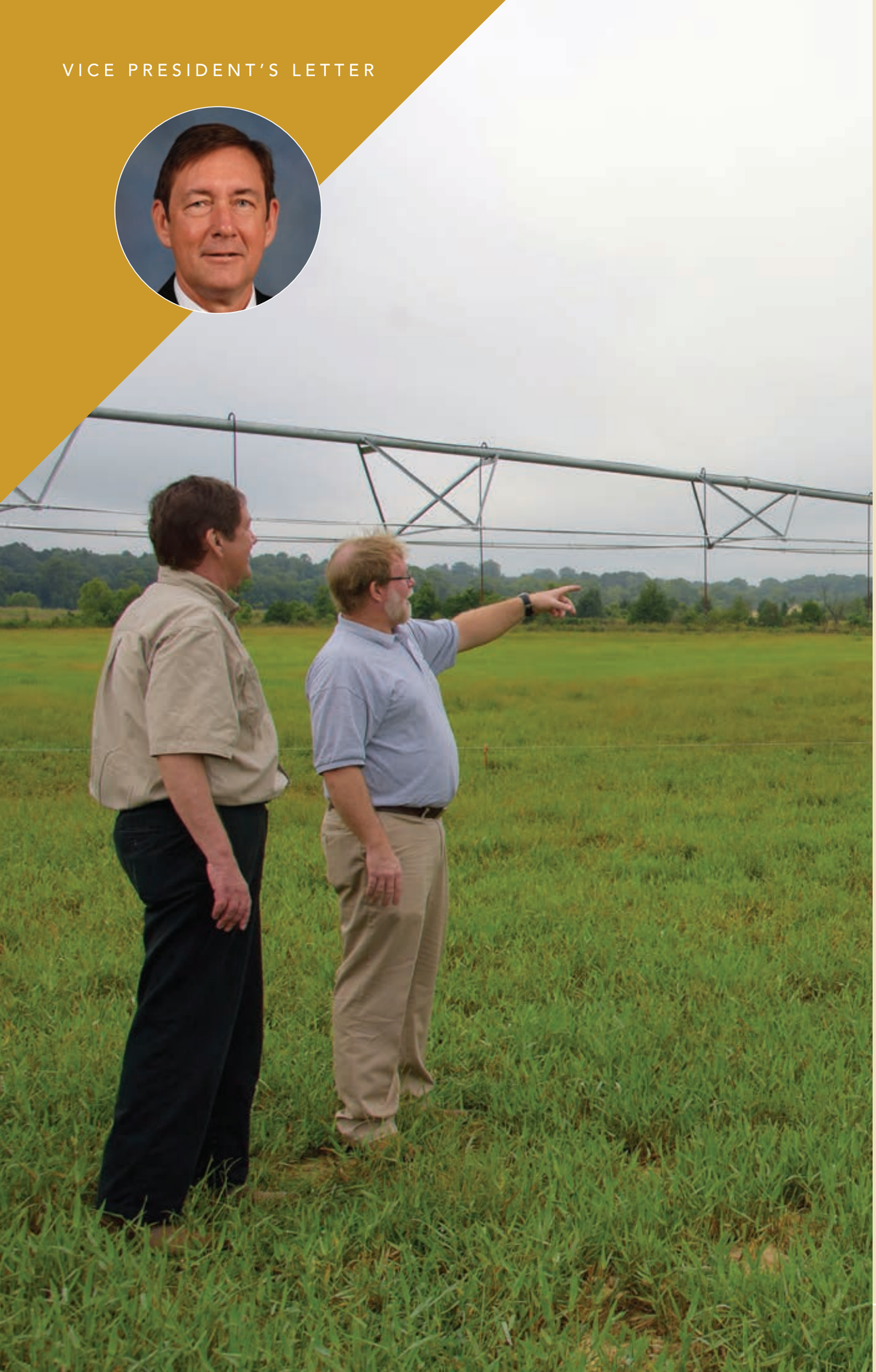
DAFVM

ANNUAL REPORT

17

DIVISION OF AGRICULTURE, FORESTRY,
AND VETERINARY MEDICINE

VICE PRESIDENT'S LETTER



Our world is more connected than ever, but the information coming at us can feel overwhelming. How, then, do we continue to advance the mission and discoveries of the Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine?

