcome that apathetic attitude,” she said. “We can’t afford not to do something, no matter how small. States and municipalities can only do so much. Everyone needs to contribute in order to make the difference.”



Rain chains are beautiful and functional tools to slow runoff from roofs.

PRACTICES HELP CHESAPEAKE BAY

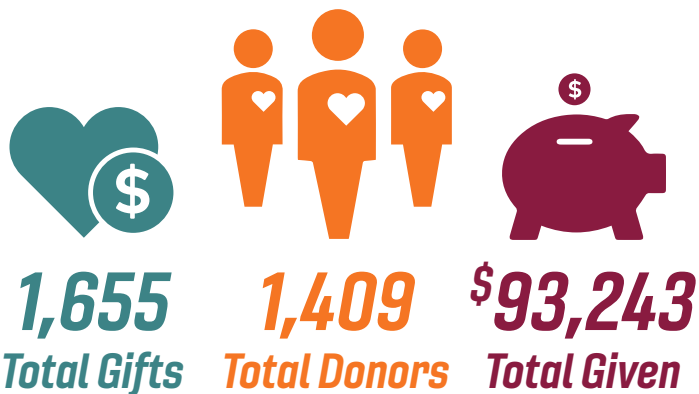


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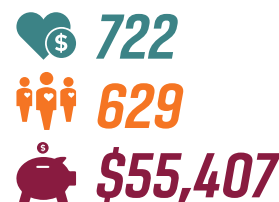
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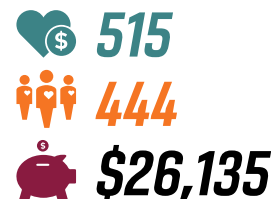
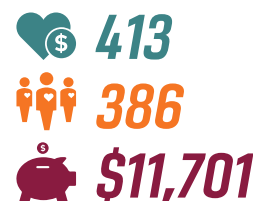
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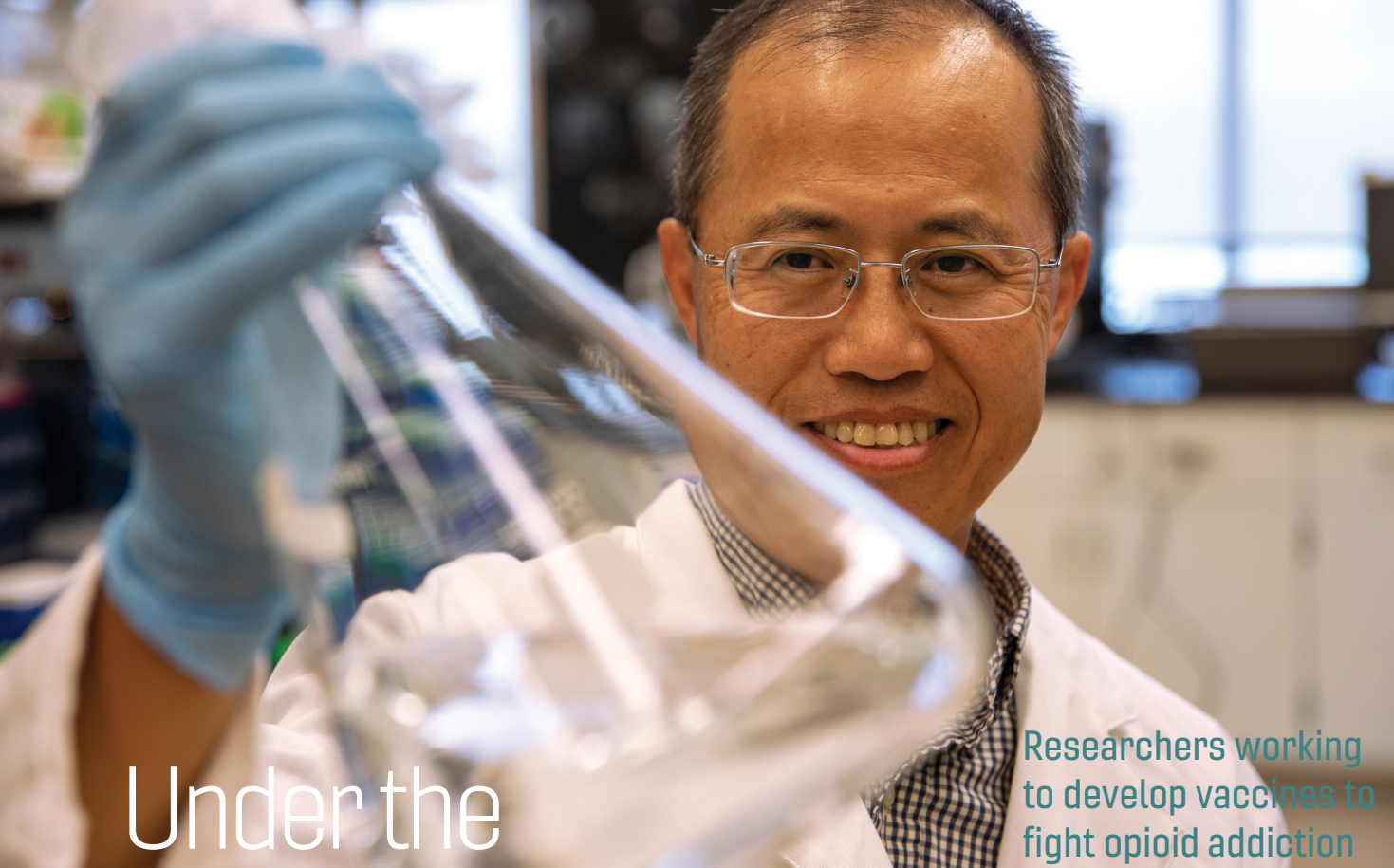


