



AUBURN UNIVERSITY
FOOD SYSTEMS INSTITUTE

2016
Annual Report





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AUFSI personnel have been critical team members in my research and outreach programs, helping me develop research proposals and produce technical articles for food industry press organizations. My research and outreach programs are made better by their help. I couldn't do what I do, at the pace I do it without assistance from AUFSI personnel.

-Bob Norton, veterinary microbiologist in the Department of Poultry Science and Food Defense Working Group leader

Working groups grow in strength and number in 2016

The Food Systems Institute has been a part of Auburn University for five years now. So far, we are hopeful that we have not only provided a platform for important food systems-related research but also fostered beneficial interdisciplinary collaborations among a long list of AU faculty members.

These collaborations have come about through our 10 *active* working groups - Obesity, Food Defense, Antibiotics Resistance, Food Entrepreneur Initiative, Egg Products School, STEM, Animal Food Manufacturing, Farm and Consumer Environmental Safety and Security (FACESS), Aquaponics, and Virtual Chicken. By far, this is a record number of active working groups for us. They are solid, dynamic groups who meet regularly and have typically worked together for a year or

Cross-collaboration among working groups is invaluable in helping get ideas funded and ultimately solving problems within the food system.

more. Many of them have submitted more than one grant proposal or have organized multiple conferences. Some of these Working Groups now have their own websites - one of our biggest developments since last year. And I would be remiss not to mention our Food Entrepreneur

Working Group, which won the prestigious 2016 National Institute of Food and Agriculture (NIFA) Partnership Award for Innovative Programs and Projects.

We are even seeing cross-collaboration among these groups - Obesity and Food Defense, for instance - that has resulted in a new level of information sharing

at AUFISI. This type of collaboration is invaluable in helping get ideas funded and ultimately solving problems within the food system.

Additionally, we reached a milestone this year as we wrapped up a five-year cooperative agreement with the FDA that involved helping

create a national food safety curriculum for inspectors of FDA-regulated food and feed. We submitted finalized storyboards in August, and course pilot testing has been completed. These courses are in addition to AUFISI's catalog of online training courses, which are offered to inspectors as well as other food industry professionals.

Managing the working groups, developing online education material, and coordinating conferences takes a diversely talented, committed staff - and we have that. AUFISI has six full-time employees plus eight part-time workers who specialize in areas such as graphic design, 3D modeling, educational technology, assessment, and web design.

I hope you'll keep reading to learn more about what our working groups, staff, and core faculty have been up to in 2016, as well as what we hope to achieve next year.



Patricia Curtis

Foundations formed

A strong groundwork has been laid for multiple AUFISI working groups—now it's about staying connected and growing stronger.

In the last year or two, many of our working groups have developed strong partnerships—the Food Defense, Food Entrepreneurship, and Obesity working groups, for example. Now it's critical these groups maintain momentum by continuing to communicate, seeking new research angles, and honing in on more grant opportunities.

Working groups bring together faculty from different disciplines, primarily to pursue funding opportunities but also to help these groups with intertwined interests develop an identity and become familiar with one another's research.

"AUFISI brought us together," says Stuart Price, an associate professor in the College of Veterinary Medicine. He is working with an interdisciplinary group of faculty from veterinary medicine and agriculture to determine whether *Salmonella*, a common pathogen in poultry, could be transferred to cattle in nearby fields.

"We would still be sitting there in our own little offices in our own colleges without AUFISI. There is no way to over-emphasize the importance of pulling faculty from various colleges with similar interests to work together."

In part, that is because funding agencies are increasingly insistent that faculty members involved

in interdisciplinary proposals are already part of a team that is working together. AUFISI is committed to providing a platform for these working groups.

"Interdisciplinary collaboration is a must in the current environment of research funding opportunities—and not just ad hoc groups getting together based on a specific funding announcement. "A history of long-term collaborations is important," says Bonnie Sanderson, associate dean for research in the School of Nursing, until recently chair of the Obesity Working Group.

We recognize, however, that some working groups function differently and may need a different type of support. Therefore, we have *Phase 1* and *Phase 2* groups. *Phase 1* groups are in the formative stage and may exist only to achieve a certain function. An example is the *Flavobacterium* Working Group, which brought the international 2015 *Flavobacterium* Conference to Auburn. AUFISI helped organizer Dr. Cova Arias write the funding proposal and organize the meeting. Working groups who have met and wish to collaborate but perhaps haven't yet found the right opportunity are also considered *Phase I*.

Phase II groups, by contrast, have a

strong identity. They meet regularly and have defined leadership. Members are always on the lookout for a new proposal, and they call upon each other for participation in new proposals. Examples of *Phase 2* working groups are those that have coalesced around food defense, STEM education, farm and consumer safety and security, food entrepreneurship, and issues related to obesity.

Working groups are not static. The new Animal Feed Manufacturing group, for example, evolved from an earlier FDA Working Group. That project included creating a three-dimensional online feed mill that allows someone to take a tour without leaving home. Another advantage is that they can even peer inside equipment.

Some *Phase II* groups have their own websites linked to the AUFISI site. The Food Defense group leader, Bob Norton, even has his own blog with a link on the working group's website. The FACESS group (small cattle farm safety) is currently working on a website, and we aim to eventually have websites for each *Phase II* working group.

We are pleased with the strong partnerships our established working groups have formed, and look forward to seeing our newer groups grow.

Obesity Issues

The AUFISI Obesity Working Group focuses on obesity prevention. The purposes are networking, sharing expertise, and generating collaborative research proposals. The group is particularly interested in the high rate of obesity in Alabama. *Bonnie Sanderson:* bks0010@auburn.edu

Aquaponics

The Aquaponics Working Group includes representatives from Tiger Dining as well as professors from fisheries, horticulture, and bio-systems engineering. Aquaponics combines aquaculture with hydroponics, or the practice of growing plants without soil. *Terry Hanson:* trh0008@auburn.edu

STEM Education

This group is working to make fun, food-related STEM lessons available to Alabama school children. *Bob Norton:* nortora@auburn.edu

Food Entrepreneur

The Food Entrepreneur Working Group brings together faculty and others interested in helping budding food entrepreneurs. This group also plans AUFISI's annual Food Entrepreneur Conference. *Jean Weese:* weesesj@auburn.edu

