

College of Agriculture and Life Sciences

# CAALS

magazine



2022



COLLEGE OF AGRICULTURE  
AND LIFE SCIENCES  
VIRGINIA TECH

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CALS MAGAZINE Winter 2022 Vol. 4 | **EDITOR/WRITER** Max Esterhuizen '12 | **GRAPHIC DESIGNERS** Tim Skiles, Kayleigh Skiles | **WEB DESIGNER** Lauren Shutt  
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# CALS DATES TO REMEMBER

## MARCH

18 CALS Alumni Organization  
Celebration of *Ut Prosim*

## APRIL

1 Experience CALS

## MAY

13-16 Spring Commencement

## JUNE

11-14 VT Reunion Weekend  
21-24 Virginia 4-H Congress  
23 FFA State Convention

## AUGUST

CALS Sesquicentennial  
Celebration Month  
24 Classes Begin

## DECEMBER

16 Fall Graduation



from the dean

Greetings,

A lot has changed since the Virginia Agricultural and Mechanical College was formed 150 years ago. We have evolved from attracting students from all corners of the commonwealth to welcoming students from all corners of the globe. And our research and Extension programs have embraced the digital age and the innovations that have come along with it.

But one thing has remained a constant over the years: our commitment to students and the communities we serve.

We were there when the university was founded and we will continue to be a cornerstone of our land-grant mission for another 150 years.

As you will see in this issue of our magazine, our impact has broadened so that we are improving the wellbeing of people around the world. Our alumni are rising to national leadership roles that affect our entire country. Our students are getting hands-on learning experiences that prepare them for rewarding careers.

Much of this is reinforced with the newly implemented strategic plan, which helps chart the course for our faculty, staff, and students to help communities thrive so we can create a brighter future together.

Thank you for being an invaluable part of helping shape our vibrant past and our shared future.

Go Hokies!

Alan Grant  
Dean

# AROUND THE AGQUAD



## ALUMNUS LEADS TIDEWATER

Virginia Tech alumnus Matthew Chappell ('98, M.S. '02), was named the new director of the Tidewater Agricultural Research and Extension Center in Suffolk, Virginia.

“Like many of Tidewater AREC stakeholders, I don't consider agriculture a profession as much as it is a way of life. That mindset drives me to improve the economic and environmental sustainability of farms across the region while broadening Tidewater AREC's reach in our communities,” Chappell said.

“As a research and extension center, we are uniquely positioned to serve as researchers, educators, and advocates for farming, which is the largest private industry in the state. I certainly believe that the faculty and staff of Tidewater AREC share these sentiments, and this is precisely why I am excited to join this productive team.”



## AG TECH HAS NEW LEADERSHIP

Susan Sumner, the associate dean and director of academic programs, was named the director of the Agricultural Technology Program. The two-year program offers a concentrated academic experience for individuals pursuing an associate degree in preparation for careers in agricultural and green industries.

Senior instructors Rachel Kohl ('00, '02) and Tom Martin ('92, '93, '01) serve as the program's assistant directors. Newly hired instructor Rose Jeter ('06, '08) will assist with marketing and recruitment. New instructor Jonathan Dickerson ('10, '13), a former staff member in the Turfgrass Research Center, is involved with the landscape and turf management tier of the program.



## LIVING UNDER A ROCK

Hearing the words “new species discovered” may conjure images of deep caves, uncharted rainforests, or hidden oases in the desert.

But the reality is that thousands of new species are discovered each year by enterprising scientists all over the world. Some of these new species come from exotic locations, but more surprisingly, many come from just down the road, including the newest member of the Hokie Nation, the millipede *Nannaria hokie*.

The newest Hokie – which has about 60 more legs than the HokieBird – was discovered living under rocks by the Duck Pond. Since then, the critter has been found around Blacksburg as well.



## TWO ALUMNI APPOINTED TO STATEWIDE AGRICULTURE POSTS

Governor Glenn Youngkin recently named two Virginia Tech College of Agriculture and Life Sciences alumni to lead two statewide agricultural positions. Matt Lohr ('95) was named secretary of agriculture and forestry and Joseph Guthrie ('89) was appointed commissioner of the Virginia Department of Agriculture and Consumer Services.

Lohr and Guthrie join a long list of people connected to the college who have gone on to prestigious leadership roles in agriculture, including Jewel Bronaugh ('94, '97), who is the current deputy secretary at the United States Department of Agriculture.



## A TRUE LEADER

Ed Jones ('79, '83), who has been the director of Virginia Cooperative Extension for 11 years and associated with Cooperative Extension for 37 years, announced his retirement in November.

Jones is widely regarded across the country as a visionary leader with innovative ideas on how to ensure Extension remains a vital part of helping communities improve their well-being in every facet of life.

“I have believed in the mission of Extension since my first interactions with it as a young boy growing up in Mercer County, Illinois,” Jones said. “Over the years, I have had the pleasure of working with so many talented and kind people who share in this belief that we can make a positive impact in our communities.”

For his years of exemplary service, Jones received the 2021 Distinguished Service Ruby Award – the most prestigious level of national recognition from Epsilon Sigma Phi, one of the oldest organizations of Extension professionals.



## RECORD GIFT INVESTS IN 4-H

Virginia 4-H has received \$1 million from Dominion Energy – the largest cash gift in the history of the commonwealth's largest youth organization – that will help Virginia 4-H continue to offer transformative educational experiences for years to come.

“We feel that supporting Virginia 4-H is an important way that we can give back to our home state of Virginia,” said Ed Baine ('95), president of Dominion Energy Virginia. “4-H holds a special place for youth across the state, and we are incredibly excited about this partnership. We are honored to be able to play a part in shaping our shared future.”



## RAMPING UP CONSERVATION: Researchers help an Appalachian delicacy stay on the menu

# under the microscope

research from around the college

At the Catawba Sustainability Center, researchers work with the U.S. Forest Service to find the best growing methods for ramps to allow the delicacy to last far into the future. To fight the over-harvesting of ramps, this team of researchers is developing methods to grow ramps in contained environments. These studies could allow farmers to grow on land that isn't used for current crops, boosting profits while lessening the burden on wild ramp populations.

Pabitra Aryal, a Ph.D. candidate in the School of Plant and Environmental Sciences, is testing the impact of Endomycorrhizal fungi, which has a beneficial relationship with plants and could positively influence the growth rate of ramps on both bulbs and seeds. Little is known about the germination time, though Appalachian lore says it could take as long as seven years.



### Powered by food (waste)

As the world works toward economically and environmentally friendly ways to power phones, controllers, computers, and the other devices we use daily, two researchers are investigating how food waste and its associated biomass can be converted into rechargeable batteries.

"This research could be a piece of the puzzle in solving the sustainable energy problems for rechargeable batteries," said project co-lead Haibo Huang, an associate professor in the Department of Food Science and Technology.



### Soil Judging Team collaborates with NASA in Plant the Moon challenge

The School of Plant and Environmental Sciences Soil Judging Team worked with NASA to grow vegetables in lunar soil simulant in their Plant the Moon challenge, a global science experiment, learning activity, and inspirational project-based learning challenge to see who could grow the best crops in a lunar environment. The team submitted a report to NASA after the 10-week challenge.



### Researchers study effects of common nutritional supplement on concussions in sports

Researchers are studying how common nutrition supplements containing Omega-3 fatty acids, usually found in low levels in collegiate athletes, help protect the brain and head from trauma in a proof-of-concept study.

"This is the first time that a study like this has been conducted in football players," said Michelle Rockwell ('97, '99, '19), an adjunct faculty member in the Department of Human Nutrition, Foods, and Exercise. "This has shown to be effective in mice, but we don't watch mice play on Sunday afternoons."

Watch videos on ramps, food waste, and the soil judging team at



[magazine.cals.vt.edu](https://magazine.cals.vt.edu)

# THE BALL IN THEIR COURT



By Max Esterhuizen

*Cole Stevenson, left, and Brenna Kiel help prepare student-athletes for practice inside the Hahn Hurst Basketball Practice Center.*

## Student trainers & nutritionists collaborate with athletics for unique hands-on experiences

On the eve of the upcoming basketball season, Hunter Cattoor, a star guard on the Virginia Tech men's basketball team, hopped onto the training table, waiting to get his ankle stretched and taped. Cole Stevenson, a student athletic trainer for the men's basketball team, was there, ready to help.