WE CONNECT. We appreciate our relationships with our associates in all areas: government, agriculture, economic and community development, health, child development, education, precision agriculture, technology, and more. DAFVM projects span a broad range and have far-reaching impacts. By working with allied industries, commodity groups, and strategic partners, we are amplifying our message and increasing our reach. In 2017, we were pleased to meet with U.S. Department of Agriculture Secretary Sonny Purdue during his visit to the Delta. Along with the Mississippi Farm Bureau, we also hosted American Farm Bureau President Zippy Duvall while he was in Mississippi.

WE GROW. The continued growth in DAVFM and at MSU reflects the ongoing value students find in an MSU education. DAFVM faculty transform students by providing numerous educational opportunities. From engaging in undergraduate research to participating in study-abroad programs, students recognize that learning takes place outside our classrooms, as well as within them. For fall 2017, both the College of Forest Resources, with 584 students, and the College of Veterinary Medicine, with 574 students, experienced record enrollment. The College of Agriculture and Life Sciences has increased enrollment dramatically and now has 2,408 students. The total enrollment of students studying in DAFVM increased to a total of 3,566.

WE BUILD. We continue to be excited about the construction activity in the division. As you read this, we should be occupying the new $7.7 million meat science and muscle biology laboratory located near the Wise Center. Also, as you drive by that facility, you will see the new $14 million animal and dairy science building being constructed. We should occupy that building by late 2018. We should also begin construction on the new $13 million poultry science facility in 2018, with a planned completion date of December 2019. We are also moving forward with an approximately $2 million renovation of the Thad Cochran National Warmwater Aquaculture Center at Stoneville.

WE DEVELOP. Developing new seed varieties adapted to the state's climate, soils, and production systems keeps Mississippi growers globally competitive. In 2017, Mississippi Agricultural and Forestry Experiment Station rice researcher Dr. Ed Redoña released a new rice variety, "Thad," named after U.S. Senator Thad Cochran. In addition to new technologies and products, developing leaders is another important DAFVM focus. Dr. Jason Krutz, formerly our MSU Extension Service irrigation specialist and Mississippi Agricultural and Forestry Experiment Station scientist, became the head of the Mississippi Water Resources Research Institute, where he directs numerous university projects and people addressing one of the world's most pressing challenges: preserving water, one of our most precious natural resources. Extension is also developing the first cohort of the Mississippi Program for the Advancement of Agricultural Leadership to enhance these emerging agricultural leaders' communication skills and management approaches.

WE INSPIRE. In 2017, CALS Associate Dean Dr. Scott Willard organized the first Mississippi Youth Institute for high school students. Participants submitted research papers proposing innovative solutions to global food security issues, ranging from water scarcity and malnutrition to international trade and infrastructure. In addition to meeting with MSU President Dr. Mark Keenum and hearing a lecture from Keegan Kautzky, director of national programs for the World Food Prize, these students engaged in stimulating discussions with each other and MSU experts. By inspiring empathy, creative thinking, and scholastic rigor, we hope to build a brighter future for Mississippi, our nation, and our world.

WE ADVOCATE. Every day, DAFVM faculty, specialists, agents, scientists, and students work to advance our messages of efficiency, sustainability, responsibility, academic integrity, and service. From conference presentations delivered across the state, nation, and globe to outreach projects in our campus community, and from social media messages to printed publications, we and our work represent MSU and maintain its outstanding reputation as a leading research and teaching university.

With continued thanks for your support,

Gregory A. Bohach, *Vice President*

CALS

As one of the largest colleges on campus, the College of Agriculture and Life Sciences (CALS) boasts an enrollment of 2,022 undergraduate, 227 master's, and 159 doctoral students. These students continue to lead at MSU and throughout the world.

Through the CALS Undergraduate Research Scholars Program, students conduct cutting-edge research under the direction of faculty mentors. One notable undergraduate research scholar is Lucas Ferguson, who graduated magna cum laude in spring 2017 with a biochemistry degree concentrated in bioinformatics. Ferguson is the university's first graduate to receive the prestigious, international Gates Cambridge Scholarship. Other CALS students participating in the undergraduate program have been recognized at professional meetings across the globe for their outstanding poster and oral presentations.

In 2017, CALS began the World Food Prize Mississippi Youth Institute for high school students, and alumni Barry and Lana Knight of Cordova, Tennessee, created an annual fund to support the program. To be invited to participate, young people wrote formal essays listing approaches to solving food insecurity challenges. Participants, named Borlaug Scholars in honor of World Food Prize founder Dr. Norman E. Borlaug, had the chance to participate in the World Food Prize International Symposium, and some earned CALS scholarships.