Gulf Coast Issues

The intent of the Gulf Coast Public Health Initiative Working Group is to understand the impact of the Deepwater Horizon oil spill on marine life, the Gulf Coast, and human communities along the coast. *Sue Duran:* duransh@auburn.edu

Antibiotics Resistance

Members of this working group are interested in identifying alternatives to the nontherapeutic use of antibiotics in the raising of food animals such as cattle, poultry, and swine. Overuse of antibiotics is correlated with the appearance of antibiotic-resistant bacteria in the food supply. *Sue Duran:* duransh@auburn.edu

Disaster Management

Most communities are just a few days away from running out of food should disaster—a hurricane, a tornado, an earthquake—strike. This new working group focuses on research and education related to disaster planning, preparation, and recovery. *Bob Norton:* nortora@auburn.edu

Salmonella Control

The *Salmonella* Working Group brings together faculty from the colleges of Agriculture and Veterinary Medicine to explore the transmission and control methods of the foodborne bacteria *Salmonella*. *Stuart Price:* pricesb@auburn.edu

FACESS

The Farm and Consumer Environmental Safety and Security Working Group (FACESS), formerly known as the Small Cattle Farm Safety and Security working group, is a collaboration between researchers from various AU departments and Tuskegee University. The group is heading into the final year of a five-year, USDA-funded project that aims to improve food security and safety

on small cattle farms. *Christy Bratcher:* clb0012@auburn.edu

Food Defense

Criminals or terrorists could score a big victory by tampering with the U.S. food supply. This new group is zeroing in on research and education to address this potential threat. *Bob Norton:* nortora@auburn.edu

Egg Products School

This working group is responsible for the National Egg Products School for the egg processing industry, foodservice, and allied industries. *Pat Curtis:* pat_curtis@auburn.edu

Animal Food Manufacturing, Quality and Safety

This group emphasizes education and training for all aspects of animal food manufacturing, worker safety, food chain safety and security, and regulatory compliance. *Charles Starkey:* cstarkey@auburn.edu

Virtual Chicken

“Virtual Chicken: The Digestive Tract” is a simulation project funded by a USDA Higher Education Challenge Grant. The simulation shows the journey a piece of corn makes through a chicken's digestive tract after consumption. This project is a collaboration among Auburn University and Pearson Education. *Pat Curtis:* pat-curtis@auburn.edu.



Protecting the ones you love

Food defense group studies threats that hit home

The U.S. Department of Homeland Security has designated 16 “critical infrastructure” sectors considered so vital that their incapacitation or destruction would seriously hurt the country. One of these sectors is food and agriculture. So what are the take-home lessons from recent terrorism events that occurred on U.S.

“At Food Safety Magazine, food defense, particularly as it relates to food fraud and intentional adulteration, has been a hot topic and continues to generate extensive editorial coverage. Additionally, as implementation of the Mitigation Strategies rule of FSMA approaches, we expect industry interest in this topic to continue to rise.”

*-Barbara VanRenterghem
Food Safety Magazine*

core faculty member Robert Norton, chair of AUFISI’s new Food and Water Defense Working Group. Norton is a long-time consultant to federal and state law

soil, and what are the implications for the food production and processing industries?

“Put bluntly, we may be entering a new phase in the war on terror, a phase in which these kinds of events occur on a more regular basis,” says Food Systems Institute

enforcement agencies, the Department of Defense and other federal agencies.

Norton says that ISIS’s situation in the Middle East is degrading. The terror group is finding it more difficult to recruit new fighters into Syria and elsewhere in the Middle East. As a result, ISIS has adopted a strategy of encouraging sympathizers and potential recruits to stay and attack from within, wherever they are situated in the U.S. and Europe.

Food corporations have assets that will be prime targets for individuals wishing to cause mass

casualties, Norton adds, including refrigeration plants that utilize ammonia as the coolant. For that reason, it is critically important that food corporations know who is inside their facilities, and any ancillary personnel like guards, delivery drivers and janitorial staff must also be vetted. Where allowed by law, personnel (particularly those who will be located at critical process points) should be given a thorough background check.

AUFISI has created a website with information about corporate defense, ranging from cyber security and operational security to threat intelligence, logistics security, and personnel and perimeter security. Representatives from key industries will be involved to ensure their concerns are considered and that practical solutions are discovered through collaborative problem solving, he says.

Norton has a blog about food defense at www.aufsi.auburn.edu/fooddefense/blog and writes regularly for *Food Safety Magazine*. The blog also features pieces by other working group members.

“Business cannot depend on the government,” Norton insists. “Brand is everything in this highly competitive economy, and a company not capable of protecting the consumers of its products is a company likely not long

Farm safety project enters final year, positive feedback rolls in

AUFISI's small cattle farm food safety and security working group has a new "face," or logo, and new name to go with it. The Farm and Consumer Environmental Safety and Security group (FACESS) is wrapping up year four of a five-year USDA-funded project that aims to improve food security and safety among small, local producers and vendors—and, thus, sustain their viability. Overall, the group believes the project has impacted aspiring farm owners, who have reached out to the group members for assistance as they become aware of project findings.

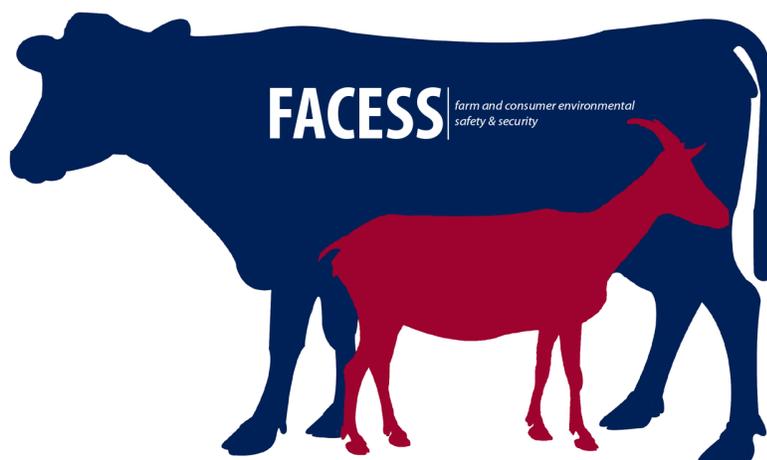
The early years of the project included collecting data for monitoring food safety through microbial loads on farms, in water sources, and in harvest facilities. As part of its research, the group also conducted interviews, case studies, and surveys among consumers and small producers/vendors. During 2016 (year four), the group investigated the occurrence of *E. coli* in the transportation/supply chain and continued collecting data from water.

