

THE magazine

Volume 18, No. 1



College of Agriculture,
Food and Environment

GROWING BUSINESS

PG. 8

ON MANY FRONTS: A GLOBAL BATTLE AGAINST HUNGER

PG. 14

IN SERVICE

PG. 19



It starts with us

Few days go by that I don't think about all the knowledge developed by land-grant universities that has continually improved the quality of life in this nation. This 155-year history of progress includes a longstanding federal partnership with the U.S. Department of Agriculture. This success has been underpinned by the confidence of state and federal governments, which has resulted in continuous funding and support. As leader of the college, my mandate is to honor the legacy of those before me by upholding a culture of continuous improvement.

Land-grant universities have produced many successful students and publications and a lot of essential outreach and game-changing research. This issue of *The Ag Magazine* describes our college's successes at home and abroad. Though ours is a rich, productive history, we can't rest. We must keep moving forward, building on our successes to create a bright future.

In 2015, the College of Agriculture, Food and Environment undertook a vast planning process, greater than we've ever done. A team of 34 college faculty, staff, and students listened to more than 1,830 individuals from all walks of life to develop the 2015-2020 Strategic Plan: *Building our Future on the Land-Grant Legacy*.

As a result, we are focused on hiring and retaining the best faculty and staff, providing students with lifetime skills, growing our state's economy and its quality of life, and improving our buildings and infrastructure. Being cognizant that this plan sets us on a course for the next 150 years, we developed a new college tagline, "It starts with us."

We have started lots of things, but infrastructure improvement has become the highest priority. A recent analysis by an architectural planning group concluded that



many CAFE buildings do not promote the best environment for learning and discovery. Since it has to start with us, we are finalizing a master plan for the ag precinct on campus. The first campus building to be renovated will be the Cooper House, the oldest building on UK's campus and the former home of Thomas Poe Cooper, dean from 1918 to 1951. Ultimately, we seek to construct eight buildings that will give faculty, staff, and students the optimal environment to grow and develop the best talent and knowledge for Kentucky and beyond.

The Kentucky Agricultural Development Board has recently granted partial funding for a Grain and Forage Center of Excellence at the UK Research and Extension Center at Princeton. The college is currently raising funds to match the board's \$15 million allocation. CAFE has also benefitted from a \$3 million gift from alumnus John Pirri, Jr. to improve teaching facilities for UK Ag Equine Programs.

It is certain that philanthropy will be essential to our success as we plan for the next 150 years and continue the momentum of "It starts with us."

—Nancy Cox
Dean, College of Agriculture,
Food and Environment



2 CAFE CORNER

Hall of Distinguished Alumni

Spotlight: Tammy Stephenson

A Small World—Academically Speaking

A Field of Lacefield

The Grain and Forage Center of Excellence

Flee, Fleas!

Mapping Disease

The Roots of the Matter

8 GROWING BUSINESS

With a quick and thorough team approach, Grow Kentucky is cultivating business success in the commonwealth.

14 ON MANY FRONTS

Around the globe, CAFE researchers and extension specialists are devising solutions to the many aspects of global hunger.

19 IN SERVICE

A Family Sciences graduate student's research is giving veterans the tools to successfully navigate the road back to civilian life.

22 SUM AND SUBSTANCE

Hops! Made in Kentucky

Polypay to Dorpor: Patience Pays Off

Tracking the Elusive Martial Eagle

The Ag Magazine is published by the University of Kentucky College of Agriculture, Food and Environment, an Equal Opportunity Organization. © 2017. Nancy M. Cox, Dean Rick Bennett, Associate Dean for Research Director, Kentucky Agricultural Experiment Station Larry Grabau, Associate Dean for Instruction Steve Workman, Associate Dean for Administration Gary Palmer, Interim Director, Kentucky Cooperative Extension Service

Agricultural Communications Services Director: Laura Skillman Editor: Carol Lea Spence Designer: Becky Simmermacher Writers: Jeff Franklin, Aimee Nielson, Katie Pratt, Laura Skillman, Carol Lea Spence Photographers: Matt Barton, Stephen Patton Cover Photo: Martial eagle in the Maasai Mara National Reserve in Kenya. Provided by Stratton Hatfield. Additional Photo Credit: Thinkstock.com

Send comments and letters to: The Ag Magazine Editor Agricultural Communications Services 131 Scovell Hall, University of Kentucky Lexington, Kentucky 40546-0064 E-mail: magazine@uky.edu

Mention or display of a trademark, proprietary product, or firm in text or images does not constitute an endorsement and does not imply approval to the exclusion of other suitable products or firms.

CAFE Hall of Distinguished Alumni

The College of Agriculture, Food and Environment conferred its highest honor on four alumni when it inducted them into the Hall of Distinguished Alumni in January. This year's recipients include a university chancellor, a college dean and advocate for African-Americans in agriculture, a beef breeder, and an agricultural economist.

CHARLES BOYD, '64
Charles Boyd returned to Mays Lick after graduation, where he built the family's cattle enterprise, Boyd Beef Cattle, into one of the nation's top seed stock producers of two major cattle breeds. Boyd mentored youth and adults in livestock evaluation, production, and management of quality cattle. He hosted and made his cattle available for 4-H, FFA, and collegiate judging teams from more than 20 states. Boyd was instrumental in founding the North American International Livestock Exposition and served on the beef advisory board and steering committee. Mr. Boyd died in 2015.

BRADY J. DEATON, '66
Brady Deaton is chancellor emeritus at the University of Missouri, where he was chancellor from 2004-2013. He is director of the Deaton Institute for University Leadership in International Development at Missouri. Deaton served as chair of the Academic Affairs Council of the Association of Public and Land-grant Universities and participates in advisory roles with the U.S. Department of Agriculture. He was appointed chairman of the Board for International Food

and Agricultural Development by President Barack Obama in 2011 and reappointed in 2012 for a four-year term.

HAROLD LOVE, '49, MS '63
Harold Love began his career as an assistant county agent in Mercer County and culminated it as an extension professor specializing in agribusiness marketing and management. His work in comprehensive management audits led to improving management techniques on both state and national levels. Management education and training programs in many parts of the United States still employ the techniques, approaches, and materials from Love's seminal work. He has done consultancy work in the United States and around the world.