Leg propped up on the table, Stevenson used a rubber strap to take Cattoor through a series of ankle stretches designed to maximize movement and flexibility while increasing strength.

Once fully stretched, Cattoor moved over to a balancing board, basketball in hand. Standing on one leg and using the hand opposite the leg on the ground, Cattoor and Stevenson practiced hand-eye coordination and balancing drills, passing the ball back and forth with one hand.

This interaction between Cattoor and Stevenson is symbolic of a partnership that is rare between athletics and academics at the upper echelon of Division 1 athletics and is a testament to the power of hands-on learning in the College of Agriculture and Life Sciences. More than 50 students from the Department of

Human Nutrition, Foods, and Exercise gain experiences with all of Virginia Tech's sports teams in all different facets, from being on the sidelines as a student trainer to fueling student-athletes in the classroom and on the court.

This experience is invaluable, said Stevenson, who is majoring in the Science of Food, Nutrition, and Exercise.

"We get a chance to sit down and work hands-on with athletes," Stevenson said. "This is what we're at school for. This is an awesome partnership. I can't imagine not having this opportunity to put into practice what we learn in the classroom."

## A slam dunk of a program

Both the nutrition and sports medicine student workers are an integral component of the services provided to Virginia Tech's student-athletes, making up the full-court press HNFE provides athletics.

"Whether it's making recovery smoothies in the Oasis for our Olympic sport athletes, or providing on-field hydration during football practice, the sports nutrition and athletic training students are essential in helping our athletes maximize their performance," said Alyson Onyon, senior director of sports nutrition for Virginia Tech Athletics.

This partnership with athletics began 21 years ago. In that time, students have seen the training rooms and learned firsthand from athletic trainers, physical therapists, physicians, and massage therapists.

"Students get to work with people doing the exact job that they're looking at going into, or expose them to something they might want to get into," said Mike Goforth ('95), the associate athletics director of sports medicine for football, and adjunct instructor in the Department of Human Nutrition, Foods, and Exercise.

Inside the room where it happens is Hisham Ziyout ('19), the director of sports medicine for men's basketball and Stevenson's direct supervisor. Stevenson watched Ziyout tape the athletes before practice. To help prevent ankle injuries, Head Men's Basketball Coach Mike Young requires all players to have their ankles taped before practice or games.

"Hisham does a great job teaching me what he's doing as he does it," Stevenson said. "It's an incredible learning experience. He goes over the anatomy, what's going on inside the body – basically everything I would need to know to treat someone."

## Let's dance

Brenna Kiel stood on Carilion Court at Cassell Coliseum as basketballs bounced in the background and players did high knee exercises on the court before practice.

Being a student athletic trainer with the women's basketball team has been her defining experience as a student. Working directly with Erin Cash ('07, '09), the senior director of sports medicine for women's basketball and tennis, Kiel has seen all the different roles of the health care continuum.

One of her favorite memories was going to both the Big Dance and ACC Tournament last year – the women's team made the NCAA Tournament for the first time in 15 years.

"It was such an awesome experience seeing the team I worked with win a game in the NCAA Tournament," Kiel said.

Kiel wants to go to physician's assistant school and earned patient care experience working with the women's basketball team.

"Sometimes I forget that we're a huge Division 1 program – amazingly, we're able to do this," Kiel said. "I'm grateful Virginia Tech has these opportunities."

## All the way to the three!

Avi Pelly looked up at the whiteboard as she walked into the football practice facility, ready to handle all the tasks of the day. Make smoothies for each player's specific dietary needs? Check. Get the

appropriate snacks stocked? Check. Prepare the football fuel bar? Check. No Hail Mary is needed here.

Carly Harris, the director of football sports nutrition, created the nutritional plan because every single thing that's put into the players' bodies impacts performance on and off the field and Pelly helps implement that plan.

"Everything we give them – even the snacks – makes a difference in the athletes' performances," Pelly said. "I've been able to learn a lot from Carly about what to feed the athletes, when timing of specific snacks and meals is vital."

In Michelle Rockwell's ('97, '99, '19) first-year course on sports nutrition for HNFPE students, Julia Whaley, a senior from Broadlands, Virginia, learned about what to eat pre- and post-exercise.

"I learned the timings of what should be eaten, when," Whaley said. "An hour or more before practice and you should have more complex carbs, like oatmeal or bread. But if it's right before practice, you want something that digests quickly – like fruit gummies."

Sometimes, something tasty can still be nutritious. After a win, Pelly makes watermelon slushies for the players – something she first made over summer camp – as a reward. She said the players loved it over the summer and kept asking for it.

"I'm just happy to be a part of this," said Pelly, a senior from Manasquan, New Jersey. "It takes a village to make the

players successful. It makes me appreciate the work that's put in by everyone that is a part of the team. I'm lucky to work with such amazing people."

Elsewhere on the field, Claudia Putman, a senior student athletic training aide from Berryville, Virginia, worked exclusively with the defensive line group, performing taping, wrapping, and casting of her position group.

"In the training room, we do rehab treatment, such as modalities, stretching, and rehab anytime somebody is injured," Putman said. "We help them with that by walking them through a rehab plan created by the athletic trainers."

During the 2020 season, Putman worked with the team in challenging conditions and had a primary focus on keeping the players healthy.

"It was difficult, but I think that our team did a really good job of making an effort to keep people safe, sanitizing things, and ensuring the overall health of everyone in the program, not just athletes but also myself," Putman said. "I was able to get hands-on experience instead of being remote. It gave me patient contact as well as human interaction during a highly stressful time."

Whether dietetics or science of food, nutrition, and exercise, no student rides the bench in this department.

Watch a video following Cole Stevenson and Brenna Kiel at



[magazine.cals.vt.edu](https://magazine.cals.vt.edu)



Stevenson attended to John Ojiako on the training table in the corner of the training room. Stevenson squeezed gel onto Ojiako's knee to perform ultrasound therapy, a form of treatment that has a deep heating effect and could increase tissue regeneration, blood flow, and more.



Kiel helped Cayla King stretch before practice. Kiel held one leg up at a time, giving just enough pressure to loosen the quads and hamstrings, taking the recommended 20 seconds of stretching per leg.



# THE CENTER FOR ADVANCED INNOVATION IN AGRICULTURE

The agricultural landscape is changing. Increased food production is needed to support the world population. Innovative efficiencies are needed throughout agriculture.

The College of Agriculture and Life Sciences recently created the Center for Advanced Innovation in Agriculture to operate at the intersection of technology, data analytics, and decisions to address challenges and security in the natural world and human society in the domains of plants, animals, and food systems.

On the Eastern Shore of Virginia, drones hover in the sky to provide growers with tools to tackle the pests and weeds that wreak havoc on their crops and manage the nutrients that help them thrive.

Students and faculty stationed at the Eastern Shore Agricultural Research and Extension Center are using advanced technologies to improve the practices of large- and small-scale farming operations, which face the ongoing challenges of water and pest management.

At the center, Extension specialist Emmanuel Torres Quezada is researching innovative cultural practices, such as irrigation management, to identify water requirements at nearby farms. Adhering to his innovative approach, he is using drones as his “eyes” in the sky to assist in this research.

“One of the technologies I’m using right now is remote sensing using multispectral cameras to identify crop stress,” Quezada said. “From the data we collect, we can make decisions about the crops below, such as how much to irrigate. This results in different methods that we can use to estimate the water requirement for different plants using cameras instead of having to measure the water in the soil or measuring the water on the plants.”



## PRECISION AGRICULTURE





## CROP AI

Song Li, an associate professor in the School of Plant and Environmental Sciences and affiliated faculty member of the center, is using a grant the college awarded him to study how machine learning can assess specialty crop health and quality.

Specialty crops have higher profit margins than traditional row crops and are a vital economic crop for Virginia and nearby regions. These crops are also well-suited to smaller-scale farms.

Through this research, Li and his team aim to develop new machine learning models that can be used by producers. The final product of this research is a portable device that includes a mobile phone application, a spectral filtering lens, and a miniature microscope that can be fitted onto a cell phone to collect data and make decisions automatically in the field. This example of artificial intelligence development for agriculture exemplifies opportunities for influencing agricultural decisions and driving the bioeconomy.