But how do the findings from the study reach producers and the public? Workshops and a university curriculum model have been created, and the group is also developing training for dissemination by the Alabama Cooperative Extension System. For example,

a Meat Myths Meeting Series workshop composed of six meetings was taught at locations across Alabama. The workshops, intended for the general public, focused on myths of farming practices and the food we consume. Over 80 participants attended.

In addition, two Process Validation Workshops were held to explain to potential producers the lifecycle

concepts that link product and process development, qualification of the commercial manufacturing process, and maintenance of the process in a control state during routine commercial production. These workshops support process improvement and innovation through sound science.



A collaborative project of Auburn University and Tuskegee University

Tuskegee University has developed a curriculum model titled *Addressing Critical Issues for Small Livestock Producers Curriculum Instructors Guide*, which guides the working group in producing the remainder of the curriculum.

In the final year of the project, the FACESS group aims to continue improving farmer knowledge of food safety, simultaneously encouraging the production of more red meat to meet consumer demand. The group also plans to have the entire curriculum loaded onto a website along with data results and other resources. This website will be available through various outlets, including a link on the AUFISI website.

"Working with AUFISI allows for formation of an interdisciplinary group where research ideas can be strengthened and goals can be developed to create outcomes applicable to a diverse audience. It is always helpful when we can challenge each other as researchers to think outside our specific area of expertise and integrate ideas across disciplines." - Christy Bratcher, AU meat scientist and FACESS group leader

Full of

Flavor

Fourth annual Food Entrepreneur Conference doesn't disappoint

One of AUFISI's most active working groups is the Food Entrepreneur Working Group, which aims to connect small food business owners to resources in the state. The working group's annual conference is an important part of this effort, as it gives aspiring entrepreneurs tools needed to grow their business as well as an invaluable opportunity to network face-to-face.

The 4th annual Food Entrepreneur Conference was held April 27-28 at the Center for Advanced Science, Innovation and Commerce (CASIC) in the Auburn

Group earns university & national recognition

The Food Entrepreneur Working Group received the prestigious 2016 NIFA Partnership Award for Innovative Programs and Projects. The USDA National Institute for Food and Agriculture (NIFA) annually recognizes outstanding contributions by land-grant universities and other institutions. The team was recognized at the NIFA Day of Appreciation in Washington, D.C., on October 6.

Additionally, the group received the 2015 Project Team Award from the Auburn University College of Agriculture.

Attendees were treated to an interesting lineup of successful entrepreneurs who offered "real life" advice for starting a food business, including keynote speaker



Tiffany Denson, T. Lish Dressings and Marinades

Chuck Caraway, owner of Southern Classic Food Group in Brundidge, Ala. Caraway began his business about 15 years ago with just seven people, producing a variety of sauces, dressings, marinades and the like. The company now employs more than 200 workers and is in the middle of a multi-million dollar expansion as well as creating a subsidiary, Magnolia Vegetable Processors.

Tiffany Denson of the Birmingham-based T. Lish Dressings and Marinades gave an inspiring recount of her journey from bottling her signature dressing for holiday gifts to nabbing shelf space in supermarkets across the Southeast. Danny Fox, owner of Tanner's Pecans and Candies in Mobile, also spoke on the second day of the conference. Getting down to nuts and bolts of food entrepreneurship, industry experts from the Alabama Department of Public Health, ACES, the Alabama Small Business Development Center, and the marketing department at Auburn University discussed important topics such as food safety regulations, product labeling, financing, and marketing.

Additionally, breakout sessions allowed participants to divide into interest groups to consult with experts in areas such as food processing/food service, Cottage Food Law, aquaculture, food trucks, and – the conference's newest breakout – developing a small business as a minority.

AUFSI collaborates with state to improve produce safety

AUFSI is collaborating with the Alabama Department of Agriculture and Industries (ADAI) over the next five years to develop a statewide Produce Safety Program that aligns with the Food and Drug Administration's (FDA) nationwide Produce Safety Rule. The rule includes science-based minimum standards for the safe growing, harvesting, packing and holding of fruits and vegetables. Together, AUFSI and ADAI will provide education, outreach, technical assistance, and training to farmers that handle produce covered under the rule.

AUFSI's main role will be to develop the training and education materials (online courses, face-to-face training materials, assessment,

etc.) by working closely with both ADAI and our partner, the Alabama Cooperative Extension System (ACES).

The program will include regulator training to help ensure long-term enforcement of the Produce Safety Rule in Alabama. ADAI and AUFSI will receive \$5.2 million from the FDA over the next five years to first perform a needs assessment for a Produce Safety Program and then carry out program training and education activities.

These efforts will move the state of Alabama into the national Integrated Food Safety System (IFSS) and effectively fulfill the requirements of the Food Safety Modernization Act (FSMA). Other states are simultaneously developing similar programs.

Training consortium project with FDA wraps up

In 2011, AUFSI entered into a five-year, \$3.9 million cooperative agreement with the Food and Drug Administration (FDA), known as the Virtual Food Systems Training Consortium (VFSTC).

During the last year of the project, we collaborated with the International Food Protection Training Institute (IFPTI) and the FDA to create online courses for inspectors of FDA-regulated food and feed, which fit within the first phase of a new national food safety curriculum. Our team worked closely with subject matter experts over several months to develop scripts for five courses – Sanitation, Personal Safety, Biological Hazards, Allergens, and Communication Skills. Once those scripts were reviewed, revised accordingly, and approved in the spring, one of our eLearning specialists created storyboards including photos, graphics, and videos for each of the five courses.

The complete storyboards were reviewed and necessary revisions made in July and August.

Course pilot testing wrapped up in fall 2016.

The new curriculum helps fulfill FDA's requirements outlined in the Food Safety Modernization Act (FSMA), which mandates a more proactive approach to food safety.

Additionally under VFSTC, AUFSI built a catalogue of online, self-paced training modules and courses that focus on similar or at least related topics such as food safety, common pathogens, pathogen detection, and social and communications skills. In fact, much of the information in these courses was incorporated into the national curriculum. They are free to local, state, and federal food and feed inspectors, but the courses are also offered to other industry professionals for a fee.

The VFSTC, also known as our FDA Training Working Group, ended in fall 2016.