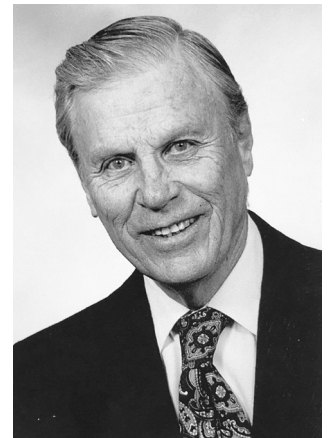
RUPERT G. SEALS, MS '56
Rupert Seals has had an esteemed career in higher education, rising through the academic ranks to dean. He has given much to agriculture through exemplary academic leadership. His advocacy and action has creating a national awareness of the vital need for increased economic support and opportunities for African-Americans at land-grant universities. Seals, a Fayette County native, became the first African-American to receive a master's degree from the UK College of Agriculture. He was professor and dean of the School of Agriculture and Home Economics at Florida A & M, and professor of animal nutrition and associate dean of the College of Agriculture at the University of Nevada. He is the recipient of numerous honors including induction into the George Washington Carver Public Service Hall of Fame at Tuskegee University.



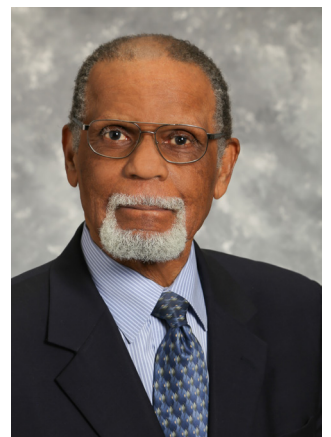
Charles Boyd



Brady J. Deaton



Harold Love



Rupert G. Seals

SPOTLIGHT: Tammy Stephenson



Originally from the Boston area, it was a chance to play collegiate soccer that brought Tammy Stephenson to the University of Kentucky, but it was her passion for nutrition and the opportunity to teach that kept her here. Now in her 16th year of teaching, Stephenson's ability to engage others has made the assistant professor in dietetics and human nutrition a student favorite. She has been recognized as a UK Alumni Association Great Teacher and a Provost's Outstanding Teacher.

Q How did you get into nutrition?

A When I came to UK, I thought I wanted to major in physical therapy or something in health sciences. I never thought of nutrition as a major, until I took the introductory nutrition class taught by Dr. Kristin Mercer. I just fell in love with that class and wanted to learn more about it. I feel like life has come full circle, because that's the class I have taught since I started teaching. It's neat for me to hear students say that class is the reason they majored in dietetics, because it's the same for me.

Q What is your teaching philosophy?

A Teaching is about developing or offering meaningful opportunities to our students both within and outside of the classroom. I try to think of ways I can truly engage a student to make them want to learn instead of just memorizing a whole bunch of content to take a test. I want them to come away with skills they will use in some way in their future. I know not all of my students are going to graduate with dietetics or human nutrition degrees, and they need skills like communication and writing, so I try to give them some of those skills.

Q Do you have any memorable student stories you want to share?

A To me, it's the little things. It's when I first meet a student, and they don't have confidence and they don't know what they want to do with their life. Then a few years later, they come back to me, and they've gotten into dental school. If I can even have just a small impact on their life, to me that's the best part of my job, and hopefully, it will be my legacy.

STEPHEN PATON

A Small World – Academically Speaking

About five or six years ago, UK's Plant Pathology Department started the process of offering a dual doctoral degree with the Universidade Federal de Viçosa in Brazil. Faculty members from UK and Viçosa have partnered on research and other projects in the past, so the relationship was already established. The dual degree program was finally approved last year, and the first Brazilian student, Franklin Machado, enrolled for the fall semester. Machado will take courses for one year in Brazil, then work at UK for 12 months. Back in Brazil, he will finish up his research and take qualifying exams. In the end, Machado will simultaneously receive doctorates from both UK and Viçosa.

"The requirements are a little more stringent than they are for either individual program, but it makes it



Universidade Federal de Viçosa in Brazil.

possible for them to work simultaneously toward those degrees," said Lisa Vaillancourt, director of graduate studies in the Department of Plant Pathology.

The Department of Veterinary Science has a similar relationship with the University of Copenhagen in Denmark. The first student, Jasmin Bagge from Denmark, began her course work in the fall. Bagge, who already has a veterinary degree from Copenhagen, will rotate between Copenhagen and UK until she finishes the four-year program.

"Interest in a dual degree program was initiated by

Denmark reaching out to us several years ago," said CAFE's James MacLeod, professor of veterinary science. "They wanted to expand equine science-related graduate training opportunities for their students."

—Jeff Franklin



University of Copenhagen in Denmark.

A Field of Lacefield

CAFE plant breeder Tim Phillips has developed a new tall fescue variety and named it after Professor Emeritus Garry Lacefield to honor his many contributions to the forage industry. Lacefield joined the college in 1974 as an extension forage specialist.

The variety, Lacefield MaxQ II, will be commercially available in 2017. The drought tolerant, insect resistant, vigorous variety is an offspring of selections of endophyte-free Kentucky 31 and related lines. It does not, however, produce the ergot alkaloids that can cause fescue toxicosis, which primarily affects cattle, but also can harm pregnant mares and milk goats. Like its professorial namesake, Phillips said, the Lacefield MaxQ II is "Kentucky born, Kentucky bred, and Kentucky proven to excel."

Read more at <http://news.ca.uky.edu/article/uk-breeder-develops-new-tall-fescue-variety>





STEPHEN PATTON

Chad Lee, director of the UK Grain and Forage Center of Excellence

Grain and Forage Center of Excellence

Like generations of Kentucky producers, Hodgenville farmer Ryan Bivens, '01, has relied on CAFE experts to help him make unbiased decisions to improve his grain operation. He sees the Grain and Forage Center of Excellence as an important way UK can help producers solve new challenges.

"We are sitting on a golden opportunity," he said. "The center will allow UK scientists to do more intensive research on production agriculture. It will not only be an asset to Kentucky farmers, but it will prove invaluable for farmers in many different states."

His feelings are echoed by many Kentucky producers, commodity groups, and legislators. Their support encouraged the Kentucky

Agricultural Development Board to partially fund the center with a \$15 million grant. UK must provide matching funds within five years. The college has launched a fundraising campaign to do so.

"Moving forward, growers will continue to play an important role in helping us shape the center's vision and mission into something that producers across the region can look to for real-world answers," said Chad Lee, the center's director.

Researchers and extension specialists will be tasked with improving grain and forage production in a way that sustains the environment and family farms. Center faculty primarily will be housed at the Research and Education Center in Princeton.