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Under the microscope

Research from around the college

Researchers working to develop vaccines to fight opioid addiction

Fueled by the gravity of an epidemic that claims 130 lives each day from overdose, researcher Mike Zhang and his team are developing what could be the next-generation treatment – a vaccine to counteract opioid addiction. Zhang, a professor in the Department of Biological Systems Engineering, is developing a vaccine that will help recipients develop antibodies against opioids and alleviate the symptoms of the high generated by the brain. Zhang and his team have been awarded a grant from the National Institutes of Health's National Institute on Drug Abuse.



Link found between invasive species and native animals

Associate Professor Jacob Barney and six graduate students in the School of Plant and Environmental Sciences conducted the first-ever comprehensive meta-analytic review examining the ecological impacts of invasive plants, one of the five drivers of global change. The researchers found that native animals are diminishing as invasive plants, which have spread across the globe, gain a foothold in their habitats.



Discovery could boost \$40 billion soybean industry

A new article published by researchers and graduate students in the School of Plant and Environmental Sciences has revealed that soybean root nodules harbor high abundances of atypical non-nitrogen fixing bacteria, a discovery that has the potential to improve crop resilience and yield. Soybean, which is grown for its protein and oil, was the most planted crop by area in the United States in 2018, overtaking corn as the country's leading cash crop. It is currently the main source of protein for livestock, poultry, and swine.



Virginia Tech Foundation secures grant funding to build new Virginia Seafood AREC

A new state-of-the-art Virginia Seafood Agricultural Research and Extension Center in Hampton, Virginia, will pave the way for further economic growth and collaboration in the state's \$550 million seafood industry. Located adjacent to the AREC's current location, the \$8.4 million project will provide expanded seafood technologies/processing and microbiological laboratories, upgraded aquaculture and fisheries research facilities and water chemistry labs, expanded training facilities, and accommodations for visiting faculty and students.



High-flying microbe research featured in special issue of Scientific American

In a special issue of Scientific American, two researchers wrote "Wild Ideas in Science" about their work using unmanned systems and mathematical models to study the transport of microbes in the air and water. The issue covers what it calls "amazing innovations that just might save the planet and us." According to authors David Schmale, School of Plant and Environmental Sciences, and Shane Ross, College of Engineering, we are only just beginning to appreciate the tremendous biodiversity of microorganisms in our atmosphere, lakes, and oceans.