Early detection of both mastitis and pregnancy establishment allows dairy farmers to intervene quickly, provide health care, and implement management strategies to ensure maximum animal wellbeing and productivity – and that’s exactly what a team of researchers are undertaking.

“Our multidisciplinary and innovative research explores noninvasive and automated systems that can leverage hyperspectral imaging, robotics, and machine learning to detect and diagnose the early onset of subclinical and clinical mastitis and pregnancy establishment in dairy cattle,” said Vitor Mercadante, an assistant professor in the Department of Animal and Poultry Sciences, Extension specialist, and principal investigator of the project.

Mercadante and his team will develop a robotic sensor platform for animal health and production management, test the sensor platform by collecting controlled sample images, and develop a machine learning method for automatic classification of hyperspectral images to identify disease and non-diseased, and pregnant and non-pregnant cows. These technological innovations can sustain animal health, allow for early detection of animal illness, protect against loss of value, and support a continuous food supply.



## IMAGING ANIMAL HEALTH



## PREVENTING PLANT PANDEMICS

Just like human diseases, plant diseases don’t have arbitrary boundaries. These diseases don’t stop at a border crossing or a port of entry. That’s why plant disease surveillance, improved plant disease detection systems, and predictive plant disease modeling – integrated at the global scale – are necessary to mitigate future plant disease outbreaks and protect the global food supply, according to a team of researchers in a new commentary published in “Proceedings of the National Academy of Sciences.”

“The manuscript offers a unique and timely perspective on plant diseases, particularly in the context of the COVID-19 pandemic,” said David Schmale, a co-author on the paper and a professor in the School of Plant and Environmental Sciences. “What would happen if the world lost a staple crop, such as wheat, to a plant disease pandemic? The manuscript considers current tools and capabilities in the context of climate change and growing human populations. There is a clear opportunity to bring researchers together that work on the epidemiology of human diseases and plant diseases.”

Schmale was a part of a team of experts, led by North Carolina State University, that met in Raleigh, North Carolina, a few years ago to discuss plant diseases and their impacts on food security. This manuscript is the result of that meeting, and many of the experts that were there in Raleigh are co-authors of the paper.



### Tomatoes go high tech

This 1957 photo shows Professor Andrews with tomato plants in a new greenhouse. Today, we are still planting tomatoes in greenhouses but using techniques like hydroponic systems and soilless root mediums to maximize yield. The newly formed Controlled Environment Agriculture Innovation Center in Danville, Virginia, is a leader in controlled environmental agriculture, where plants can be grown inside anywhere in the world.



### The ins and outs of animals

In 1963, the scientific instruments that Ike Eller ('55, '66) and Bill Backus ('56) used on cattle mostly stayed outside the animals, as seen in this photo where they are using the college's first ultrasound machine to measure body composition. Now, Robin White and others in the Center for Advanced Innovation in Agriculture are examining ways to place sensors and robots inside animals to measure everything from metabolism to heart rate that will improve the health of the animals.

# ROOTED IN VIRGINIA TECH'S HISTORY

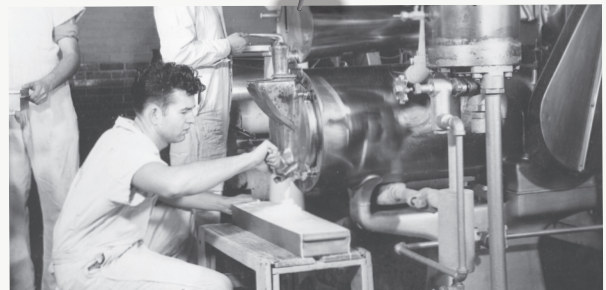
Agriculture is all about roots.

Roots allow plants to grow and sustain us. Roots run through generations of family farms that shape communities. Roots in Virginia's agricultural industry continue to drive the commonwealth's economy.

And at Virginia Tech, the College of Agriculture of Life Sciences' roots run deep, too.

Ever since the Virginia Agricultural and Mechanical College was formed 150 years ago, agriculture has been a driving force for the university and a cornerstone of its land-grant model. This year, as the university celebrates its sesquicentennial, the college remains a driving force of impact and innovation.

Though, as these photos show, the technologies have changed (along with hairstyles!), the root of what the college has done for the last 150 years is the exactly the same as what it will do for the next 150 years – helping communities thrive near and far.



### Next on tap: Beer-flavored ice cream?

Students working at the VPI Creamery in 1947 used then state-of-the-art equipment to make ice cream. While the creamery is no longer here, the college now has a modern brewhouse in the Pilot Plant, where food scientists recently collaborated with Hardywood Park Craft Brewery to create the hugely popular Fightin' Hokies Lager.



### Got milk? We do

Back in 1956, new technology meant simple meters that dairy scientists used to measure how much milk a cow produced. Fast-forward 66 years and we have a host of state-of-the-art facilities that includes an 11,900-square-foot milking parlor with a double-12 parallel milking system with a computerized milk-monitoring system. A newly constructed Metabolic Research Laboratory next door allows scientists to study the impacts of climate change on animals. And construction was recently completed on the Etgen Large Animal Learning Center on Plantation Road where students can work alongside researchers who examine the latest issues in animal sciences.



### No ties — but lots of knowledge

It would be downright rude to show up to a field day in 1952 if you weren't wearing a tie and a fedora. We are a bit more casual these days, just as long as you are wearing maroon and orange. And while the styles of clothing at field days may have changed over the years, we still hold them every year around the state at our network of Agricultural Research and Extension Centers where we provide producers the most current research-backed information that helps their bottom line.



### Generations of leaders blossomed because of 4-H

4-H's core belief hasn't wavered over the more than 113 years it has been active in Virginia – to make the best better. In the halcyon black-and-white photo days, this mission came to bear via livestock showing like these grand champion winners in Henrico County. Today, we still make the best better, though we are also doing it by teaching robotics, civic engagement, and STEM-based activities to more than 200,000 youth in Virginia who are an equal mix of boys and girls – with nearly 40% coming from urban areas.



### Advancing well-being one person at a time

While styles and technology and the world may change, it hasn't changed what Virginia Cooperative Extension has done for more than 100 years – advance the wellbeing of Virginia by empowering its people, stewarding its resources, and shaping its future. Extension is the outreach arm of Virginia Tech and Virginia State University and helps people with whatever issues they may have by being a personal source of knowledge. There is a reason this undated photo looks much like the current one decades later. We are always out there in our communities, sharing knowledge and making a difference.



Learn more about our sesquicentennial celebration

[magazine.cals.vt.edu](http://magazine.cals.vt.edu)

# SOWING SEEDS OF SUSTAINABILITY IN SENEGAL

By Zeke Barlow

THIEWLE, SENEGAL — Aissit Deme slips off her sandals and sits with the other women escaping the 101-degree heat under the palm-thatched open-air hut, their feet forming concentric circles of henna-dyed artistry. They just came in from harvesting mung beans in the fields, where their dresses looked like a box of crayons exploded onto the green landscape as they quickly plucked the beans from the knee-high plants.

Deme knows that the mung beans are easy to grow in the hot Senegalese sun and that her two children aren't as hungry after eating them. But since mung beans are a relatively new food source, Deme doesn't know many ways to prepare them.

Which is why Ozzie Abaye ('92) is here today.

**“Only God knows how happy we are,” one farmer said of a project between Virginia Tech and Counterpart International to grow mung beans for children in Senegal.**

Armed with a stack of mung bean recipes she perfected in her Blacksburg home, five years of research to bring mung beans to protein-deficient Senegal, and decades of agronomy knowledge and outreach, Abaye unpacks the mangos and mint that she bought at the local market.

As women mash garlic in a worn wooden pestle, Abaye talks not only about the ease of growing mung beans, but also their nutritional value. They are high in protein and fiber, which helps kids feel full longer. They are high in folic acid and iron, which promotes breastmilk. They don't need much fertilizer or pesticides, which saves farmers money. The women nod in agreement as they mix the food together and the young children look at the “toubab” — strangers — sharing the afternoon shade.

When the mango-mung bean salad is complete — Deme and the others stuff it into baguettes— a relic of France's colonialization of Senegal.

“Good, good, good,” one woman says in Palor, one of the many Senegalese languages, as she shares the baguette with her child. Deme nods in agreement.