Potential research projects include warm-season grasses, irrigation systems, crop stress management, and water quality monitoring. Lee said the research will focus on local challenges, but he expects some projects will have regional, national, and international implications.

Such research will be critical for the future success of farms across the region.

"With agriculture changing at such a fast pace and the challenge placed upon today's farmer to increase production and efficiency, the need for a center like this is more important today than ever before," Bivens said.

—Katie Pratt

Flee, Fleas!

They're an irritant and a nuisance. They aggravate our pets and can cost us money and sleep. Fleas are responsible for more than half of all skin conditions that require veterinary care. A single flea can lay up to 50 eggs a day on an animal, but many eggs drop off onto carpets or bedding. This means treating the animal alone may not be enough to control the problem. The most effective products for treating your home's interior contain both an adulticide and an insect growth regulator. Read the labels carefully!

Read more:
<https://entomology.ca.uky.edu/ef602>



Jacqueline Smith. Maps can be found at <http://vdl.uky.edu/EpidemiologyInformation>.

Mapping Disease

Jacqueline Smith, PhD '12, epidemiologist at UK's Veterinary Diagnostic Laboratory, has created digital maps of reported rabies cases in Kentucky. Smith is putting to use the knowledge she has acquired as an epidemiologist and in her studies in geographic information systems, or GIS, mapping.

Almost 30,000 animals have been tested for rabies in the state over the past 25 years, with only 707 positive cases, mostly from skunks and bats. Rabies in domestic animals is rare. The Kentucky departments of Fish and Wildlife and Public Health contribute to the surveillance by testing deer, raccoons, and other wildlife.

"It shows the state does an extensive job of surveillance for rabies to protect the public health," Smith said. "We all collaborate to foster the idea of 'one health' in Kentucky."

Smith has also started mapping several bovine and equine diseases or their causative agents. So far, she has mapped bovine viral diarrhea, bovine leukemia virus, anaplasmosis, bluetongue, wobblers disease, streptococcus equi, and Johnes disease.

"The cool thing about these maps is they update automatically as we get new cases," Smith said. "We protect our clients' confidentiality by mapping based on the county of the submitting veterinarian, so no identifying information is given out."

Producers visiting the maps can get an idea of what disease is going on in their area and modify treatments or vaccines accordingly.

—Jeff Franklin

The Roots of the Matter

David McNear studies the rhizosphere—the area where plant roots, microbes, and soil interact. With a \$500,000 U.S. Department of Agriculture grant, he is exploring how phosphorus moves through the rhizosphere in a no-till cover crop system.

Phosphorus is a mined, finite resource only found in a few regions of the world. Some scientists expect, at current usage rates, phosphorus production will peak or plateau within the next 100 years. Therefore, it is important for farmers to efficiently use the mineral.

In most cropping systems, a lot of applied phosphorus doesn't make it into the crop, affecting use efficiency and the farmers' bottom lines.

McNear, UK associate professor in soil science, is studying ways plants can get the most from phosphorus in the soil, which should help farmers better capitalize on their fertilizer investment while at the same time preserving the environment.

For his study, winter wheat is the cover crop, followed by corn.

"Plants only use inorganic phosphorus. However, between 30 and 80 percent of all phosphorus in the soil is organic," he said. "In no-till systems where winter cover crops are used, the plant roots and the phosphorus within the cover crop remain in the soil, but we don't have a good idea how much of this phosphorus is accessible by the next crop. We want to try to quantify that and try to optimize the system by selecting wheat cultivars that are efficient at extracting phosphorus from the soil."

McNear, with the help of UK wheat breeder Dave Van Sanford, will screen wheat populations spanning 100 years to look for root attributes that could be favorable for phosphorus uptake. McNear will select the most promising varieties and, with the help of UK soil scientists John Grove and Josh McGrath, grow them under simulated field conditions in the new UK Agroecosystem Mesocosm Facility. The mesocosms, equipped with unique root viewing tubes called rhizotrons, allow him to photograph the roots during plant growth. This provides a unique look into the interaction of the remaining wheat roots with the newly planted corn roots.

As corn grows through the cover crop roots, it starts a process called rhizosphere priming, during which the new crop pushes carbon into

the soil, feeding soil microbes. The microbes begin to consume soil organic matter including the wheat roots. They retain some of the nutrients, including phosphorus, for themselves, but they release some of it into the soil, where it could be available for the corn.

"Scientists have thoroughly explored this process with nitrogen and carbon, but not much has been done with phosphorus," McNear said. "There's little doubt that the process is similar with phosphorus. Until now, we just haven't had the tools to quantify just how significant a contribution this process makes to P fertility."

Knowing this could help improve fertilizer and cover crop recommendations to farmers, which could result in fewer fertilizer applications.

—Katie Pratt




David McNear demonstrates the use of a rhizotron, which allows him to view the root system within a mesocosm.

STEPHEN PATON

Growing Business

BY AIMEE NIELSON
PHOTOGRAPHY BY MATT BARTON

A welder wearing a blue t-shirt, safety glasses, and black gloves is working on a metal part. Sparks are flying from the welding point. In the background, there are stacks of metal parts and a clipboard on a stand.

Business is cutthroat. Sometimes a little cultivation makes all the difference between growth and extinction. The University of Kentucky College of Agriculture, Food and Environment wants Kentucky companies to grow and thrive. CAFE's Grow Kentucky is cultivating seeds for success. An economic gardening program, it is a partnership between the Community and Economic Development Initiative of Kentucky and the Kentucky Small Business Development Center.

Grow Kentucky team leader Gordon Garrett describes the program as a quick, but thorough team approach to growing businesses.

“We’re in, we’re out,” he said. “It’s a very intensive six- to seven-week process.”

Garrett said the program works with companies that are poised for growth, but perhaps don’t have enough knowledge about their marketplace to move forward. Grow Kentucky deploys a team of specialists to help with strategic market research, geographic information systems, search engine optimization, and social media marketing.

“In a lot of cases, we can tell businesses about their marketplace and their competitors,” Garrett said. “We identify ‘watering holes,’ which are places where their customers may congregate online, and we try to get the business in close proximity to their customers in those ‘watering holes’ to give them potential for some one-on-one marketing.”