Programs within the college continue to receive national accolades. For example, www.fashion-schools.org, a website listing information about fashion careers and academic programs, ranked CALS's fashion-design program 39th in the nation and sixth in the South. The site ranked the CALS fashion-merchandising program 37th nationally and ninth in the South.

Students pursuing their degrees in the Department of Landscape Architecture received high praise for the rain garden they developed for the Oktibbeha County Heritage Museum in Starkville, Mississippi. The American Society of Landscape Architects recognized the garden with an honor award for student collaboration.

MSU's Department of Poultry Science, one of only six such programs in the U.S., turned 70 years old in 2017. Poultry science faculty members continue to train students to work in Mississippi's largest farm commodity industry.

As the founding college at MSU, CALS continues to support and grow an exemplary student body of leaders, internationally renowned faculty, and reliable alumni mentors.

COLLEGE OF AGRICULTURE
AND LIFE SCIENCES

CALS

MISSISSIPPI AGRICULTURAL
AND FORESTRY
EXPERIMENT STATION

MAFES

Mississippi Agricultural and Forestry Experiment Station (MAFES) scientists are committed to increasing economic prosperity and environmental stewardship, building stronger communities and families, and improving Mississippians' health and well-being.

Through a network of 16 branch stations, MAFES scientists work across soil types, topographies, and climates to improve agricultural and animal production systems and increase food quality and safety. Increasing global food security, quality, safety, and accessibility is a strategic research priority for MSU and MAFES. To ensure the long-term food supply, MAFES scientists are examining how environmental factors, such as drought and increased carbon dioxide, impact crops. Food scientists are studying the use of food-grade coatings to extend food's shelf life. Plant and soil scientists are evaluating organic and conventional blueberries in an effort to extend their growing season.

Agricultural economists are developing a shellfish decision tool to increase oyster production and yield along the Mississippi Gulf Coast. Restoring oyster populations is good for the environment because they provide numerous environmental benefits. MAFES agricultural and biological engineers are working to restore coastal oyster reefs and sand dunes to serve as barriers against storms.

Sustainable agricultural systems are designed to protect soil and water quality while reducing inputs. MAFES scientists are researching cover crops in both no-till and reduced-till production systems for row, vegetable, and organic crops. Cover crops may reduce tillage costs, inputs, and nutrient transport, while enhancing soil health.

Water availability remains a concern because more than half of Mississippi farmland and almost all of the Mississippi Delta's row-crop acreage is irrigated. Much of that water comes from the Mississippi River Valley Alluvial Aquifer, which loses approximately 300,000 acre-feet of water annually. MAFES scientists are studying how artificial intelligence might help predict aquifer levels. Scientists are also evaluating how on-farm storage can help save water and improve its quality.

Animal production systems are an essential component to the MAFES research portfolio. The new 15,000-square-foot Meat Science and Muscle Biology Laboratory is scheduled for completion in early 2018, while the 34,500-square-foot animal and dairy science building has an expected completion date of December 2018. These new facilities will dramatically enhance research capacity in animal production systems.

MAFES scientists are dedicated to continuing the research necessary to increase producers' agricultural yields and profits, as well as to advance research for a more food-secure Mississippi.

MISSISSIPPI AGRICULTURAL
AND FORESTRY
EXPERIMENT STATION

MAFES

CFR

The Mississippi State University College of Forest Resources (CFR) continues giving students the chance to study "going green" by offering majors in forestry; natural resource and environmental conservation; sustainable bioproducts; and wildlife, fisheries, and aquaculture. CFR enrollment grew in 2017 among undergraduate, graduate, and doctoral students.

Among the best and brightest in the nation, several CFR students participated as Demmer Scholars during the summer of 2017. These future leaders interned and worked in Washington, D.C., with federal and nongovernmental organizations on natural resource policies. One student interned for Congressman Gregg Harper during the spring before he served as a Demmer Scholar.

CFR students represented the university and college on the national stage in 2017. For the 19th consecutive year, the Society of American Foresters (SAF) ranked the MSU student chapter one of the top three student chapters in the nation. The chapter is involved in a number of professional and service-oriented activities within the community.

Students excelled in the CFR Undergraduate Research Scholars Program, which pairs undergraduate students with faculty mentors. Participants discovered new knowledge, enhanced discipline-specific expertise, and gained critical-thinking skills. Students shared their research at professional meetings, and they received national recognition for poster and oral presentations. One undergraduate scholar applied for and received a grant to continue studies on alligators, while numerous other students co-authored papers for scholarly publications.