“The first time I had it, I didn't know how to cook it, so there wasn't a lot of interest. But now that we have mung bean recipes, there is a lot of interest. It is needed for the children and now we know how to cook it,” says Deme.

“Now I want to go back to the field and plant the rest of them,” she says.

Enclosed in this tiny bean is not only the fiber and protein that her children need; inside this mung bean is the story of harnessing power of the research, Extension, and education efforts of a global land-grant university. It is a story about the impacts of partnerships with groups like the USDA, USAID, and Counterpart International.

It is a story of how agriculture can change the world.

***It is a story that only Virginia Tech can tell.***





Extension agent Kim Hoffman selects food from a local farmers market to use in a cooking demonstration.





*Left: Professor Ozzie Abaye (center) conducts many of her meetings with local villages under the shade of a neem tree. Right: Mary Michael Lipford, pictured with Abaye, trekked across the world to fight food insecurity in Africa, help farmers, and empower youth.*

## PLANTING A SEED OF AN IDEA

In 2012, Abaye shook a small orb from a seed packet into a Senegalese farmer's hand.

Had he ever seen this before? she asked.

The farmer shook his head. He had never seen a mung bean in his life.

In reality, Abaye — or “Dr. Ozzie” as her legions of adoring students call her — knew the answer before she asked the question on that hot African day.

The professor and Extension specialist in the School of Plant and Environmental Sciences had spent several years assessing what would be the best crop to diversify the Senegalese diet.

And so, a project that married all the things she cared most about in life — agronomy and food security, children and empowering women — was born.

Abaye and others embarked on a USAID-ERA project to link research, education, and outreach that was designed to investigate the potential use of mung beans as a new crop to address malnutrition and food insecurity in Senegal. She looked into other warm-season legumes but none were climatically a right fit for Senegal. Abaye started thinking about mung beans.

She asked her counterparts at the Senegalese equivalent of Agricultural Research and Extension Centers if they ever grew mung beans. One of them brought her back to the room where thousands of small brown envelopes filled with seeds were stored. He dug out a packet of mung beans and told her a private company thought

about growing mung beans but abandoned the project. Later that day, she took the brown packet and showed it to the farmer that had never seen such a thing.

“That was it. We didn’t need to do any more research,” said Abaye, whose voice carries the lilting Ethiopian accent of her childhood. “We found our bean.”

## HANDS-ON ACROSS THE WORLD

From 2013 to 2016, Andre Diatta ('16, '20) was one of 14 Senegalese graduate students who made Blacksburg their home, which was made possible by the USAID-ERA project.

In between his beloved walks around the Duck Pond and soccer games on the Drillfield, Diatta was in the lab and at Kentland Farm, testing more than 550 lines of mung beans to see which ones would grow best in Senegal.

Though Diatta didn’t grow up in an agricultural family, when he looked around his country where food security was a major threat, he knew what he wanted to do.

“Getting into agriculture was trying to be part of the solution,” he said recently as he walked around the campus of Gaston Berger University in Senegal, where he’s now an assistant professor of agronomy.

Virginia Tech’s *Ut Prosim* (That I May Serve) ethos combined with the mung bean project was a perfect match, he thought. “This felt like an opportunity to give back and serve,” he said.

Other students got involved in the project, too.

Mary Michael Lipford ('21) was one of three students engaged in mung bean research and outreach in Senegal. The students were funded by Counterpart International, the college’s Graduate Teaching Scholars Program, and Pratt Undergraduate Research Program.

Their work opened doors they never thought possible.

When Lipford came to Virginia Tech, she wanted to change the world — which seemed like a daunting task until she took a course with Abaye.

“I heard her talk about her mung bean research and how she helps empower women,” said Lipford, who traveled to a village in Senegal and helped hold a mung bean cooking competition. “I immediately knew that’s what I wanted to do.”

For a society to grow, Lipford said, it needs to have its basic needs met: food, water, health, and education. “If you can’t feed yourself, you can’t go anywhere or do anything,” she said.

To show what you can do with the mung bean, Lipford traveled to a village while in Senegal and helped hold a mung bean cooking competition.

The mung bean project involved other departments within the college and around the university. Kevin Kochersberger ('83, '84, '94) and Mary Kasarda from the Department of Mechanical Engineering designed a mung bean splitter for Senegal. Taylor Vashro ('16, '17), a student researcher in the Department of Human Nutrition, Foods, and Exercise, examined the effect of mung bean on women’s and children’s dietary diversity.

“When she eats mung beans, her breasts are full of milk and she’s saving money, because if you don’t have milk in your breasts, you have to buy formula for your infant,” Vashro reported one woman telling her.



Andre Diatta, who is now a university professor in Senegal, earned his Ph.D. studying mung beans at Virginia Tech. Right: Erika Bonnett worked with local schools to incorporate STEM education based on mung beans, including a yarn exercise that shows the food chain.



After eight years, the project was a success – but it was also wrapping up. Abaye felt unsettled, like there was more work to be done.

## PLANTING ANOTHER PROJECT

The day that she heard that Counterpart International was seeking a partnership with a land-grant institution to pilot a nutritionally rich crop for their school feeding programs in Senegal, Abaye dashed home to work on her proposal.

Counterpart International — a non-profit that partners with other organizations to build inclusive, sustainable communities in which people thrive — was looking for someone to complement school meals with newly released mung bean seed varieties. The project was funded through McGovern-Dole-USDA Food for Education Program.

“Virginia Tech’s experience with developing mung beans made for a great partnership to help us further our mission of providing communities the tools they need to thrive and be sustainable,” said Kathryn Lane, chief of party for Counterpart in Senegal.

Over the next three years, teams from Virginia Tech, Virginia Cooperative Extension, and Virginia 4-H visited the West African nation more than a dozen times and collaborated with Counterpart International to pilot the mung bean project at 10 different villages.

From 2019-2021, more than 1,000 kilos of mung beans were produced on two hectares of land, which provided school meals to 2,761 school girls and 2,006 boys.

But Mamadoe Thoiye doesn’t need those hard facts to know that the mung bean project was a success in his village.

## GROWING MUNG BEANS, GROWING YOUTH

Ibrahim Thoiye, 12, walked through the fields where the rainy season dumped a coat of verdant green over the normally dun-colored land. He passed the okra and casava growing in the sandy soil and golden birds flitted about the sky as he came to a plot where black pods dangled from ankle-high plants.

Just a few years ago, Thoiye had never eaten these mung beans that are growing, but now he can’t get enough of them.

“I can see the difference with the mung bean already,” his mom, Asyaia Thoiye, said. “The children are physically stronger and it helps with indigestion.”





His village was one of the 10 pilot projects and one of the more successful ones. They are hungry for more. Over the last three years, Ibrahim's father, Mamadoe Thoiye, donated a few acres for the mung beans to be grown for the local school canteen.

Mamadoe Thoiye, who is president of the local school board, said the mung beans can be harvested many times during the growing season and you can plant many successive crops due to their short growing time. They are easier to grow and more productive than the cowpea they have worked with for so many years.

And Thoiye is seeing even better results than those found in the field. He said absenteeism is down in school because kids aren't as hungry. And their standardized test scores are higher than they've ever been – a testament, he said, to the nutrition they are now getting from the mung bean.

But the mung bean project isn't just feeding children's bellies – it's also feeding their minds.

## EXTENSION AND VIRGINIA 4-H GO TO SENEGAL

Erika Bonnett laid out an assortment of circuit boards, water pumps, and balls of yarn, and issued the teachers a challenge: take what you've got here and create a lesson for your students using only these materials.

The sound of afternoon prayers drifting in from the nearby mosque mixed with the chatter of excited teachers as they picked up the various electronics and started developing an impromptu lesson.

Over the last three years as Abaye and others were working in the fields to grow mung beans, Bonnett, a Virginia 4-H education specialist, has been in Senegalese classrooms collaborating with teachers on developing a STEM-based experiential learning curriculum around the mung bean. Before this, much of their learning modules had been theory or teaching from a book. But Bonnett knows first-hand the value of the 4-H model of learning by doing.

Bonnett grew up in a small, poor mining town in West Virginia where opportunities were limited. She became involved in 4-H through opportunities with her local club and grew her leadership ability at state and national 4-H events. She was hooked on 4-H so much so that the lessons stuck with her through her Ph.D. and now, as a leader of educational program

development for the state's more than 200,000 youth involved in Virginia 4-H.