Digging deep and growing

When a company decides to partner with Grow Kentucky, they begin a relationship that lasts much longer than the official six- to seven-week program. The program fee is \$1,500, but many clients find grant funding to cover the costs. Company representatives meet with Grow Kentucky staff during a discovery call. The call frames their situation, identifies areas of success, and areas where they need help.

“We try to find out why they win business and why they lose business,” Garrett said. “We talk a lot about their challenges and where they want the company to go.”

Next, the team leader sends notes to other team members and gives them a week or so to digest the information and get to work. The team sets up an online location with the client where team members can share documents. The documents will include information about market trends, competitors, mapped geographic areas for targeted marketing, lists of websites, blogs, and online communities that help the client better understand current and potential customers.

Along the way, the team leader will stay in contact with the client.

“Our end goal is to help them grow,” Garrett said. “We couple our information with consulting. We don’t just hand them a stack of paper and say, ‘Best of luck. Call us if you need us.’ We try to go through all the information with them and help them make sense of it. We give them some strategic direction and hopefully help them increase sales, number of employees and, if at all possible, increase their tax base.”

The Harvest

Powell Valley Millwork–Clay City

In the past two years, Grow Kentucky has worked with approximately 30 clients. Some of them are far enough out of the initial consulting phase to evaluate their results.

Michael Thornberry is one of the five managing principals of Powell Valley Millwork, a wood mouldings manufacturer located in Eastern Kentucky. Michael graduated from UK in 2007 with a bachelor’s degree in political science. He moved to Washington, D.C. to follow a career in politics for several years, but wanted to get back home to Kentucky and join his family in their business. The company, Powell Valley Millwork located in Clay City, sounds young on paper but is actually a revival of a previous collaboration in the same industry that began in 1993. Michael’s grandfather and



Powell Valley Millwork



(l-r) Gordon Garrett, Jimmy Thornberry, and Michael Thornberry

father built a similar business in Montgomery County, which they sold in 2007.

“We missed the business, we missed the industry, we missed our team,” Thornberry said. “When we learned of the opportunity to acquire this site, we began talking with two gentlemen, Brian Lambert and Dale Budke, who were instrumental in the success of our previous facility. They both joined us as partners in this new company.”

The partners were able to rehire the existing 35 employees at the site, a staff which has since grown to nearly 90 folks working two shifts supplying customers across North America.

“The past couple of years have been filled with upgrades to the land and facilities, new equipment, new accounts, and responding to markets that are slowly making their way out of the recession,” Thornberry said.

Powell Valley Millwork manufactures wood moldings, primed interior trim, and plantation shutter components among other specialty products. They made a connection to Grow Kentucky through the

Mountain Association for Community Economic Development.

“We began talking with Grow Kentucky in 2015, describing what we did, who our current customer type was, what we were going after, and who we were looking for. We posed questions on how to gather more data and information to talk with customers or find better ways to communicate with folks who we knew existed but needed help making a connection,” Thornberry said. “As Gordon predicted, the data that came back to us was overwhelming. I’m proud to say that we’ve made contact with several of those leads across a wide variety of product categories and have had success.”

Simona Balazs is a geographic information systems specialist on the Grow Kentucky team with a primary responsibility of creating maps that help clients visualize their targets.

“We customize the maps to the client’s situation, and the results they get can really make a difference in how they market their products and services,” Balazs said. “It gives the client a better understanding of their business

possibilities and where they want to go.”

Thornberry said he and his father both have large maps provided by Grow Kentucky in their offices, which help them see their existing and potential customer base.

“It provides direction on who we should target and helps us implement the best strategy to reach a specific market,” he added.

The Powell Valley team said the website component of Grow Kentucky’s services had an immediate impact on their business.

“To have someone say, ‘Here, use this language, consider this blog post, Twitter, or Facebook post,’ gave us a significant leg up,” Thornberry said. “Having an organized and engaging website is an integral component to telling our story to anyone in the world with access to a computer, tablet, or smart phone.”

Powell Valley wants to expand and keep evolving. With Grow Kentucky’s help, they are well on their way.

“Working with Gordon and his team has been a huge benefit. They are a group of professionals with a keen ability to gather information and disseminate it in a way that is immediately useful to businesses,” said Jimmy Thornberry, Michael’s father. “Their work created a very large database of potential customers and projects that we had not been exposed to before. I think one of the things that is important to our company is to come up with something new and different and to think outside the box.”

Davert USA – Bowling Green

Davert USA is in a completely different business sector than Powell Valley Millwork, but still found a place with Grow Kentucky. Davert manufactures metal,



Randy Matthews and the Davert factory floor.

and their core clientele is in the automotive industry. They supply paint-assist tools to automotive manufacturing assembly plants. Davert's parent company is about 20 years old, but the U.S. division started in 2014.

Davert's president, Greg Head, and controller Randy Matthews received valuable information through Grow Kentucky.

"One of our goals as a company was to diversify our offerings," Matthews said. "Grow Kentucky gave us the ability to know what businesses were in Kentucky and who their contacts were."

Davert deals with four assembly plants in Kentucky—Toyota in Georgetown, two Ford plants in Louisville, and the Corvette plant in Bowling Green. With Grow Kentucky's help, Davert is finding

ways to expand business beyond the automotive sector and build relationships with companies in the agricultural machinery and rail car industries.

"I would say that you can get to where you want to go without working with Grow Kentucky, but it's going to take you a lot longer to do it, and it'll be a lot more expensive," Matthews said.

Success Leads to Satisfaction

Garrett has a diverse background as an entrepreneur in the software industry. He has experience with starting up, raising capital, and buying and selling other companies. He eventually sold his

company and came to work for UK about 10 years ago.

Helping businesses that are in trouble gives him a lot of personal satisfaction.

"Things happen quickly. Sometimes the money dries up, credit dries up, or notes get called in. We've been able to help businesses like that get going again," he said.

Working with a variety of businesses and seeing all kinds of ideas from truly creative people brings its own satisfaction.

"To help people realize their dreams, to take chaos and bring order to it, to help businesses get on their feet and guide them toward success, well, there's nothing like it," he said.

"As long as we have clients, we'll keep growing Kentucky." ♦

Wildcat

Farm dogs work from sunup until sundown and then some. They are among the hardest workers at the sheep unit at the college's C. Oran Little Animal Research Center in Woodford County.



Dogs

Della: A Tireless Herder

With just a stare and some quick footwork, Della, a border collie, commands the sheep. She takes directions from Endre Fink, her owner and the sheep unit manager. Border collies are very intelligent, high-energy working dogs with a natural herding instinct. Fink said he has to force her to rest, otherwise she would work all day without complaint.