Alumni highlights

Dean's Advisory Council

The Dean's Advisory Council has recently been reorganized to advise the college on all aspects of teaching, research, and extension programs and to advance and promote the programs of the college. This includes matters pertaining to review of current and future plans of the college; providing information and recommendations concerning these plans; assisting in the dissemination of information with constituent groups; helping public relations and reputation; and fundraising and engagement efforts.

The following alumni and supporters were elected to the executive committee:

Robert Mills, Jr., '94, chair; president, Briar View Farms Inc.

Katie Frazier, '04, vice-chair; chief marketing and external affairs officer, Farm Credit of the Virginias

Dixie Dalton, '86, '89, academic partners committee chair; dean of humanities, social sciences, and business, Southside Virginia Community College

Joseph Wilson, advancement partners committee chair; CEO emeritus, PermaTreat Pest Control

Hobey Bauhan, industry partners committee chair; president, Virginia Poultry Federation



Robert Mills, Jr. '94, Dean's Advisory Council chair

For more information and to see a full council membership list visit www.cals.vt.edu/get-involved.



Beef cattle industry giant Gary L. Minish honored

More than 200 alumni and friends gathered at the Alpha Gamma Rho fraternity house this fall to honor Gary L. Minish's career achievements.

The former department head of animal science was one of the first to champion leaner, more heavily muscled, and faster growing cattle over the less profitable, smaller, and fatter cattle of the 1950s and early '60s. His influence helped shape the modern beef cattle phenotype, long before the introduction of genomic technology.

Following the induction of this year's new members to the Virginia Livestock Hall of Fame, a luncheon was held at AGR that honored Minish's lasting legacy at Virginia Tech, including the scholarship endowment set up in his honor and his past work as coach of the livestock judging team.

New directors elected to CALS Alumni Organization Board

The CALS Alumni Organization Board of Directors elected three members whose three-year terms began on July 1, 2019.

From student engagement to alumni recognition, there are ways for all alumni to be involved. We welcome you to reach out to any board member or our director of alumni relations (Jamie Lucero : jlucero@vt.edu) to find out how you can be more involved with the organization.

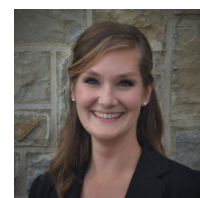
For a full list of board members visit www.cals.vt.edu/get-involved.



Tommy Amal '14
M.S. Agriculture and
Life Sciences
Blacksburg, Virginia



Jessica Jones '04
B.S. Secondary Ed,
Agriculture, '04 B.A.,
Interdisciplinary
Studies
Gladys, Virginia



Morgan Slaven '14
B.S. Agricultural
Sciences
Staunton, Virginia

2020 upcoming events

March 20 CALS Alumni Organization Celebration of Ut Prosim

April 17-19 Black Alumni Reunion

April 22 CALS Alumni Organization New Alumni Launch Party

May 21-23 Virginia Tech Alumni Association Old Guard Society of Golden Alumni Reunion

June 4-7 Virginia Tech Alumni Association Reunion 2020

#iamVTCALS

HELP STUDENTS DISCOVER THE WORLD

Austin Skeens had never been on an airplane, much less traveled overseas.

All that changed when the CALS student spent a winter break studying food security in South Africa. Seeing food insecurity in a foreign land drove home how important, and challenging, global food issues are — and his journey inspired him to do more.

“Whether it’s helping with economic problems or dietary issues, I just wanted to get back home and give back,” said Skeens, whose trip was made possible because of a scholarship.

Last year, the generosity of CALS donors largely supported experiential learning opportunities like these for more than 20% of our students — but we want to make it so that every one of our students can have such experiences.

Please make a gift to create an endowment for long-term support or make a current use gift to provide a student the chance to explore the world around them.

Learn more at
cals.vt.edu/get-involved/giving



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104 Hutcheson Hall
250 Drillfield Drive
Virginia Tech
Blacksburg, VA 24061

www.cals.vt.edu



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The Bunn family in Pulaski County uses drones as part of their cattle operation as the sun rises every morning.

Read about how the college is building a SmartFarm Innovation Network around the state to help producers like the Bunn family thrive on page 7.