Visit www.aufsi.auburn.edu/training to see a list of the available courses offered through AUFSI.



Aquaponics Working Group 'Future of Farming'

One of the Food Systems Institute's newest working groups brings together researchers from fisheries, horticulture, and biosystems engineering to study aquaponics, which has been called "the future of farming" because of its highly efficient use of water to grow both fish and produce. With AUFISI's help, the working group recently secured USDA funding to further its research.

Aquaponics combines aquaculture with hydroponics, the practice of growing plants without soil. An aquaponics system optimizes productivity per acre of land by producing far more fish and vegetables per square foot than traditional methods. Aquaponics also eliminates the need for traditional

chemical fertilizers with the potential for run-off, which can pollute streams and rivers and ultimately carry nitrates into the oceans to nourish algae blooms that absorb oxygen, creating vast dead zones

where most sea life can't survive.

We are trying to maximize water and feed efficiency, two of the major inputs in aquaculture. When you release water from a fish tank, you can hear dollars going down the drain.

*-Daniel Wells,
horticulture professor*

to begin with. Best Management Practices and produce safety standards haven't yet been developed, and there are questions about the economics of aquaponics on a larger scale. That's why the

research is necessary.

"Our number one objective was to build an economic model, and now we're making improvements," says Dan Wells, a horticulture professor involved in the project. "We are trying to maximize water and feed efficiency, two of the major inputs in aquaculture. When you release water from a fish tank, you can hear dollars going down the drain."

The aquaponics system consists of two greenhouses located at the E.W. Shell Fisheries Center a few miles north of Auburn's main campus. One greenhouse

contains tanks brimming with tilapia, and the other is full of cucumber vines trellised on strings, curling up from Dutch buckets filled with pine bark substrate. The greenhouses produce some 65 pounds of cucumbers a day, as well as 150 pounds of tilapia per harvest.

AU Tiger Dining is another active partner in the working group. The tilapia and produce are processed and delivered when Tiger Dining needs the product. Campus dining gets year-round access to exclusive, high-value products in return for a reasonable investment, and researchers are able to study a working model that otherwise would be too expensive to operate.

The two greenhouses were built in 2006 with an energy conservation grant. In 2015, AU Tiger Dining invested in refurbishing the fish house and greenhouse and replacing the electrical system. AU Tiger Dining also buys fish and seed on a regular basis.

Interdisciplinary grant submissions key activity in 2016

The Auburn University Food Systems Institute continues to work closely with its working groups, submitting or helping with a record number of proposals in 2016.

2016 Grant Submissions

Using hands-on food-related activities to promote mathematics and science learning among sixth graders in the Montgomery, AL, school district (USDA SPECA): Chih-hsuan Wang (Educational Foundations), Christine Schnittka (Science Education), Bob Norton (Poultry Science), Katherine Jackson (AUM). (Not funded)

FoodMASTER Deep South Network (National Institutions of Health): Chih-suan Wang (Educational Foundations), subcontract with East Carolina University. (Pending)

INFEWS (National Science Foundation): Pat Curtis (AUFISI), Bob Norton (Poultry Science), Thorsten Knappenberger (Soil, Crop and Environmental Sciences), Ed Davis (Materials Engineering), Monica Dominguez (Water Resources Center), Sergio Ruiz-Cordova (Water Resources Center), \$1 million. (Not funded)

Interdisciplinary Research Leaders (Robert Woods Johnson Foundation): Kimberly Garza (Pharmacy), Chih-hsuan Wang (Educational Foundations), Annie Newton (Edward Via College of Osteopathic

Medicine), Laura Lester (Alabama Food Bank Association), \$350,000. (Not funded)

Moving Alabama value-added products to market (USDA AMS): Jean Weese (AUFISI/Extension), Christy Mendoza (Extension), Patti West (Extension), Matt Wilson (SBDC), \$500,000. (Not funded)

Farmer's Market Promotion Program to Increase Entrepreneurial Opportunities for Small Shell Egg Producers (USDA AMS): Pat Curtis (AUFISI), Ken Macklin (Poultry Science), Joe Hess (Poultry Science/Extension), \$499,500. (Not funded).

Improving aquaculture's value through enhanced nutrient management (USDA Special Research Grants Program—Aquaculture): Terry Hanson (Fisheries), Jesse Chappell (Fisheries), Daniel Wells (Horticulture), Tung-shi Huang (Food Science), David Blersch (Biosystems Engineering), \$300,000. (Funded)

Implementing FDA's Produce Safety Rule in Alabama (NIH): Lance Hester (Alabama Department of Agriculture and Industries), Hassey Brooks (ADAI), Ben Mullins (ADAI), Jean Weese (AUFISI), \$4.9 million. (Funded)

National Food Safety Curriculum Development (NIH/FDA): Pat Curtis (AUFISI), \$6.5 million. (Not funded)

Innovative Antimicrobial Resistance Education for Multiple Audiences (USDA NIFA): Pat Curtis (AUFISI), Robert Norton (Poultry Science), Stephanie Ostrowski (Veterinary Medicine), Emefa Monu (Food Microbiology): \$1,999,972. (Pending)

One Health (Robert Woods Johnson Foundation): Robert Norton (Poultry Science), Stephanie Ostrowski (Veterinary Medicine), James Wright (Veterinary Medicine), \$125,000. (Not funded)

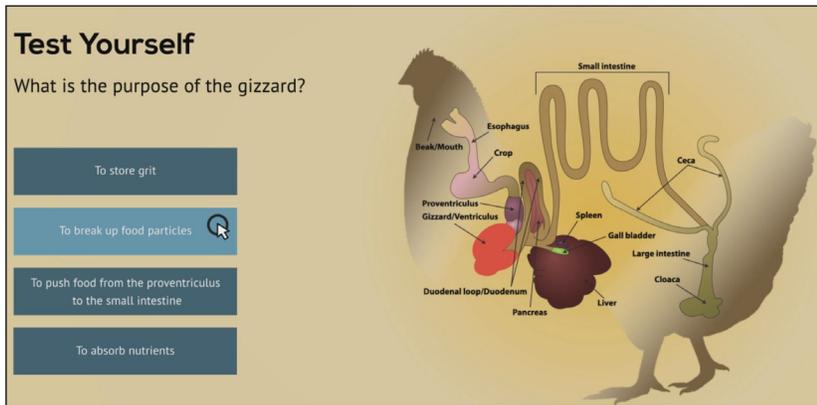
Research and Extension Experiential Learning on Food Safety for Undergraduates (USDA): Zhongyang Cheng (Materials Engineering), Jean Weese (AUFISI/Extension), \$300,000 (Not funded)