D.O.G.: Protector of the Weak

D.O.G., actually pronounced dee oh gee, is a Bulgarian shepherd whose main job is to guard the sheep from predators such as coyotes. She is strong, instinctively protective, and stays with the sheep as a full-time member of the flock. D.O.G. is the first Bulgarian shepherd to live and work at the sheep unit. Don Ely, UK sheep specialist said it took the sheep awhile to adopt her into the flock, because she is so similar in appearance to Della, who is also black and white.



PHOTOS BY STEPHEN PATTON



On Many Fronts: A Global Battle Against Hunger

BY CAROL LEA SPENCE

Reading, writing and... rice. The young girl in the blue cotton dress, her feet clad in dusty sandals, has come to school for all three. At the Kentucky Academy in Ghana, students have learned an important equation: education = food.

Around the globe, hunger is the enemy—of health, of achievement, of development. Without a secure, sustainable food supply that cannot be sundered by an earthquake or a hurricane or social upheaval, without secure ways to store and distribute the food that is grown, and without a steady, healthy diet for its citizens, the future of developing countries is grim.

The solution doesn't lie on one front, nor is there a single answer. Consequently, when University of Kentucky College of Agriculture, Food and Environment faculty and students spread across the globe, they go to tackle one dilemma, hoping that many small actions will add up to solve an overwhelming global hunger crisis.

GHANA: Feeding the Future

Though one of the more developed countries in Africa, Ghana struggles to feed its people. A CAFE team made up of Janet Mullins and Amanda Hege in Dietetics and Human Nutrition, Mark Williams in Horticulture, and Mike Reed and Yoko Kusunose in Agricultural Economics, is addressing part of that problem through a three-year U.S. Department of Agriculture Foreign Agricultural Service grant, Feed the Future.

The 80-student Kentucky Academy, a kindergarten founded by former Dietetics and Human Nutrition Professor Kwaku Addo and his wife Esther in her hometown of Adjeikrom, is ground zero for the plan.

The team is focused on expanding the reach of the school feeding program the college established at the kindergarten, a program aimed at reducing hunger and malnutrition while increasing enrollment, attendance, and retention. The grant goals also attempt to increase domestic food production by providing women farmers with production expertise and introducing them to potential markets.

The USDA grant has provided an opportunity for the UK team to broaden the program into schools in Tamale (pronounced TAH-mah-lay) in the northern region. By



Children line up for mealtime at the Kentucky Academy in Adjeikrom, Ghana.
Photo provided by Janet Mullins

leveraging existing relationships and assets they've already developed through the academy, the team hopes to create more opportunities for women farmers to raise crops like legumes and maize.

Local partnerships are vital for long-term success. The CAFE team has joined with Vivian Tackie-Ofosu, an extension child development specialist at the University of Ghana, who has been working with UK in Adjeikrom since 2008 helping to build important relationships and provide training for school cooks, food buyers, teachers, and students. The project director in Ghana is Nashiru Sulemana, a doctoral student at the University for Development Studies whose dissertation focuses on the socio-cultural aspects of linking the Ghana school feeding program to local agricultural development. Mildred Osei-Kwarteng, also with the University for Development Studies, brings to the project a knowledge of the barriers women farmers face in Ghana, as well as a deep understanding of production and post-harvest practices.

Nashiru and another graduate student collected information in Tamale about what kinds of food school caterers use and what kinds of local food they're able to procure.

With the data collected, the team is now concentrating on encouraging school food buyers to buy more locally produced foods.

"If you really want to fight hunger, you have to make a difference in

poverty,” Mullins said. “The focus of the Foreign Ag Service is trying to develop in-country capacity for people to grow their own, so that we don’t end up shipping commodities around the world.”

HAITI: A Model for Success

Haiti has no barriers to trade. On the surface, that sounds like it would be a good thing for an island nation that regularly faces more than its share of natural disasters. With no tariffs, Haiti is free to, and does, import food from other countries. Neighboring Dominican Republic pours products across the border. The United States also funnels food products into the country. Reed, who aside from his work in Ghana is also involved in Haiti in his capacity as an agricultural economist, said he was surprised when he learned how open the borders are.

“They probably need some protections, some way to stimulate their economy. The policies are not there,” Reed said, explaining that when exports pour into a country, there is little incentive or ability to develop a strong domestic agricultural base.

Haiti’s farms are small—anywhere from one to five acres. Such small-capacity farming doesn’t provide much of a buffer, so exports, hurricanes, earthquakes can all spell disaster to the farmer trying to support a family and put a little money aside for the inevitable rainy day.

When the Foreign Agricultural Service sent out a request for a proposal to build a policy analysis matrix model to help the Haitian agriculture ministry make policy decisions, Reed and agricultural economics doctoral candidates Sheila Sagbo and Didier Alia responded. Though its name sounds complex, the model is a simple one that uses data on production systems and analyzes how inputs transform into outputs.

“In economies like Haiti’s, there are always distortions that change things. There might be a tax on fuel that causes a distortion that carries forward, and so that affects agricultural production and the margins that people have in the system,” Reed said. “This simple model incorporates those things, so the government can do ‘what if’ situations. What if we had to change this policy? Or what if we had a construction project that put a road in here? What would be the impacts of those decisions?”

The team focused on four of Haiti’s key agricultural commodities: rice, plantain, sweet potatoes, and beans.

Sagbo, who came to UK with a Fulbright scholarship, had done similar work in her native Benin. She spent a total of four months in Haiti, working with government officials and training enumerators to collect data on production,



Alia, in dark suit, training Haitians on using the model. Photo provided by Didier Alia.

profitability, and how current government policy affects profitability in five of Haiti's 10 departments (political divisions much like a province). Overall, the enumerators interviewed 500 producers and 100 transporters, as well as wholesalers, retailers, and processors. They collected data on the costs they incurred, their profits, and the innovations or policies that affected them. The data showed that each department was implementing its own policies, which might differ from those of other departments.

Alia is also from Benin. He has bachelor's degrees in mathematics and physics and a master's in statistics. It was his task to create the model.

"I use metrics as a tool to make informed decisions," Alia said. He explains the process easily, as if it's no harder than adding two plus two.

"With this model, we can assess whether the sectors are profitable, whether it is efficiently managed or not, and if not efficiently managed, where are the bottlenecks and what action can the government take to improve the profitability of any given sector?" he said.