During her time in Senegalese classrooms, Bonnett has worked with teachers to develop STEM education curriculum.

Mamoune Niang, the headmaster of the school at Thiago where Bonnett was conducting the program that day, said the lessons have been invaluable.

"In the past, our science was focused on theory," Niang said. "But with this program they have the chance to practice what they are learning. They have an interest in science because they are having hands-on learning."

Over the last year, three Extension agents visited Senegal to teach everything from food safety to good nutrition, including Kim Hoffman, an agent from Stafford County. She was there recently to share messages on healthy eating much like she does back home, where she works with schools to help children make healthy choices.

Hoffman translated a series of posters on safe food handling process into French and shared best practices with a group of cafeteria workers. She explained how colorful vegetables are the key to a healthy diet and spoke about how the mung bean was high in iron and helps blood to clot after a cut. The woman nodded in appreciation as a gas stove in the corner hissed, cooking up a fresh pot of mung beans.

As Bonnett and Hoffman's time with the group was winding down, so was the project in Senegal, but Niang said the hands-on problem-solving lessons will continue long after the team returned to Virginia.

"Thank you for your friendship and all that you have done for Senegal," Niang said as they hugged goodbye. "It is not a small thing that you have done."

## REAPING WHAT WAS SOWN

Bean by bean, Amadou Saydou Sow measured out his harvest. When one fell to the ground, he carefully picked it up and placed into back in the bag to be measured. He'd worked too hard to let one bean escape.

Of all the villages that Abaye has worked with over the last few years, Sow's Thiewle has been the most successful. The 140 kilograms of mung beans from a quarter of a hectare that Sow was weighing out was all the proof that was needed.

These beans are the result of some of the new open pollinated lines being screened by Senegal's Research Institute from 600 lines that are expected to be the best mung bean varieties for Senegal. Sow, who is the head of the local school board, has fed his new-found food to the children of the village and has produced so much he's able to sell the seeds to other villages, where the work can begin anew.

"Long after Virginia Tech is gone, we will continue this project," said Sow, whose undershirt had the spires of Burruss Hall peeking out of it.

Ever the agronomist, Abaye wanted to know everything about his harvest. How much did he water it? What inputs did he use? What other crops were grown nearby? How many times did he plant it? When Sow wasn't able to breach the language barrier when talking about his favorite variety of mung beans, he used his fingers to draw a picture in the sand.

This village has been more to Abaye than just a test subject. She's part of it now. The day she learned her sister died, the village wrapped its collective arms around her. Abaye built and named the school's kitchen in her parents' honor. Children chant her name when she arrives after being away for months.

For it is here, in this remote West African village, where all the things she has devoted her life to — children and education and agronomy — have come together in the form of one little bean. The fruits of this labor will be reaped for years.

"Feeding the children is feeding the community," Sow says as the two say goodbye. "Only God knows how happy we are."

*Max Esterhuizen contributed to this story. Youssoupha Gueye assisted with translations.*

Watch a video on mung beans in Africa at



[magazine.cals.vt.edu](http://magazine.cals.vt.edu)





## Cyril Ayuk

*Food Science and Technology*

Dr. Laura Strawn inspires resilience and spontaneity makes working with her fun. She is smart and pushes us to always learn and be up to date with our research. Dr. Strawn has helped me by working to connect me with people in our industry which is helpful because it allows me to create my own network within industry.



## Anne Cappellina

*Dairy Science*

I work under Dr. Gonzalo Ferreira in the dairy nutrition lab. He is a really good leader and he has a lot of qualities that I admire and that I want to have once I am in the working world. He made sure to really mentor all of us, and he really gave us a lot of opportunities to learn. Even if it were tasks that he probably could have done more efficiently, and in a quicker amount of time, Dr. Ferreira gave us those learning opportunities. He really cared about making sure to take us step by step in teaching us in the lab.

# Teaching With PURPOSE



## Hunter Hilbert

*Agricultural, Leadership, and Community Education*

Dr. Donna Westfall-Rudd is very passionate about agricultural education. She has always been inspiring in class time. She always brings her perspective from the field and past lived experiences that help connect us to what it's possibly going to be like when we are teachers one day. She is super dedicated and driven.

Snapshots of students impacted by our faculty



## Leilani Hyatt

*School of Plant and Environmental Sciences*

Dr. Mike Ellerbrock makes me want to roll out of bed and go to class each morning. I really appreciate how Mike makes an effort to get to know everyone in the class. He makes an effort to remember your name, and remember where you're from, and what you are majoring in. I really appreciate that he does that.

# LANDMARK GIFT PAVES THE WAY



Left: Michael Beahm ('73) and his wife, Lillian Beahm. Above: The Beahm family farm

By Max Esterhuizen

## From farmer to globetrotter

Michael Beahm ('73) didn't leave the farm much growing up – that's the life of a farm family. He attended 4-H meetings when he learned of International 4-H Youth Exchange Program which would give him the chance to expand his horizons. When the opportunity for international travel presented itself, he jumped on it.

Just two days after his graduation from Virginia Tech, he was on a plane headed to South Korea as part of the International 4-H Youth Exchange Program.

Beahm stayed with farm families in South Korea and learned how to farm in another part of the world and how the techniques could be used or adapted back home. He witnessed firsthand how local farmers overcame challenges and was eager to share this newfound knowledge with people in his own country.

"The experience made me aware of what was different and how to better understand things," said Beahm, who graduated with a degree in animal science. "4-H was a huge part of my childhood and upbringing and this experience was and continues to be a testament of the power of 4-H for youth."

In a show of appreciation for Virginia 4-H and the Agricultural Research and Extension Centers that helped Beahm and his wife, Lillian, throughout their farming career, both institutions will receive a landmark gift – a \$750,000 estate gift from Michael and Lillian Beahm to help the life-changing and foundational services help others the way they helped them.

These vital programs gave Michael and Lillian Beahm a head start and propelled them into successful and rewarding careers in Virginia's agriculture industry.

"This is an incredible gift for Virginia 4-H and Virginia's Agricultural Research and Extension Centers," said Ed Jones ('79, '83), director of Virginia Cooperative Extension. "Our farmers and our youth are the backbone of our state and our future. Michael and Lillian's support will further bolster our renowned services to help our farmers and our youth. We are incredibly grateful for their generosity."

## A lifelong connection to the Agricultural Research and Extension Centers

Michael Beahm's family farm was established by his mother's parents and his father, Charles Beahm, who joined the family farm by marriage – he had been a bookkeeper and rural mail carrier.

In the 1930s, Michael Beahm's maternal grandfather, J. W. Sanderson, started working with the Virginia Cooperative Extension service setting up his vegetable operation utilizing both the vegetable production and agricultural engineering services.

As a child, Michael Beahm came to Blacksburg with his father for vegetable grower field days.

Even then, as they do now, Virginia Tech researchers led the charge to help local communities thrive and boost the entire agricultural industry. The Beahm's learned the cutting-edge methods and tools of the day to use on their farm.

"We've been fortunate to have such good agents over the years," Michael Beahm said. "There's been strong leadership from the top and great agents in Roanoke and Botetourt counties."

## Making the best better

Beahm experienced the many opportunities that 4-H offered – livestock judging, National 4-H Congress, school clubs, and a 4-H All-Star. He also participated in Future Farmers of America, or FFA as it's called now.

These programs helped Beahm grow into the farmer he is today – and played a vital development role for him through his years in Botetourt County Public Schools.

"The reality of farming is that you just don't leave the home that much," Beahm said. "There's always something to do – we worked all seasons with livestock and vegetable farming. I always wanted to go somewhere and 4-H gave me those opportunities."

That's when the opportunity for international travel presented itself.

"I wanted to experience something new," Beahm said. "The trip affected my attitude. I didn't think it would impact my career as much as it did – it changed how I viewed things and how I interacted."

Combined with his experiences in South Korea immediately following his graduation from Virginia Tech, he received immense support and hands-on skill-building and almost became an Extension agent himself. But the farm called him back. Through a lifetime of support from Lillian Beahm, who aided her husband's career as a farmer through her own career as a clinical audiologist, Michael Beahm enjoyed a few privileges in his career that not many people receive.