Graduate students also make a big impact through their research efforts. A sustainable bioproducts graduate student received the Gareth Williams Award for best scientific paper and presentation at an international meeting. Graduate students conduct research all over the globe, including projects in Russia, Tanzania, and Brazil, among other countries. These projects allow CFR students to expand the reach of MSU and develop solutions to natural resource issues that can be applied in the U.S.

More than 4,000 alumni represent CFR at all levels, and they demonstrate the leadership skills they received from MSU. In 2017, Tony Tooke, 1983 forestry alumnus, was named chief of the U.S. Forest Service. Tooke leads the national agency responsible for the management and protection of 154 national forests in the U.S.

As the population grows and the climate changes, managing, conserving, and using natural resources sustainably remains an important challenge that CFR will continue to address by developing another generation of leaders who are willing and able to fill this role.

COLLEGE OF
FOREST RESOURCES

CFR

FWRC

The Mississippi State University Forest and Wildlife Research Center (FWRC) conducts research into the conservation, development, and use of forests, forest products, wildlife, and fisheries resources of the state, nation, and world. FWRC research supports Mississippi's $15.5 billion forest industry through research and education.

The longleaf pine ecosystem is a nationally important, though imperiled, environment supporting nearly a quarter of all plant species. Because establishing longleaf pine seedlings can be difficult, FWRC scientists are studying whether midstory hardwoods facilitate seedling establishment. Scientists also study how southern pine beetle infestations impact an affected forest's carbon storage and water cycling. Understanding what happens to a forest's carbon during an infestation could help managers better plan carbon budgets.

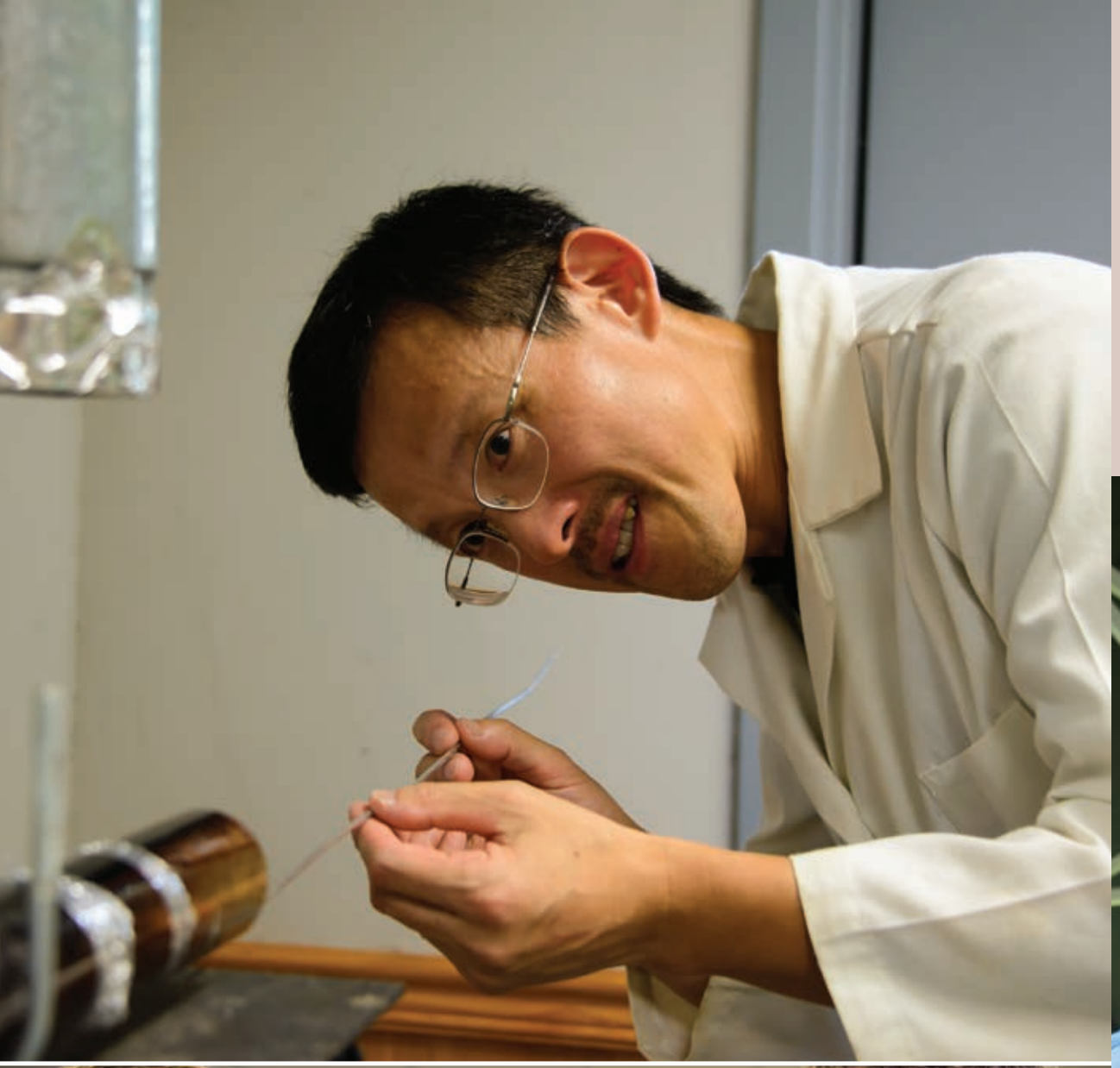
Nonnative feral hogs cause damage throughout the U.S., affecting wildlife, soils, forests, water, and crops. In Mississippi, wild hogs cause an estimated $66 million in damage annually. With accelerometers (movement-tracking devices) attached alongside GPS collars, FWRC scientists are discovering how feral swine use the landscape. Understanding feral swine movement patterns will help researchers refine management techniques to produce ecological and economic benefits for the state.