The second component of the project is to build the capacity of Haitians to continue to collect this type of data and to build and update the model on their own. The third component is to raise policymakers' awareness on the importance of using this type of model to base their decisions on scientific analysis.

Using the model, the team found there is strong competition between local and imported rice. The lack of a high tariff on imported rice hurts local farmers trying to make a living. And the problem with plantain, a rising export, often lies with the middleman, who buys from the



Unloading corn from bags into a dump pit at one of the government silo facilities in Akure, Nigeria, where McNeill's team had their second training workshop in March 2010. Photo provided by Sam McNeill.

farmer at a fairly low price, then sells it to European buyers at two or four times what he paid the producer.

The UK team presented the completed model and the initial findings to the Haitian government at the end of November.

"We wanted to leave them something they could use forever," Alia said.

NIGERIA: Safe Storage

When Sam McNeill was in high school, the Rural Electric Cooperative Corporation sent his father to work in Thailand for two years.

"I remember seeing all the harvest losses in mangos, papayas, all that wonderful fruit, and they couldn't really preserve it," said the associate extension professor in the Department of Biosystems and Agricultural Engineering. "That's when I really saw firsthand how extensive food loss can be and the impact it had on local economies."

That early experience formed much of what McNeill has focused on in his career. Since 2009, he, Klein Ileleji, an agricultural engineer from Purdue University, and George Opit, a stored-products entomologist from Oklahoma State University, have focused on improving grain handling and storage methods in Nigeria.

On their first trip, under the auspices of the Foreign Agricultural Service, the team traveled into the northern reaches of Nigeria, passing small holdings of no more than five acres of grain sorghum, maize, millet, soybeans, or cowpea. Maize yields are fairly low, averaging less than 60 bushels an acre.

"They could be a real bread basket, if they could ramp up their production," McNeill said. "And some NGOs are making strides in that direction."

The men toured many of the existing storage complexes where the Nigerian government stockpiles surplus grain with the intent of releasing it during times of insufficient production.

“They had 11 or so at the time. Now they have 33. They have a lot of capacity, but they have not utilized all of those facilities to the fullest extent,” McNeill said.

The team determined that training was needed to improve hygiene practices, to eliminate the need for many chemical fumigants, and to reduce worker exposure to pesticides—insects are a problem in equatorial Nigeria’s warm climate.

Backed by funding from the U.S. Agency for International Development, the men develop training materials and have returned 11 times to conduct training sessions.

“They have some challenges in basic handling, because despite the fact that these are modern facilities like you would see in the U.S., grain comes to the facilities in bags,” McNeill said.

It puts a lot of responsibility on farmers to dry everything properly before it’s bagged. At the storage facilities, workers open the sacks and empty them individually onto conveyors.

“Typically they have 10 100,000-bushel bins. It’s a well-laid out plan, but they haven’t grown into the bulk handling system as quickly as they thought they might,” he said.

In the past, farmers brought in maize at a higher moisture level than the government-recommended 12 percent, which is safe for proper storage.

“High moisture levels have been one of the problems that has caused spoilage and losses during storage,” McNeill said.



Sam McNeill ties a bag of corn. The PICS bags have two plastic liners, which have to be tied separately to provide an airtight seal. PICS bags were evaluated with four other treatments to compare their performance with untreated corn in a 12-month study. Photo provided by Sam McNeill.

Each facility has a dryer, but the dryers aren’t used, because they can’t be trickle-fed from bags.

Loss is considerable, up to 25 or 35 percent of production. Determined to help Nigerians reduce that figure, the men have trained more than 400 farmers, grain merchants, warehouse managers, extension educators, and processors. They’ve also held four training workshops in neighboring Ghana, where bags are stored intact in warehouses.

McNeill and Opit’s work continues. They are now part of a project led by Kansas State University in Ghana, Ethiopia, Guatemala, and Bangladesh. McNeill and Opit are leading an 11-member team in Ghana. There, they have been testing a team member’s low-cost moisture meter, something McNeill said has great potential around the world.

McNeill returned to Ghana in January to conduct another training, this time with the intent of reaching the people who do most of the harvesting and handling of the crops—women.

He has been in Africa so often, the Nigerians he works with kidded him during his last trip, saying they should give him an honorary chieftancy.

“I don’t know if I need that, but I never thought I’d hear it,” he laughed.

Grain by grain, school by school, farm by farm, CAFE faculty and students are inching the world out of hunger and toward a brighter, more sustainable future. ♦

In Service

BY JEFF FRANKLIN
PHOTOGRAPHY BY STEPHEN PATTON


A moment of clarity for David Weisenhorn may have come on one of the most tragic days in this country's history, September 11, 2001.

Weisenhorn was stationed at Fort Myer in Arlington, Virginia. He was in the 3rd U.S. Infantry, referred to as "The Old Guard," the oldest active-duty infantry in the Army. When al-Qaeda hijackers flew American Airlines Flight 77 into the Pentagon that morning, Weisenhorn was heading to a command and staff meeting at Fort Myer, just across Interstate 35. His building shook from the impact.

"Within ten minutes of that plane hitting the Pentagon, my chaplain and I were on the grounds of the Pentagon with a gurney, providing first aid to those who were coming out," he said.

That horrible day gave birth to Weisenhorn's life career—giving back to the military through service.

"In that moment, it was just to provide crisis counseling and truthfully just an open ear," said Weisenhorn. "It's amazing how tragic events like that really do shape what you are to do in the future."

A group of approximately 15 people, including men, women, and children, are posed in a narrow, vertical crevice of a large, moss-covered rock formation. They are all looking towards the camera and smiling. The crevice is formed by two large, textured rock walls that are covered in green moss and lichen. The lighting is bright, suggesting daylight. The group is dressed in casual outdoor attire, including t-shirts, shorts, and hats. Some of the children are wearing hats with logos. The overall mood is positive and adventurous.

Weisenhorn joins families at Military Teen Adventure Camps. The camps offer military service members and their teenage children outdoor experiences and a chance for service personnel to reconnect with their families after deployments.

Armed with Education

Weisenhorn is currently working toward a doctorate in family sciences in CAFE's School of Human Environmental Sciences, building on his own experiences to help military personnel. His doctoral research focuses on identifying protective factors that help veterans in crisis.

"We are talking about people coming back from Afghanistan and Iraq, who suffer from post-traumatic stress disorder, anxiety, depression, substance abuse, and trauma," he said. "I am trying to offer them some sort of relief and determine how we can protect against those problems."