"I got to work with my father," Beahm said. "There aren't many businesses where families can work together, but farming is one. I consider myself fortunate."

# FROM PESTS TO PROTEIN

## Edible insects emerge as a sustainable food source

By Mary Hardbarger

### BUGS...THEY GET A BAD RAP.

Some bite. Some sting. Some stink.

But what if they could be considered beyond their pesky traits? What if certain insects could actually benefit the health of humans, of animals, of the entire planet?

Virginia Tech scientists think so, and they have the research to prove it.

Faculty at the Virginia Seafood Agricultural Research and Extension Center are testing - and eating - certain insects to develop alternative and sustainable food sources to support a world population forecasted to reach 10 billion by 2050.

Some of the insects, seven, in their lab so far, are edible on their own. Others are being converted to proteins that are rich in nutrients and antioxidants and incorporated

into bars and cookies. And the bugs aren't just for human consumption. Some of the insects are being used in animal feed, as well.

Beyond its nutritional value, the consumption of bugs is also a boost for the economy and Mother Nature, explained Reza Ovissipour, an assistant professor in the Virginia Tech Department of Food Science and Technology and Virginia Cooperative Extension specialist.

"Blending our current agricultural practices with insect-based protein will increase the food supply to meet demand while reducing pressure on natural resources," he said. "Eating bugs is good for the Earth. It is good for the environment, and it is good for your health."

### BARBECUE-FLAVORED BUGS?

Ovissipour began the insect protein project in 2018, inspired by a problem that had been bugging him for some time.

"Many agricultural byproducts have high value, and they are being thrown away. Not only are they not being used, but they are also being added to the environment and causing environmental issues," he explained.

In Ovissipour's lab, these valuable by-products aren't treated as waste, but rather, as insect feed.

"We are using different types of agricultural waste materials, which are really rich in proteins, fibers,

and carbohydrates, to feed our insects," he said.

Loud and annoying with their buzzes and clicks, two of the most common insects used are black soldier flies and crickets.


Using fermentation and different bioprocessing methods, the insects are eventually converted to protein with high nutritional and medicinal value. Research suggests this source of protein may mitigate several health problems, including hypertension, Ovissipour said.

Once the protein is created, it is extracted and mixed with different ingredients to produce certain food items, such as cookies and protein bars with endless flavor possibilities. Some are savory. Some sweet. Popular among Ovissipour's team: barbecue.

Ovissipour compared the process to that of brewing beer: yeast converts glucose to create a value-added beverage.

Also in his lab are bugs such as cicadas, silkworms and scorpions that are edible on their own. Their taste isn't preferred by everyone, but neither is the taste of seafood, beef, or poultry, Ovissipour pointed out.





"Eating bugs is good for the Earth. It is good for the environment, and it is good for your health."

The research team has been working with large companies and insect producers across the United States to put the products on the market.

Some, such as crickets, silkworms, scorpions, meal worms, sago worm, and Junebug, are already on store shelves, Ovissipour said, so be on the lookout.

### FROM THE LAB TO THE TABLE

Beyond insect harvesting, Ovissipour's team is also using similar research methods to create cultivated meat: animal cells grown in vitro to form anything from chicken tenders to salmon fillets.

This effort is an additional attempt to keep pace with the growing demand for food and meat, he said.

"Compounded with diminishing land and water resources and an accelerating climate crisis, new technologies that maximize resource efficiency and minimize waste are needed to feed an increasingly hungry world," Ovissipour said.

Whether a fish fillet, a beef patty, or a chicken nugget, everything begins with cells – the basic building blocks of organisms.

"In our lab, we're focused on stem cells from aquatic species to create seafood products," explained Lexi Duscher, a postdoctoral researcher at the Virginia Seafood AREC who is working in Ovissipour's lab.

Using fish stem cells, which can be ethically collected from live animals, Duscher will differentiate cells to selectively grow muscle and fat cells – the same cells and tissues that make up the fish fillets you can buy at the store. The cells, grown in specialized media in the lab, will then be assembled into a fish fillet.

Using animal stem cells and plant-based media, lab technicians can differentiate cells and grow muscle and fat cell types that can then be assembled into a final meat product. Mimicking a fish fillet using cell culture then requires structural engineering at the microscopic level.

"There are different ways to form the final meat product, but our lab will be focused on 3D bioprinting as well as scaffolding with plant-based and sustainable materials to achieve that delicious, flavorful meat texture," Duscher said.

### A COLLABORATIVE EFFORT

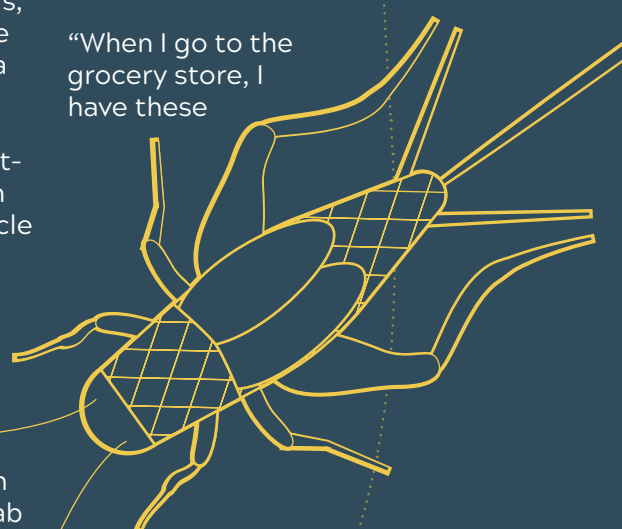
As new technologies continue to emerge for producing alternative food sources, such as smart agriculture and airborne agriculture, it is important to remind producers and consumers that these methods are not competing with traditional agricultural processes.

"We are just trying to introduce another option and we are trying to help farmers and growers be more sustainable and profitable," Ovissipour said.

"For example, insect farming is going to help farmers and agricultural communities because they can use insects to convert their byproduct to value-added products – products they can add to the soil as a fertilizer to enhance soil quality. They can also be fed to their chickens, their cattle, their swine, and their seafood."

Ovissipour is excited to see insects share the shelves with some other protein-packed favorites, like a juicy fillet of beef or chicken breast.

"When I go to the grocery store, I have these



options, and they are all good sources of protein. They are good for your health, and they are tasty," Ovissipour said. "My hope is that edible insects and insect protein products will soon become an option, too."



# RISING THROUGH LAND GRANTS

How Virginia Cooperative Extension and Virginia State University prepared Virginia Tech alumna Jewel Bronaugh for the No. 2 post at the USDA

By Max Esterhuizen

This wasn't the original path for Jewel Bronaugh ('94, '97). She didn't intend to become the Deputy Secretary of the United States Department of Agriculture and the first Black woman to hold the position.

An educator by trade, Bronaugh wanted to follow in her parents' footsteps and become a teacher. She wanted to impact people and help them achieve success in the classroom.

But instead of following their path – she forged her own. Now, she's not only helping youth achieve success, she's helping the entire country.

On May 13, 2021, the former dean of the College of Agriculture at Virginia State University and 4-H youth development specialist was confirmed as the deputy secretary of the USDA after being nominated in January by then President-Elect Joe Biden.

"I fully understand the historic nature of this confirmation, along with the responsibilities of my service in this role," Bronaugh said. "I join thousands of dedicated civil servants at the USDA who work in every state and 100 countries around the world. I know from experience how their work touches the lives of all Americans each day in so many positive ways. I value their work and identify with their selfless commitment."



*Jewel Bronaugh forged a path led her from Virginia State University to the federal government.*

The former commissioner of the Virginia Department of Agriculture and Consumer Services will face her biggest hurdle yet when she serves as the second-in-command at the USDA.

Her roots in Virginia Cooperative Extension and at Virginia Tech's partner land-grant institution, Virginia State University, helped her prepare to handle everything that awaits in the road ahead.

## AN EDUCATION FOR ALL

Virginia's land-grant institutions exist to provide higher education opportunities to people who otherwise would not have had that chance. It's the outreach arm that disseminates knowledge to the people.

"These institutions took a chance on me before I even believed in myself," said Bronaugh, who earned her doctorate from the Virginia Tech School of Education in 2000. "They gave me the chance to become an administrator. Where would I be without Extension, Virginia State, and Virginia Tech? I have no idea. They're the ones that pushed me forward and let me stand on their shoulders."