Graduate Fellowships in Aquaponics (USDA-NNF): Terry Hanson (Fisheries), Daniel Wells (Horticulture), David Blersch (Biosystems Engineering), Jesse Chappell (Fisheries/Extension), Tung-shi Huang (food science), \$262,000. (Pending)

Partnership puts FSI at leading edge of digital learning

AUFISI has formed a partnership with Pearson Education, the education publishing giant that is moving aggressively into digital learning tools like Virtual Chicken I and II. Virtual Chicken I took students on a tour through a hen's reproductive tract, and Virtual Chicken II follows the path of a grain of corn through a chicken's digestive tract. The latest technology will even allow a student to zoom in to see organs down to enzymes in a chicken's digestive tract.

The first Virtual Chicken (<http://aufsi.auburn.edu/virtual-chicken/>) was designed for an undergraduate poultry class but proved so popular and useful that the CD has been mailed to 250 countries and is available online. The site has had 53,000 hits since January. The second is designed for middle school to undergraduate settings, allowing instructors to monitor its use and receive assessment on students' comprehension.



Screen shot from *Virtual Chicken II: The Digestive Tract*, which is expected to be complete by the end of 2016.

Pearson also partners with Google Expeditions, a program that allows teachers to take their students on virtual field trips using Google Cardboard. Now Pearson is creating its own virtual reality experiences.

Developed under USDA grants, both of the innovative interactive *Virtual Chickens* are designed to allow students to study poultry anatomy without sacrificing actual birds.

“We started out with a flat piece of paper and a drawing, but that’s not going to work with the current generation,” said Pat Curtis, a food scientist at Auburn who conceived both projects and sought USDA-Higher Education Challenge funding.

Virtual reality is expected to play a much larger role in education as more publishers test digital technologies, and the Pearson partnership positions AUFISI to continue on the leading edge of this trend.

Another Egg Products School, another success

Twenty-two people attended the National Egg Products School (NEPS) held September 19-21 in Auburn, including food formulators and chefs. The 15 instructors were experts from the USDA Agricultural Research Service (ARS); AUFISI; the American Egg Board; FDA; and universities such as North Carolina State, Purdue, and Texas A&M.

Deana Jones of ARS has served as director of NEPS since 2008. She is now handing over leadership to Manpreet Singh, associate professor and Extension food safety specialist at Purdue University. He is also an AUFISI core faculty member.

The three-day NEPS is hosted by AUFISI and held biennially. Participants receive a thorough introduction to eggs and egg products from their initial formation through the packaging of liquid and dried egg products. This “farm to fork” review includes side excursions into molecular structure, safety, microbiology, and the latest research on egg nutrition.

Plans for the school usually take shape at the International Production and Processing Expo (IPPE) Conference held each year in January. AUFISI core faculty



Egg School students participate in a hands-on learning activity.

and working group members have the opportunity here to collaborate with egg industry representatives on NEPS plans.

Where are we Going?

Every year, AUFISI staff members meet to update our goals and objectives, with the aim of making sure we have a clear road map of where we are going and a clear understanding of what it will take to get there.

Goal 1

Maintain infrastructure to support interdisciplinary research, teaching, and training collaborations, and external partnerships with academia, industry, government and consumers.

Objectives:

- Update and maintain an internal advisory board to provide guidance to AUFISI.
- Establish an external advisory board to provide active participation and feedback.
- Update and maintain an interdisciplinary, cross-departmental venture for core faculty and working groups.
- Maintain a cadre of content experts in core science and technology focus areas.
- Conduct an annual Needs Assessments among core faculty, advisory boards, industry, government and consumers.

Goal 2

Ensure the protection of public health by conducting research on pathogens and advancing food systems' technology.

Objectives:

- Facilitate and pursue collaborative funding opportunities.
- Develop advanced tools, practices and interventions to reduce foodborne hazards in every part of the food chain.

Goal 3

Promote food safety practices to ensure high quality and sustainable food systems.

Objectives:

- Establish a Food Entrepreneur Network to help establish innovative, sustainable businesses.
- Develop quality credit and noncredit education for adult learners in safety and quality of food systems' related disciplines.
- Develop quality education for K-16 and graduate learners in food safety and related environmental issues.

Goal 4

Facilitate and make tangible contributions to national, regional and state food safety efforts through interdisciplinary research, outreach and educational collaborations and external partnerships with academia, industry, government and consumers.

Objectives:

- Implement marketing strategies for external licensing and commercialization of products.
- Interact and participate with the local, state, national and international food system communities.
- Determine impact of attendance at regional and national expositions.

Goal 5

Inform and contribute to the legislative and regulatory creation of standards relating to food systems.

Objective:

- Build relationships with representatives of local, state and federal government agencies that impact the food system.



AUFSI social media presence expands

Social media sites are one of the best ways to reach your audience these days, and AUFSI is no exception. Not only is there a main AUFSI Facebook page, we also have pages that highlight and promote some of the most active, important parts of our organization.

The Tailgate Times Facebook page, for example, has “reached” 209,000 people since creation and has more than 9,000 “likes.” Perhaps more importantly, it has helped raise awareness of the AUFSI Tailgate Times website and print magazine. Promoted by inexpensive Facebook advertising targeting Facebook users interested in Auburn football, the page is where fans can get useful tailgating tips, including those related to food safety, and share their own fun tailgating photos. Most importantly, it directs users to the more comprehensive website and PDF version of Tailgate Times.

Some of our working groups also have Facebook pages, including Food Defense, Obesity, and the Food Entrepreneur Initiative. The Front Line Food

Defense page is a resource for up-to-date information on protecting the U.S. and international food and water supplies. Similarly, the Obesity Working Group page is full of links to informative articles coalesced around obesity issues.

The Food Entrepreneur Conference Facebook page is one of our most active, containing updates and news pertaining to that annual event. The 2017 conference is scheduled for April 26-27, and we’ll soon begin updating that Facebook page with details, including guest speakers and links to registration. During the conference, we post photos, updates and changes to the agenda, and interesting quotes from the guests’ talks.