Using genetic markers, FWRC scientists are determining the lineage of white-tailed deer, one of the most sought-after game species in Mississippi. Understanding the current genetic structure of the southeastern U.S. deer population can provide insight into how restoration efforts are impacting modern populations.

Finding new uses for natural resources is the mission of FWRC sustainable bioproducts researchers. Even as the paper industry shrinks, sawmills still have piles of sawmill residuals, the materials left over from the lumber produced from logs. FWRC scientists explore how to use these residuals to create pellets for energy production and as soil amendments.

FWRC scientists also evaluate cross-laminated timber, a composite of multiple layers of lumber glued together to form panels, for its potential as a building material in the South. While the timber has been used in northern climates, the South's climate creates a unique environment to explore.

Mississippi's natural resources provide economic and environmental benefits and provide a place for residents to relax and rejuvenate. FWRC recognizes the importance of the state's natural resources and continues to manage and sustain these treasures today and for future generations.



FOREST AND WILDLIFE
RESEARCH CENTER

FWRC

CVM

The Mississippi State University College of Veterinary Medicine (CVM), established in 1974, works to make advancements in teaching, research, globalization, and community service. By educating students and people involved in animal agriculture, CVM improves the standard of living for animals.

New leaders in the CVM Department of Pathobiology and Population Medicine are providing crucial training to veterinary students. Dr. Gretchen Grissett, assistant clinical professor, is the new clinician, and cohesion among students and animals is increasing on her watch. Toxicologist Dr. Barbara Kaplan leads research efforts examining how cannabinoids impact the development of autoimmune diseases, and she investigates the effects of a common environmental pollutant on the immune system. She also teaches veterinary and graduate students.

The Animal Emergency and Referral Center (AERC) in Flowood saw substantial growth in 2017. Two new emergency veterinarians joined the AERC team, which now totals 50 members, 11 of whom are veterinarians. CVM's graduate programs continue to attract top U.S. students, including graduates of Mississippi State University, Oklahoma State University, Louisiana State University, and Michigan State University.

Dr. Alyssa Sullivant, assistant research professor, is another valuable addition to the faculty. She provides specialist-level expertise for small animal internal medicine services at the CVM Animal Health Center. She also teaches veterinary students and is developing a new program that delivers referral-level expertise to local practitioners, who share their knowledge with clients. This new program improves health outcomes for patients and relieves the financial burdens many clients face when they need advanced veterinary care for their pets.

The college's commitment to introducing underserved students to veterinary medicine and the sciences has remained strong. CVM's VetAspire program continues to attract more Mississippi applicants. High school and first-year college students gain hands-on experiences with current veterinary students, and they learn about veterinary medical education and careers.