In his research, he has looked at combat exposure, length of deployments, number of deployments, exposure to suicide victims, and traumatic loss as variables that cause veterans to have these issues.

"I've seen these things first-hand as a veteran myself, being in the military as a chaplain's assistant, working with families, and seeing the additional stress deployments and military work often have on the family," said Weisenhorn. "It's good to be on the helping side of that now to offer programs that really help those families—whether it's reunification or creating tight marital bonds."

Weisenhorn works part-time as a research assistant in Family and Consumer Sciences, paired with Kerri Ashurst, a senior extension specialist who works with military family programs and camps.

The position has given Weisenhorn the opportunity to serve at many of the military teen adventure camps. The camps are designed for military service members and their teenage children, with all expenses paid, including travel. Each camp offers a high-energy, high-adventure outdoor experience that allows teens to build confidence and leadership and teamwork skills. Weisenhorn serves as a military family life counselor at the camps, and if anyone needs to talk with someone, he is there for them.

"When I go on these trips, I get to talk to the military personnel in the family to see how the camps are impacting them and to encourage their participation," Weisenhorn said. "We want to know if they find these camps helpful, so more camps can be provided for military personnel."

Joe Salinas, a 20-year Army veteran currently based in Fayetteville, North Carolina, took his two oldest sons, 14-year-old Nathan and 12-year-old T.J., on the Red River Gorge trip this past summer. Salinas has had several deployments over his military career, and he said the camps help him reconnect with his sons and reflect on his emotions.



David Weisenhorn high-fives Anna Morataya after "scaling the heights" at the Red River Gorge.

“The Red River Gorge trip was the first one that I really noticed the impact of the counselors like David,” said Salinas. “Especially the group discussions and the one-on-one time with David. He is just a phenomenal guy. We swapped stories, compared notes a little bit. I just found that therapeutic.”

Guard Against the Toll

When families spend time together at the camps, improvement in communication results, especially among adolescents. Discussions each evening allow parents and teenagers to process their experiences. Structured questions are provided to the participants to help facilitate the family discussions. Several participant testimonials have reported using similar questions to continue having meaningful conversations at home. Using pre- and post-camp surveys and other data he collected under a Department of Defense grant written by Ashurst, Weisenhorn found that teens use the teamwork and problem-solving skills they learn at camp after a family member has been deployed.

It's not just children of military personnel who are affected. During the camps, all participants learn the value of asking for help, as well as how to work together to overcome an obstacle. The camp personnel then places that same instance or situation in context of a family deployment in order to show how the skills are transferable to their home environments.

Deployments take their toll on marriages too, Weisenhorn's research shows. Multiple deployments cause marital satisfaction to decrease, resulting in a rise in breakups among married military personnel. The results revealed that service members' length of deployment plays a role in both



Nate Springer and his son Curtis on a hike in the Red River Gorge during a military teen adventure camp. The elder Springer is a Lt. Col. and squadron commander at Fort Campbell.

the service member and spouses' abilities to cope with readjustment post-deployment. Longer periods of deployment were significantly related to reports of drug use and suicide intent and negatively related to marital satisfaction.

On the other hand, marriage can provide protection from post-traumatic stress disorder. In one of his studies, Weisenhorn looked at a sample of suicide-exposed veterans. The odds of a veteran with high-impact suicide exposure having clinically-significant PTSD symptoms were higher than veterans with low-impact suicide exposure. He also found that those who are married are half as likely to meet the criteria for PTSD than those who are single. His findings indicate that veterans who are married are also less likely to be highly-affected by another individual's suicide. Thus, marriage is a protective factor for suicide-exposed veterans.

As tragic and heartbreaking as the events of 9/11 were, Weisenhorn believes they were a defining moment for him.

“I just knew, if I could help in some way, this is what I wanted to do with my life,” Weisenhorn said. ♦

HOPS!

Made in Kentucky

The Kentucky craft beer industry is rapidly growing. Many brewers would love to use locally produced hops, but the local supply is so small most buy from growers on the other side of the country. Fortunately, the hop plant is native to Kentucky; it just hasn't been developed as a crop.

The UK Department of Horticulture hopes to capitalize on that and ultimately develop commercial hop varieties that Kentucky and the Southeast can call their own. Shawn Wright is a horticulture specialist at the UK Robinson Center for Appalachian Resource Sustainability in Quicksand. He's been growing hops at the center since 2011.

"Our hope for the future is to get funding that enables us to collect native hops germplasm and then select and breed a true Kentucky hop so our brewers can put that into their recipes and use that as a marketing hook," Wright said.

Interest in hops is increasing, as a lot of states are looking at them as specialty crops. Wright's program focuses on diversified enterprises; he believes hops could be an option to help replace tobacco income for some growers.

Farmers need about five acres to be viable as a stand-alone enterprise. Right now the largest hops grower in Kentucky has about three acres. Wright said growers will have to expand to be profitable, but he stressed that the market has to come first, otherwise "all you have is a hobby."

"They need to talk to the brewers first and see what varieties they need," he said. "Growers need to be very cautious when investing, as there is a surplus of some hop varieties on the market and the high prices may not last."

Craft brewers frequently change recipes. It takes about three years to get a hop variety into full production, so growers need to network and stay informed about potential buyers in the marketplace.

The hop plant grows from a rhizome and starts to emerge before the last frost of the spring. Wright said those first shoots are edible, and there may be a market for them.



STEPHEN PATTON

"You can sauté them, pickle them," he said. "I have seen pickled hop shoots sell for over \$40 for a 64-ounce jar. They start growing, and then they can freeze off. You don't actually start training your vines until after the last frost and then harvest them sometime in August or September."

Some growers are packaging hops in sachets because they do have some sedative properties. People put them in pillows as a natural sleep aid. Some soda makers are using hops in their products as well. Wright wants to explore how Kentucky growers can profit from growing hops in any way. He recently learned that UK will receive a Specialty Crop Block grant through the U.S. Department of Agriculture to study hops.

"Kentucky is known for horses and bourbon, perhaps we can be known for a specific variety of hops," he said.

— Aimee Nielson

From Polypay to White Dorper: Patience Pays Off

In the early 2000s, sheep producers started looking to hair sheep breeds to make their meat flocks more adaptable. Unlike wool breeds, hair breeds naturally shed their coat, so farmers could produce a quality meat animal and not have to worry about the costs and labor associated with shearing. The CAFE sheep unit had two wool breeds at the time, and the cost to add a hair sheep flock was just not feasible.