Our main Facebook page focuses on AUFSI activities and food-related news. For instance, you might see articles about the latest foodborne illness outbreak or excerpts from Norton’s Food Defense Blog. The main AUFSI page has “likes” from countries as far away as Brazil, India, and Spain.

We also have Twitter, Youtube, Vimeo, and Instagram accounts where we post news, photos and videos.



Certification courses keep us busy in 2016

In 2016, AUFISI coordinated a total of five HACCP certification courses - four for meat products and one for seafood - for about 80 participants total. HACCP refers to Hazards Analysis and Critical Control Points, a program designed to help assure safer meat and seafood products.

AUFISI Director Pat Curtis was the course instructor, with Associate Director and Extension Food Safety Specialist Jean Weese assisting with all except Seafood HACCP. The certifications are geared toward meat and

seafood processors, regulators, and inspectors.

Another training opportunity coordinated by AUFISI in partnership with the Alabama Cooperative Extension System this year was the two-day Better Process Control School, which certifies supervisors involved in the manufacturing of low-acid and acidified foods. Such companies must operate with a certified supervisor on the premises. One session was held in March 2016 with 22 participants, and another was held November 2-3 with 12 participants, including two international attendees from Barbados.



We got **tweeted!** Three AUFISI working groups currently have funding from USDA's National Institute of Food and Agriculture, so NIFA representatives stopped by to visit with AUFISI staff at the Institute of Food Technologists annual Expo (IFT) in July. The Expo attracts nearly 20,000 food science and technology professionals from more than 90 countries, making it a good place for AUFISI to promote the work of Auburn University researchers and to introduce our food safety training. NIFA provides leadership and funding for programs that advance agriculture-related sciences to ensure the long-term viability of agriculture.

*"We have **shared ideas** for future research to address obesity in Alabama. One **great benefit** of working with AUFISI is the support in **connecting to community partners**, without which I might not have been able to collaborate with these groups."*

*—Kim Garza,
assistant professor in
School of Pharmacy and
chair of Obesity Work-
ing Group*



STRONGER TOGETHER

Faculty lend expertise to help improve food system big picture

AUFSI boasts a roster of Core Faculty who are experts in core science and technology focus areas and collaborate on some of the world's most challenging food systems issues. The roster includes faculty from other universities, including Purdue University, University of Georgia, Southeast Missouri State University, and East Tennessee State University.

TONI ALEXANDER is an associate professor at Southeast Missouri State University, where she is chair of the Department of Global Cultures and Languages. She formerly was associate chair of the Department of Geology and Geography at Auburn

and is interested in “cultural geography,” which describes and analyzes the ways that language, religion, economy, government and other cultural phenomena vary or remain constant from one place to another.



Alexander



Arias



Bratcher



Brunner



Cheng

COVA ARIAS, a microbiologist, is a professor in the School of Fisheries, Aquaculture, and Aquatic Sciences in the College of Agriculture. She researches oyster safety, among other topics.

CHRISTY BRATCHER is an associate professor of meat science in the Department of Animal Sciences. She investigates food safety and niche markets for beef and goat meat.

BRIGITTA BRUNNER-JOHNSON is a professor in the School of Communication and Journalism, part of the College of Liberal Arts. She heads the public relations program and possesses expertise in crisis management.

ZHONGYANG CHENG, a materials engineering professor in the College of Engineering, is assistant director of the Center for Detection and Food Safety in the College of Engineering.

WILLIAM DANIELS is an associate professor of marine and freshwater aquaculture for the School of Fisheries, Aquaculture, and Aquatic Sciences. Daniels' research focuses on catfish aquaculture and alternative production systems and species.

ALLEN DAVIS is an alumni professor of aquatic animal nutrition in the School of Fisheries, Aquaculture, and Aquatic Sciences. He seeks to expand our understanding of the nutritional requirements of species of economic importance and to facilitate the continued development of commercial rations for use in supplemental feed systems.

SUE DURAN, professor and clinical pharmacist in the College of Veterinary Medicine, researches new prod-

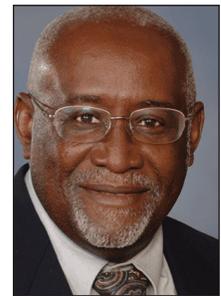
ucts for treating diseases in food animals and works with veterinarians to study proper dosages and withdrawal times to ensure meat and milk safety.

MISTY EDMONDSON is an associate professor in the College of Veterinary Medicine, where her duties include management of clinical hospital cases, didactic teaching, research, and outreach. Her major interest is theriogenology of cattle, small ruminants, and camelids.

TUNG-SHI HUANG is a professor of food science in the Department of Poultry Science. He studies food safety and development of biosensors to detect foodborne pathogens.

CURTIS JOLLY is the Barkley Endowed Professor in the Department of Agricultural Economics and Rural Sociology in the College of Agriculture. He is interested in development, trade, and the economics of fisheries.

KEVIN KEENER, a food engineer, is a professor and director of the Center for Crops Utilization Research and BioCentury



Jolly

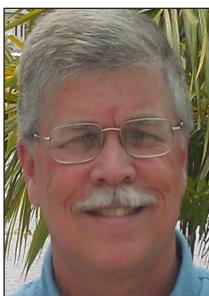


Keener



Macklin

more



Daniels



Davis



Duran



Edmondson



Huang

aufsi core faculty



Monu

Research Farm at Iowa State University. He has experience providing technical assistance on food safety, food technology, food regulations, and food labeling to small businesses as well as many major food companies.

KEN MACKLIN is a professor and Extension specialist in the College of Agriculture's Department of Poultry Science. His research interests include the reduction of foodborne bacteria through the use of feed additive and the safe handling and disposal of poultry litter.

EMEFA MONU is an assistant professor of microbiology in the College of Agriculture. She comes to Auburn from the University of Tennessee, where she was completing post-doctoral studies. Her goal as a researcher is to improve food security through increasing the microbiological safety and shelf life of food.

AMIT MOREY is an assistant professor in the poultry science department and an Extension specialist. He is interested in food safety, shelf-life, post-harvest processing technologies, product development and storage, and spoilage microbiology.

BOB NORTON, a professor in the Department of Poultry Science, is an expert at data mining and database management.