The college's summer Veterinary Camp attracts talented, enthusiastic aspiring veterinarians from across the U.S. This program, supported by scholarships, provides opportunities to students who may not have otherwise explored veterinary medicine as a possible career path. In 2017, nearly $3,500 in scholarships covered camp tuition expenses for students with demonstrated financial needs.

CVM remains committed to working to improve the health of animals and people, to contributing to Mississippi's economic development, and to improving quality of life throughout the region. Providing quality education, advancing research, and serving the community through excellent diagnostics, clinical care, outreach, and shared learning are making a difference.

COLLEGE OF
VETERINARY MEDICINE

CVM

MSUES

The Mississippi State University Extension Service delivered 195 planned educational programs and numerous hands-on training opportunities to thousands of Mississippians in 2017. Despite the state appropriation drop of 7.5 percent and 51 vacant positions, Extension continues its mission: we enhance agriculture's viability, preserve the environment, foster positive youth development, enhance technological access, and build families and communities.

Agricultural producers added billions of dollars to Mississippi's economy in 2017, and Extension professionals assisted them in variety, pesticide, and herbicide selections and in solving challenges. More than 1,100 participants completed Extension's training modules for auxin-containing herbicides, including dicamba and 2,4-D. U.S. Secretary of Agriculture Sonny Perdue and American Farm Bureau President Zippy Duvall met with Extension agents and specialists in separate visits.

The first class of the Mississippi Program for the Advancement of Agricultural Leadership began. The state's premier educational and personal-development program for emerging Mississippi agricultural leaders will develop participants' collaborative and managerial skills. Extension will deliver the educational activities and content for nine intensive seminars over the 2-year course.

Extension's family and consumer sciences outreach efforts emphasized health education. State Health Specialist Dr. David Buys, an assistant Extension and research professor, was named chair of the National Chronic Disease Prevention and Management Action Team.
Also, Extension agents continued hosting community programs teaching clients how to prepare common fruits and vegetables and develop nutritious meals.

Natural resources and conservation education, along with other research-based programs, expanded in 2017. Extension again organized thousands of volunteers to pick up litter at the annual Mississippi Coastal Cleanup. Entomology faculty hosted a U.S. Environmental Protection Agency tour to illustrate Extension's successes with Mississippi's pollinator-education program.

Altogether, Extension developed 16 new apps during 2017. One app, requested by the state climatologist and produced by Extension's Center for Technology Outreach, enables agents to monitor drought conditions in the field. Extension's efforts to increase broadband adoption among rural and low-income households continue.

Approximately 70,000 Mississippi 4-H'ers experienced another successful year. The Rankin County 4-H robotics team was named part of the winning alliance at the FIRST Tech Challenge in Texas. MSU 4-H'ers participated in the 2016 National 4-H Conference, administered by 4-H National Headquarters of the USDA National Institute of Food and Agriculture.

Extension continues to improve Mississippians' quality of life through hands-on education. Our agents and specialists are extending knowledge and changing lives.

MISSISSIPPI STATE UNIVERSITY
EXTENSION SERVICE

MSUES

D A F V M
ADMINISTRATION

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Dean / College of Veterinary Medicine

GEORGE M. HOPPER

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Director / Mississippi Agricultural & Forestry Experiment Station