Bronaugh got that start when the Petersburg, Virginia, native returned to the commonwealth

to be closer to her family after teaching at Bowling Green State University in Ohio. An opening for a 4-H Youth Development Specialist job caught her eye. She had taught high school before, so she knew what it was like to work with youth.

Bronaugh honed her leadership skills during the statewide travels with farmers as both an Extension specialist and dean of Virginia State's College of Agriculture and 1890 administrator.

During some of these travels, she saw the heart and soul of Virginia's producers firsthand and she got to know Robert Mills ('94) and chair of the CALS Dean's Advisory Council, who is the 2017 Swisher Sweets/Sunbelt Expo Southeastern Farmer of the Year, a former member of Virginia Tech's Board of Visitors, and graduate of the College of Agriculture and Life Sciences.

At a Farm Bureau convention in Hot Springs, Virginia, Mills opened up to Bronaugh – who was then the Commissioner of the VDACS – about the mental state of farmers in Virginia. It's a difficult topic that few people want to talk about.

This was at a time when prices were depressed. The economy wasn't great. There was a constant stream of farms that were going up for foreclosure. The suicide rate of farmers was high.



*“Dr. Bronaugh has done exceptional work for the commonwealth, and we have no doubt that she will continue to do so at the federal level. We look forward to working with her and the USDA as we address our country’s agricultural, nutritional, and infrastructure needs.”*

*Virginia Senators  
Mark Warner and Tim Kaine*

“We sat down at the couch there in a little atrium room and I poured my heart out to her,” Mills said. “Her response to what I told her about the folks that I love so much here in Virginia was from the heart. It was overwhelming in the sense that she took what I told her, ran with it, and started a farm stress task force.”

Coinciding with the new task force, Virginia Cooperative Extension and professional agency partners conduct and go through training on how to identify critical mental health needs of farmers and farm family members in their communities. This includes agents having much-needed tools for talking to and providing referrals for farmers and family members who may need professional support and health care interventions.

“Sometimes it’s sitting down or standing across from a farmer and seeing them cry. Sometimes it’s been out of frustration. Sometimes it’s been out of joy. They are honest in what they share with me and the help that they need to continue to make the contributions to their communities and their families,” Bronaugh said. “It moves me, and it’s what motivates me to do the work that I do. The decisions that we make impact someone’s life.”

## **AN INSPIRATION FOR THOSE TO COME**

In a voice vote, the United States Senate confirmed Bronaugh in May, officially making her the first Black woman and woman of color to serve as the USDA’s deputy secretary and a role model for many.

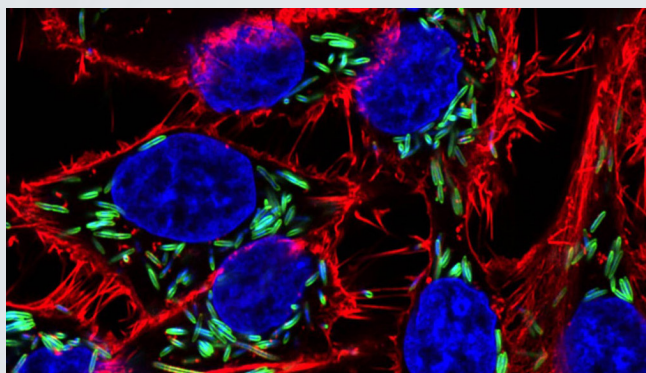
“My job is to represent all people who are clients of the USDA,” Bronaugh said. “But I do understand that my role as a woman and my role as an African American can require me to speak up for people who may feel that they have suffered systemic racism and discrimination. I have a role to play in being a voice and in sharing a perspective, if necessary. I realize that this is part of the responsibility of who I am and what people see in me in this role.”

Through all of her positions and roles in agriculture, Bronaugh continues to be a trailblazer.

# BIOCHEMISTRY MAKES BIG IMPACT BY EXPLORING THE SMALLEST OF THINGS

## SOLVING UNSEEN PROBLEMS

*Analytical and Nutritional Biochemistry*



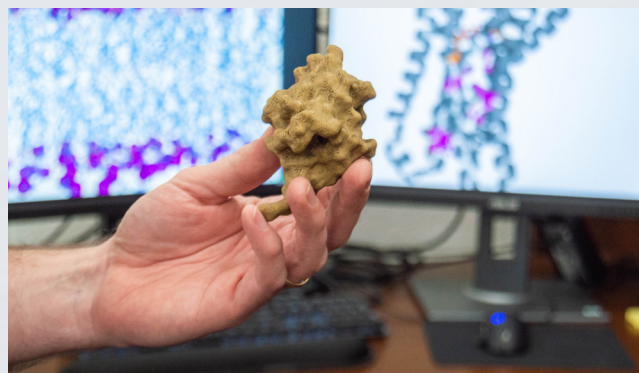
An unusual disease puzzled generations of farmers until Ruben "Charlie" Engel stepped onto the scene.

Engel, along with Wilson Bell ('34), noticed that once healthy cows would become disabled after licking the axles of farm machinery sitting around a farmyard. This observation led Engel to research and ultimately discover the cause of this disease: polychlorinated naphthalenes (PCNs), which were toxic substances derived from lubricants used on farm equipment in the 1950s.

He provided a PCNs detection method to prevent future herds of disabled cows. Today, Richard Helm carries on Engel's legacy by helping several research groups on campus utilize technology to answer questions about agriculture, human health, and the environment with the development of a university-wide mass spectrometry facility.

## UNDERSTANDING BODILY FUNCTIONS

*Enzymology and Protein Structure and Function*



Thanks to Bruce Anderson's seminal discoveries in pyridine nucleotide function, the larger scientific community now has a deeper understanding of how energy metabolizes in our bodies and how the heart and other cardiovascular tissues function.

Enzymology is now approaching an era where many problems can benefit from computation studies, which is what Justin Lemkul ('07, '12) does. Lemkul deploys advanced computational methods to elucidate the molecular details of the structure and functions of enzymes and nucleic acids in living systems. The molecules that Lemkul Lab researches are critical to understanding new approaches to treating Alzheimer's and cancer.

## THROUGH THE YEARS

**1952**

### **It All Starts with Engel**

Through the leadership of Harold Young, then director of the Agricultural Experiment Station, the Department of Biochemistry and Nutrition was established. In 1952, he recruited Ruben "Charlie" Engel from Auburn University to lead the new department.

**1953-1969**

### **The Initial Years**

When the building was occupied, additions to the faculty broadened the research expertise of the department. The department developed the biochemistry undergraduate major program, which was housed in the College of Arts and Sciences and the College of Agriculture.

**1970-1989**

### **The Second Generation**

In 1970, the department reached a transitional point with the hiring of Bruce Anderson as department head. A new generation of faculty hires joined the department over the next 20 years that shifted the department's research portfolio away from analytical and nutritional biochemistry and toward areas such as enzymology and molecular biology. The biochemistry building was renamed "Engel Hall" in 1988 in honor of Engel's many contributions.

**1990-1997**

### **Undergraduate Excellence**

Under William "Bill" Newton's leadership, faculty were merged between the Department of Biochemistry and Nutrition and the Laboratory of Anaerobic Microbiology, resulting in the present Department of Biochemistry. In 1994, the department was recognized as a University Exemplary Department for its outstanding research programs.



Through its 70-year history, the Department of Biochemistry has dedicated itself to operating at the inflection point of chemical and physical sciences with physiological, genetic, and biological sciences. The result? A better understanding of biological events at the molecular level.

## REDUCING DISEASE SPREAD

*Vector-Borne Diseases*



Virginia Tech biochemistry researchers work to reduce the spread of insect-borne diseases, such as Lyme disease, malaria, Zika, and yellow fever by learning more about the carriers of these illnesses. Zhijian “Jake” Tu and his collaborators were the first to discover the male determination factor in mosquitoes, a finding that could help reduce the spread of diseases that kill hundreds of thousands of people annually.

Chloé Lahondère, Clément Vinauger, and Brandon Jutras each work on a novel aspect of vector-borne disease research. Lahondère studies ecological and biochemical mechanisms important for mosquito and other insect sensing pathways; Jutras examines the biochemical composition of the cell wall present in the bacterium, which causes Lyme disease; and Vinauger investigates the mechanistic basis of vector-host interactions.