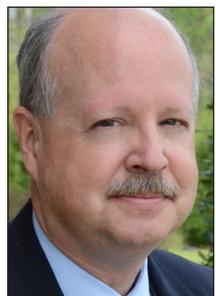
STUART PRICE is an associate professor in the College of Veterinary Medicine's Department of Pathobiology. His lab studies the molecular basis of bacterial pathogenesis, with a focus on pathogens that cause foodborne illness.

BONNIE SANDERSON, a professor and associate dean for research in the School of Nursing, is interested in the effects of obesity on health.

ELIZABETH SCHWARTZ is an assistant professor of biological sciences in the College of Sciences and Mathematics. Schwartz has a longstanding interest in the foodborne bacterial pathogen *Listeria monocytogenes* and in the innate immune responses elicited by this organism.

MANPREET SINGH, a microbiologist, is a professor and Extension food safety specialist in the Department of Poultry Science at the University of Georgia. He formerly was an associate professor at Purdue University and an assistant professor in Auburn's Department of Poultry Science.

HARSHVARDHAN THIPPAREDDI is a professor in the Department of Poultry Science at the University of Georgia. He is interested in the development of technologies for the food industry to control foodborne pathogens, nonthermal food processing and safety, and rapid detection and identification of foodborne



Norton



Price



Sanderson



Schwartz



Singh

pathogens.

CHIH-HSUAN WANG is an assistant professor in the College of Education. Her research is focused on educational research, evaluation, measurement and statistics.

LUXIN WANG is an assistant professor in the College of Agriculture's Department of Animal Sciences. Her specialties are food safety and microbiology, and her particular interests include isolation and identification of zoonotic pathogens as well as rapid detection methods for identifying zoonotic pathogens in animal products.

YIFEN WANG is a professor in the College of Engineering's Department of Biosystems Engineering. He is interested in the applied and fundamental study of food engineering and food safety.

SUSAN WATERS was an assistant professor in the Auburn University School of Communication and Journalism and recently moved to East Tennessee State University, where she is an assistant professor in the Department of Mass Communications. Waters is an expert on public relations and social media.

DANIEL WELLS is an assistant professor of horticulture in the College of Agriculture. His research program is focused on specialty crop production systems in

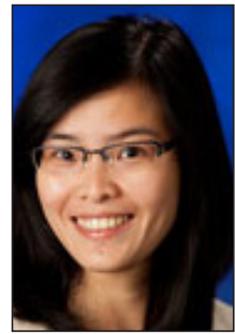
Alabama, and he was recommended to the faculty because of his interest in local foods production.

NORBERT WILSON is a professor in the College of Agriculture's Department of Agricultural Economics and Rural Sociology.

JIM WITTE, a professor in the College of Education, is interested in the development of training programs.

MICHELLE WOROSZ is an associate professor in the Department of Agricultural Economics and Rural Sociology and researches economic viability in rural settings.

PEI XU is an assistant professor of business analytics in the College of Business. She offers expertise in "big data" with the ability to effectively evaluate a wide variety of business issues by using data to apply quantitative techniques for decision-making.



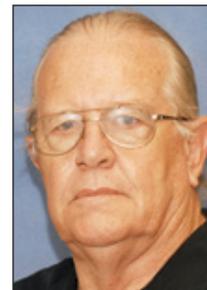
Xu



C. Wang



Wilson



Witte



Worosz



Thippareddi



L. Wang



Yifen Wang



Waters



Wells

Diverse, experienced staff continues to support AUFISI

Administration

Dr. Patricia Curtis is AUFISI director.

She joined the Auburn faculty in 2002 as a professor and director of the Poultry Products

Safety and Quality Peaks of Excellence Program. In 2008, she was named interim director of the National Egg Processing Center, a partnership between eight institutions and industry. Curtis holds a bachelor's degree in home economics education from Texas Women's University and master's and doctoral degrees in food science and technology from Texas A&M.



Dr. Jean Weese became associate director of AUFISI in March 2016. She previously served five years as a

core faculty member and, as food safety specialist for the Alabama Cooperative Extension System, has been critical in establishing AUFISI's reputation. Her new role includes leadership of the Entrepreneur Working Group;

shared leadership roles in outreach and food safety; and representation of AUFISI at local, state, national and international events. She is also a professor in the Department of Poultry Science.

Regina Crapps, academic program administrator, has a background in human resources, financial

analysis, and workshop facilitation. She holds a degree in human resources from Auburn University-Montgomery and an MBA from the University of Phoenix. She handles registration and payment for classes and pulls together all details of delivering course materials, providing information for students, and calculating CEUs.



Accounting

Savannah Mehren is AUFISI's new contracts and grants specialist. She assists with the management,

acquisition, dissemination, and reporting of sponsored program funds. Savannah came from the CDC-funded Rape Prevention



and Education Program, where she managed the dissemination of funds and the achievement of grant goals and objectives for 13 years. She has a bachelor's in health education from UAB.

Assessment

Dr. Regina Halpin, AUFISI's assessment specialist, creates program evaluations and project assessments.

She also teaches bioscience and business statistics at Auburn. She holds undergraduate, master's, and doctoral degrees from Auburn.



Communications



Jacquie Kochak, communications specialist, oversees communications projects for AUFISI. An award-winning

writer and editor, her background is in newspapers, the trade press, and association management. Kochak holds a degree from the University of Kansas.

Karen Hunley, communications associate, assists with the grant



writing, editing, and communications projects for AUFISI. She holds a master's degree in technical and professional

communication as well as a bachelor's degree in journalism. Her background includes positions as a communications specialist and a newspaper journalist.

Technology

William Shaw, AUFISI's instructional designer, develops online educational programs for the AUFISI. He holds a master's



degree in aquaculture and allied sciences, and bachelor's degrees in fish and wildlife biology as well as general science.

Troy Hahn is vice president CIO for City University of New York's (CUNY) Medgar Evers



College and the academic technology director for AUFISI. He is responsible for online training and entrepreneurial innovations at AUFISI. Hahn holds a bachelor's degree in management information systems and a master's degree in higher education administration from Auburn, and he is currently pursuing a doctoral degree from the University of Liverpool.

Celena Spurgeon is an e-learning developer who assists with eLearning maintenance and development. She is a senior at Auburn majoring in human resources management.



Christina Johnston is the webmaster for AUFISI's websites. She has a bachelor's degree in computer science and applied mathematics and a master's in educational technology.

Cicily Williams assists AUFISI with graphic design. She executes graphics for various materials and publications and also develops video formats of online courses.