Dean / College of Agriculture & Life Sciences

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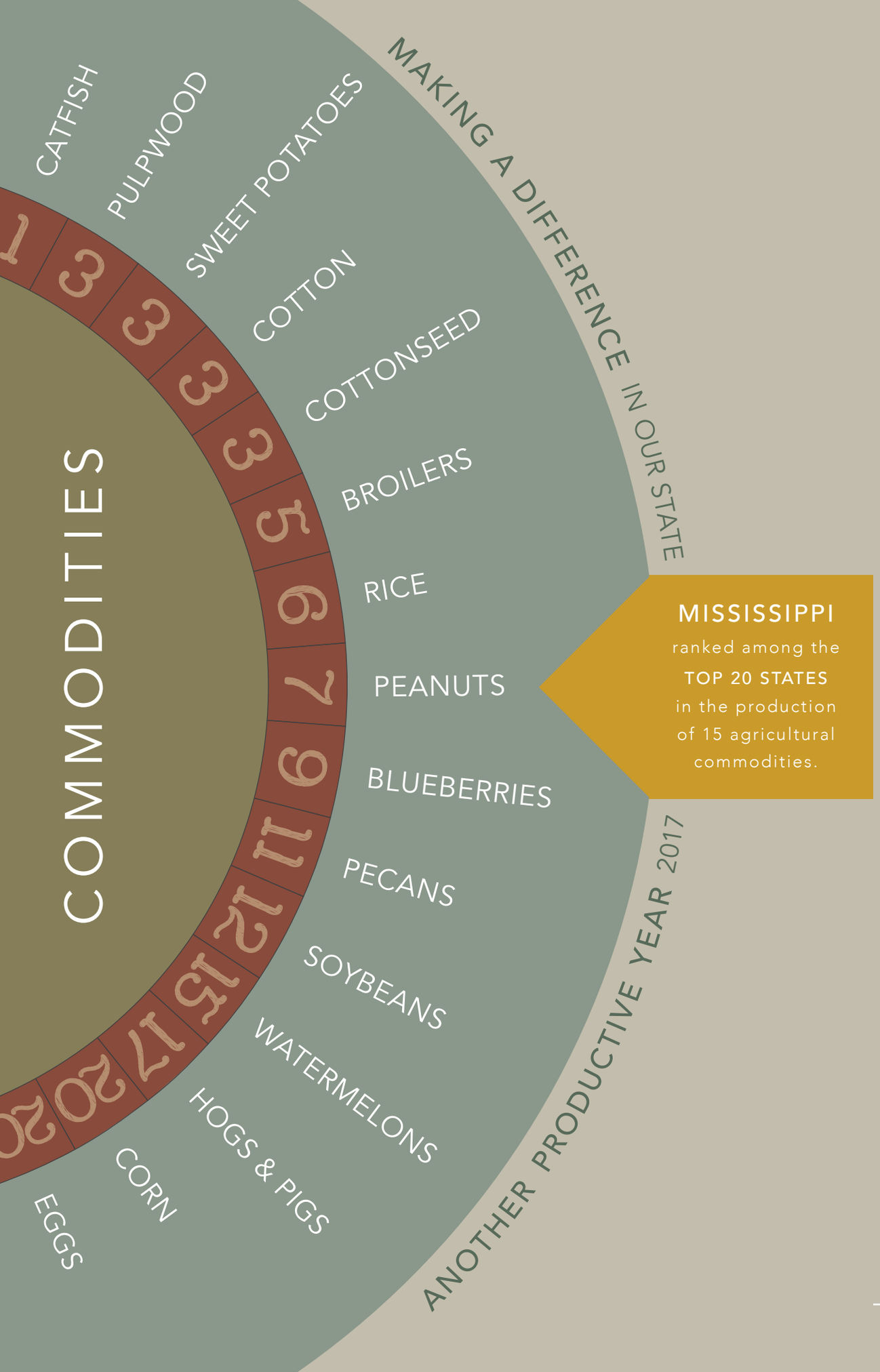
GARY B. JACKSON

Director / Mississippi State University Extension Service



MISSISSIPPI
ranked among the
TOP 20 STATES
in the production
of 15 agricultural
commodities.

$7.56 BILLION

2017 **farm-gate** value of ag and forestry production

(includes government payments)

$16.41 BILLION

2017 **value added** to the Mississippi economy by ag and forestry

$105.5 MILLION

R&D expenditures by MSU in agricultural sciences FY 2016

SOYBEAN YIELDS
52 bushels/acre*

COTTON YIELDS
1,083 pounds/acre*

PEANUT YIELDS
4,500 pounds/acre*

EGG PRODUCTION VALUE
$263 million*

CORN YIELDS
188 bushels/acre*

PEANUT PRODUCTION
189 million pounds*

SOYBEAN PRODUCTION
112.8 million bushels*

COTTON PRODUCTION
1.4 million bales

BROILER PRODUCTION VALUE
$2.52 billion*

* record/near record level

Sources: USDA National Agricultural Statistics Service, Dr. Brian Williams, Dr. John Auel