Researchers put their knowledge of crossbreeding to work and began to grade up to hair sheep over a series of breeding seasons.

“We decided if Kentucky producers were going to have an interest in hair sheep, we should know something about them,” said Debra Aaron, professor in Animal and Food Sciences. “Since our primary goal is to produce a high-quality, lean lamb, we decided to go with the white dorper breed.”

The white dorper originated in the 1940s in South Africa to meet the need for a high-quality meat sheep that could thrive in semi-arid climates.

Aaron said they began crossing some of the polypay ewes on the farm with a white dorper ram.



STEPHEN PATTON

“We have found that in general, the hair sheep are more resistant to parasites, which means April lambs can take full advantage of quality Kentucky forages.”

“We had to make sure people understood we weren’t doing it because we didn’t like the polypay, because we’re actually quite fond of the polypay. The polypay is an excellent maternal breed,” Aaron said. “We just wanted an additional breed to study, and we couldn’t afford to go out and buy them.”

After 10-plus years of grading up, UK now maintains a white dorper flock, considered purebred by the American Dorper Sheep Breeders’ Society. Along the way, Aaron, professor Don Ely, former research coordinator Tracy Burden, research coordinator Frank Berry,

and sheep unit manager Endre Fink, compared the white dorper to the polypay in many ways, including reproduction, lambing, mothering traits, and carcass quality. In true UK Cooperative Extension fashion, Kentucky producers can learn from specialists what to expect from hair sheep. From there, they can decide if the breed may be a good fit for their farm.

“They are very comparable to polypays in carcass quality, but it’s really hard to beat the maternal qualities of the polypay ewes,” Ely said. “We have found that in general, the hair sheep are more resistant to parasites, which means April lambs can take full advantage of quality Kentucky forages.”

One of the best things to come out of the project is the way the results can impact students in Aaron’s and Ely’s classrooms.

“Our research has been very valuable to our students,” Aaron said. “We’ve been able to show them firsthand what they are reading about in their textbooks. We can show them the results from several generations of grading up, and they can visualize the concepts much better than a book can describe.”

The UK white dorpers also have had success in the show rings of the Kentucky State Fair and the North American International Livestock Exposition. A few entries went on to become grand champions or reserve grand champions at NAILE. In 2015, UK was named premier exhibitor in the white dorper division at the NAILE.

—Aimee Nielson

Tracking the Elusive Martial Eagle

Solitary, silent, a fleck among the clouds, the eagle rides the air currents above the Maasai Mara National Reserve in Kenya. Two miles below, UK graduate student Stratton Hatfield bounces along rough trails in a Land Rover, more visible to the eagle than the eagle is to him. For 10 to 12 hours at a time, he searches along with his two Kenyan Bird of Prey Trust mentors, Simon Thomsett and Shiv Kapila, craning their necks to catch a glimpse of an elusive predator, the martial eagle.

The martial is the fifth largest eagle in the world, with a wingspan of 6 to 9 feet. The females can kill prey weighing up to 30 pounds; the smaller males, less. Martials are on the decline, and Hatfield is determined to learn as much as he can about the top avian predator in the African savannah ecosystem. His current research project, using transmitters and camera traps to track and study the birds within the reserve and surrounding communities and conservancies, is part of his master's degree work in wildlife conservation in the UK Department of Forestry.

"Part of the reason I can do what I do is the Maasai communities surrounding the Mara have leased their land for conservation," said Hatfield, who has been fascinated by birds since he was a child growing up in Angola, Zimbabwe, and Kenya.

"I'm not seeing this study as just a degree. I'm seeing raptor conservation as something I hope to dedicate a large part of my life towards," he said.



(l-r) Shiv Kapila and Stratton Hatfield examine a martial eagle before releasing it, part of Hatfield's research for his master's degree in CAFE's Department of Forestry.

Hatfield's passion and love for his homeland is evident in the way he describes the Mara, an enormous conservation area that is part of the Greater Mara Serengeti ecosystem.

"It is an amazingly open tall grass prairie, with rocky outcrops and hills and forests, with 100 thousand wildebeest and a pride of lions on the rocks, a herd of elephants under the trees, giraffes browsing by the river. It's beautiful. You add to that Maasai herdsman, 200 cattle walking through the plains, and it's breathtaking."

Outside that idyllic scene, though, population growth in Africa is monumental, which can seriously compromise the natural world.

John Cox, assistant professor of wildlife and conservation in the Forestry Department and Hatfield's graduate professor, links biodiversity loss not only with population growth but also climate change.

"Coupled with desertification, temperatures are getting hotter and rain patterns are changing. That can alter animal migrations and human land-use patterns," he said. "It's a major global problem and a challenge that we can't afford to ignore."

Because martials occur at very low density—one pair of birds may occupy 150 square miles of territory—much remains unknown about them.

Cox said Hatfield's study, in collaboration with Kaipila, Thomsett, Dr. Ralph Buij of the University of Wageningen, and Dr. Munir Verani of the East African Peregrine Fund, will lead to understanding the eagle's habitat needs.

The camera traps have caught some remarkable pictures of nesting pairs. Away from the nest, the team collects data through the use of ultra-light, solar-powered transmitters that fit like backpacks on the birds. Weak leather links built into the straps will cause the transmitters to detach after a year or two. With points recorded up to every 30 seconds, Hatfield and his colleagues can identify every tree where the bird roosts, how it flies to that tree, and how fast and high it flies—data that up until now was impossible to gather.

It's work that stands to greatly benefit the martial eagle, a very special symbol of Africa.

—Carol Lea Spence





Our CAFE researchers are improving production methods and yields in ways that will sustain family farms and the environment.

The Grain and Forage Center for Excellence at the Research and Education Center in Princeton

A golden opportunity for Kentucky's producers.

It starts with us.

For more information, visit
<https://gfce.ca.uky.edu/>

 College of Agriculture,
Food and Environment

ca.uky.edu

The Ag Magazine
115 Huguelet Drive
Lexington, Kentucky 40546
www.ca.uky.edu

Change Service Requested

It starts with us



CAFE's sheep unit's canine protector, D.O.G., as a puppy, growing accustomed to her flock—and vice versa.
Photo by Stephen Patton.

The College of Agriculture, Food and Environment is an Equal Opportunity Organization.