Trade press editors now eager to work with AUFISI

The AUFISI staff has continued to nurture its connections with trade press editors, with good results. A record number of articles by Auburn University researchers have been published this year in two publications, *Food Safety Magazine* and *Refrigerated and Frozen Foods*.

The most prolific author this year has been Bob Norton, chair of the Food Defense Working Group, who is doing a monthly blog on various aspects of the subject for Food Safety. Other authors this year are Tung-shi Huang and his graduate student Mingyu Qiao, who wrote

about "Potential Applications of N-Halamines in Food Production, Processing and Packaging for Improving Food Safety." AUFISI staff wrote an article about allergens, and an upcoming article by Emefa Monu will talk about natural antimicrobials.

Trade magazines are a good way to disseminate information about university research to business and industry, and trade press editors are eager for contacts within universities. AUFISI seems to have tapped a real need, because we have reached the point that editors are coming to us.

'Return on investment' is measured in more than money

The Auburn University Food Systems Institute consistently has demonstrated its value in terms of financial returns. In fact, the Alabama Agricultural Experiment Stations (AAES) got a stunning 526 percent return on the \$409,081 invested in AUFISI in fiscal 2015. Auburn University's Office of the Vice President for Research and Economic Development (OVPR) got a 3,610 percent return on its investment of \$69,700.

As the pie chart shows, AAES contributed 21 percent of AUFISI's total budget in fiscal 2015, while OVPR contributed 3 percent. A total of 76 percent of AUFISI funding came from grant proceeds coming directly to AUFISI combined with indirect cost recovery for other grants. What the chart doesn't show, however, is the extramural funding that AUFISI has helped secure for Auburn University's faculty. In fiscal year 2015, these collaborative efforts generated \$1,049,080 for Auburn.

The chart also doesn't show the benefits that accrue to Auburn University

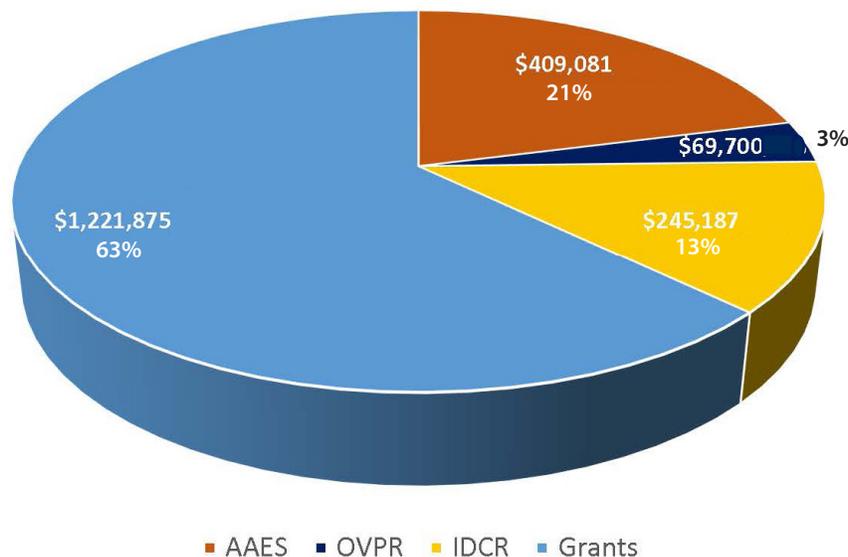
from breaking down the barriers that usually segment different disciplines, and encouraging faculty to share ideas. The first and most obvious benefit is that funding agencies are increasingly desirous that proposals describe interdisciplinary research, and they want teams with demonstrated records of working together for a period of time. Through AUFISI working groups, faculty members are able to build those connections and develop that kind of research.

Less obvious is that AUFISI provides a "cradle" where ideas can be nurtured before they are ready to seek funding. A good example is the Food Defense Working Group, which already has a website and a blog that are bringing visibility to the issue. Thanks to AUFISI's contacts in the trade press, chair Robert Norton has been able to place a series of articles about food defense that are raising Auburn University's national visibility in this area. Proof of that visibility is the fact that Norton is already fielding phone calls from the Department of Homeland Defense and the Food

Protection and Defense Institute at the University of Minnesota. We're confident funding will follow. AUFISI has promoted national and even international attention for Auburn University in other ways, as well. For example, AUFISI Associate Director Jean Weese, who is also head of the Alabama Cooperative Extension System's food safety and quality team, recently traveled to Washington D.C. to accept a USDA NIFA Partnership Award for Innovative Programs and Projects for her efforts in leading AUFISI's Food Entrepreneur Working Group, which with Extension sponsors a conference for Alabama's aspiring food entrepreneurs every year. Auburn was one of only three universities nationwide so honored.

Projects vital to an enterprise sometimes go unfunded because these "intangibles" don't add to the hard number return on investment (ROI). Misguided project investments can undermine a university's critical strategic goals. AUFISI is here to help meet those goals.

AUFISI Annual Budget Summary 2015 - 2016



aufsi **Advisory Board**



Patterson

AUFSI's internal advisory board consists of deans, the directors of the Alabama Agricultural Experiment Stations (AAES) and the Alabama Cooperative Extension System (ACES), and the associate vice president for research. This group provides invaluable feedback about AUFSI efforts.



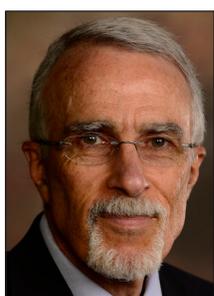
Aistrup

Board members are (at left) Dr. Paul Patterson, dean of the College of Agriculture; Dr. Joe Aistrup, professor and dean of the College of Liberal Arts; Dr. George T. Flowers, dean, Graduate School; Dr. Nicholas Giordano, dean and professor, College of Sciences and Mathematics; Dr. Bill C. Hardgrave, dean, College of Business; Dr. Gary Lemme, ACES director; Dr. John Liu, associate vice president

for research; Dr. Calvin Johnson, dean, College of Veterinary Medicine; Dr. Vini Nathan, dean, College of Architecture, Design and Construction; Dr. Gregg E. Newschwander, dean, School of Nursing; and Dr. Chris Roberts, dean of the College of Engineering.



Flowers



Giordano



Hardgrave



Johnson



Lemme



Liu



Nathan



Newschwander



Roberts



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