## SAFEGUARDING THE ENVIRONMENT

*Anaerobic Microbiology*



Dennis Dean has spent the past 40 years working with the anaerobic enzyme nitrogenase to extend the microbial capacity for biological nitrogen fixation to plant crops. The current Haber-Bosch process that is widely used for the industrial production of nitrogen fertilizers sustains more than 40 percent of the human population, but this process comes with challenges of fossil fuel consumption, production of greenhouse gases, and watershed health. Dennis Dean’s work with the enzyme nitrogenase is seen to be the key to replacing the Haber-Bosch process and improving the land that we use.

Anaerobic enzyme, called methanogenic archaea, are currently being studied in Kylie Allen’s lab because their complex energy metabolism provides important clues for mitigation strategies of greenhouse gases. This work is crucial for generating knowledge useful in combatting climate change.

### 1998-2004

#### **Partnership with Fralin**

The Fralin Life Biotechnology Center, now known as the Fralin Life Sciences Institute, served as a source of space and funds to develop new research initiatives for the Department of Biochemistry. Collectively, the department’s faculty employed the broad spectrum of research tools to explore how organisms function and to assess unique attributes.

### 2005-2011

#### **New Research Initiatives**

Supportive faculty clusters were created to allow for growth in the new research funding climate. Under Peter Kennelly’s leadership, the department recruited and expanded the development of the vector-borne disease research program and initiated new focuses in drug discovery and protein structure, function, and regulation.

### 2012-2019

#### **Building Community**

The expansion of the biochemistry undergraduate program resulted in the hiring of new faculty and the department saw a doubling in the graduate program. The department’s commitment to research and inclusivity expanded with the creation of EngelPalooza, a biochemistry research showcase for students, funded by a grant through the Howard Hughes Medical Institute in 2019.

### 2020-Present

#### **Resiliency**

To better serve all majors in biochemistry, the department became housed in a single academic unit within the College of Agriculture and Life Sciences. The renovation of facilities in Engel Hall, along with the acquisition of space in Steger Hall, has resulted in an expanded research footprint of the department.

# CALSAO highlights

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## Students selected to serve as CALS Sesquicentennial Ambassadors



Peter Arnold (Crop and Soil Sciences), Joyce Lu (Animal and Poultry Sciences), Grayson Moyer (Agricultural Sciences and Environmental Horticulture), and Rebecca Vick (Human Nutrition, Foods, and Exercise) are representing the student body at CALS events helping to celebrate and highlight the college's role in the university's 150-year history.



## New directors elected to CALS Alumni Organization Board

July 1 marked the start of the new planning year for the Alumni Organization and election of two alumni to director's seats.

DIRECTOR



**Sarah Jane Thomsen, '19**  
M.S. Crop and Soil Environmental Sciences

DIRECTOR



**Zach Jacobs, '19**  
B.S. Agribusiness Management

## Annual tailgate reunites CALS Hokies

The CALS Alumni Organization enjoyed hosting alumni, faculty, staff, and students at the annual tailgate before the Notre Dame game.



## Get involved on a CALS Alumni Organization committee

Our programming offers a number of ways for alumni to engage with students, faculty, and fellow alumni both on and off campus, in person and virtually through individual talents and a wide range of time commitments. Complete our volunteer survey at:

<https://www.cals.vt.edu/alumni/serve.html>

## CALS Dean's Advisory Council

The CALS Dean's Advisory Council elected officers and committee chairs for 2021-23 and two new members were appointed.

**Executive Committee:**

**Robert Mills, '94, Council chair**

**Katie Frazier, '04, Council vice chair**

**John Rowsell, '87, '91, Academic Partners Committee chair**

**Steven Critchfield, '80, Advancement Partners Committee chair**

**Robert Reinhard, '94, '95, Industry Partners Committee chair**

**New Member Appointments:**

**Kenneth Opengart, '85, '89, '91, Tyson Foods, Inc., Signal Mountain, TN**

**Steven Brown, Indian Springs Farm and Vineyard, Ltd., Woodstock, VA**

# CONNECT. ENGAGE. SERVE.

Together, let's help communities thrive for the next 150 years

Volunteers are the backbone of the CALS Alumni Organization, the college, and Virginia Cooperative Extension. Their passion for serving others has made the last 150 years possible and will continue to be a cornerstone of helping communities thrive.

This year, the entire CALS Alumni Organization, college, and Extension communities came together to create many special moments after a time apart.

From the launch of the Fightin' Hokies Lager, the annual CALS tailgate, the National 4-H Hall of Fame ceremonies, and other memorable events, the enthusiasm and support of alumni and volunteers all around Virginia and beyond made 2021 unforgettable.

Together, we work tirelessly to help Hokies overcome the challenges of the day and make it possible for students to pursue their true passions and to meet the demands of an ever-changing planet.

*Alumni leaders like Elizabeth Galbreath ('17), president of the CALS Alumni Organization and Robert Mills, Jr. ('94), chair of the CALS Dean's Advisory Council work diligently to connect and engage fellow Hokies and encourage all to serve in the spirit of Ut Prosim.*

## DONORS AND VOLUNTEERS OF CALS, EXTENSION, AND 4-H



**KRISTI, '88, '89, AND JOHN, '87, '91, ROWSELL**

We are grateful for the opportunities we found at Virginia Tech when we were here as students. We believe it is important to give back where we can. We wanted to support the COINS program in particular because it represents experiential learning at its best and showcases the breadth of the Ag Economics curriculum.



**PAUL BENNECHE**

Our youth is our future. I enjoy working with young people, and to a large extent, 4-H is my extended family. Giving back is important to me, and I feel if everyone gave just a little the world would be a better place.



**UTIBE BASSEY**

To be involved is to participate meaningfully and willingly in activities or causes that benefit others. There's always a benefit to you if your goal is for something to benefit other people. It is important to me because I believe the whole point of amassing anything - knowledge, skills, resources - is to give it away/apply it to where there is a need.

It's a privilege to be involved - to be involved means I not only have something to give, I recognize that I do, because everyone truly does, and there's a place where what I have to give - be it time, a listening ear, skills, a donation - is needed.



**MORGAN MESSER, '14**

I grew up in a family that put a strong emphasis on being involved in the community. I remember my dad being engaged in multiple boards and community events growing up. Being a full-time farmer, it wasn't lost on me that he didn't have a lot of time to spare, but still managed to make giving back a priority.

We all have to take our turn to give back to a community that gives back to us. That conversation had a resounding impact on my motivation to be involved in organizations at the local, state, and national level.



**JESSICA JONES, '04**

As a Hokie, *Ut Prosim* epitomizes service to others for the greater good of our global community today and in the future. I became a Hokie because my family had always emulated for me the need to serve others with what you have, where you are, and who you're with and to ultimately do what is right because it is the right thing to do.

We look beyond ourselves to see the needs of others, imagine the possibilities, take action, and join together to learn, inspire, and create a better tomorrow for all.





**COLLEGE OF AGRICULTURE  
AND LIFE SCIENCES**  
VIRGINIA TECH.

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Blacksburg, VA 24061

[www.cals.vt.edu](http://www.cals.vt.edu)

**Virginia Tech is home.**  
REUNION WEEKEND 2022



Virginia Tech is home. Return to Blacksburg for time with friends and campus during our four-day summer event June 9-12.

Enjoy dinner on the Drillfield, special campus tours, family activities, happy hours, presentations from university leaders, and more. We're celebrating in Blacksburg! Don't miss it.

REGISTER TODAY  
[ALUMNI.VT.EDU/REUNION2022](http://ALUMNI.VT.EDU/REUNION2022)



SAVE THE DATE  
**100TH**  
VIRGINIA 4-H CONGRESS  
JUNE 21 - 24, 2022



**EXPERIENCE  
CALSA '22**

**FRIDAY, APRIL 1, 2022**

A day behind the scenes for alumni and friends

Registration will open **March 1**.  
Check here for schedule updates,  
<https://www.cals.vt.edu/alumni/experiencecals>

**Celebration  
of Ut Prosim**

Friday, March 18, 2022

Register to attend by March 4  
<https://aimsbbis.vt.edu/CALSAOUtProsim2022>



COLLEGE OF AGRICULTURE AND LIFE SCIENCES  
**ALUMNI ORGANIZATION**  
VIRGINIA TECH.