DAFVM
BUDGET OVERVIEW

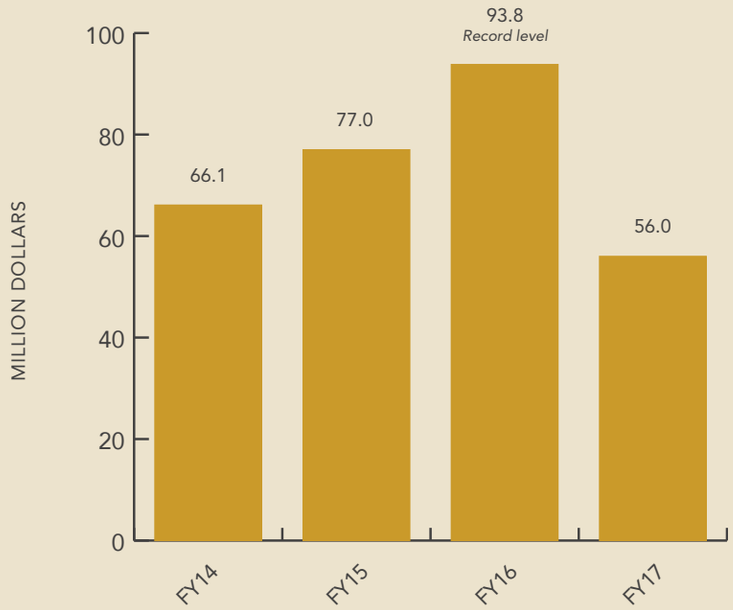
R A N K E D
#12 NATIONALLY

TOP 12 SINCE 1998

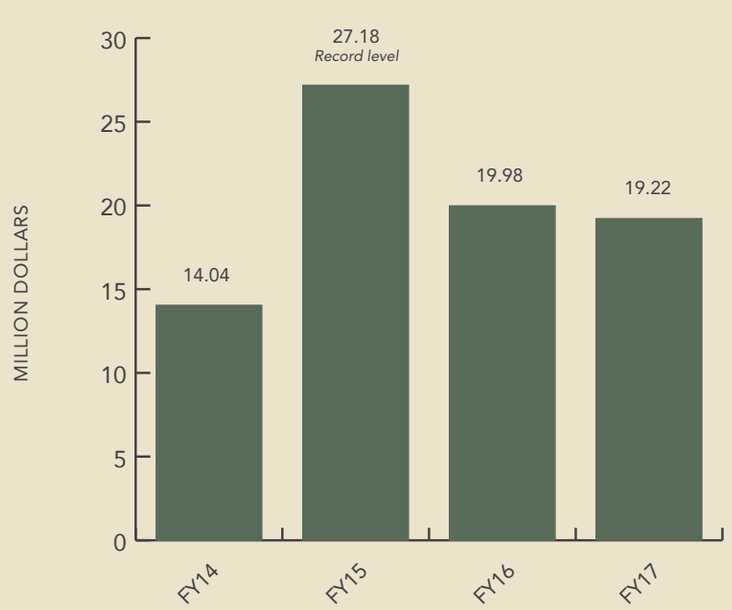
In Total Higher Education R&D Expenditures in Ag Sciences | FY 2016

Source: National Science Foundation Higher Education Research and Development Survey | FY 2016

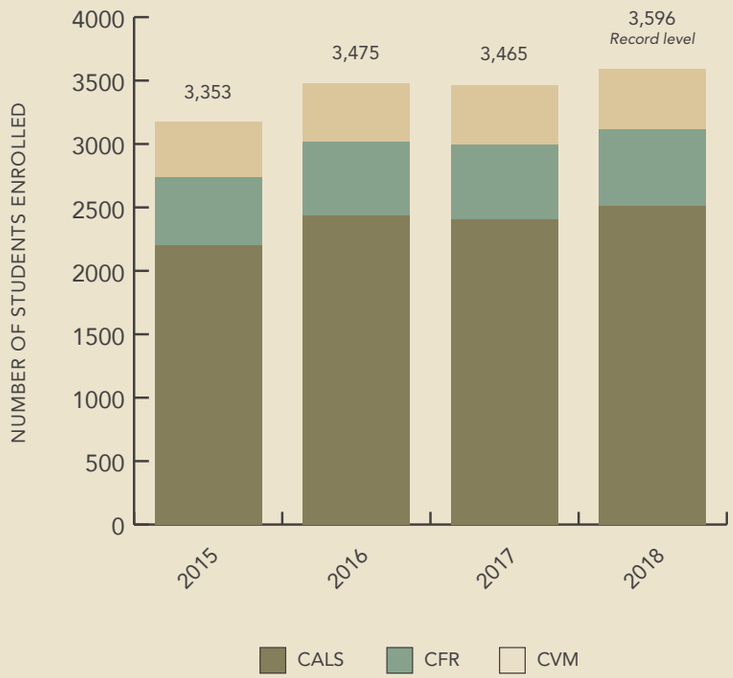
GRANTS & CONTRACTS RECEIVED



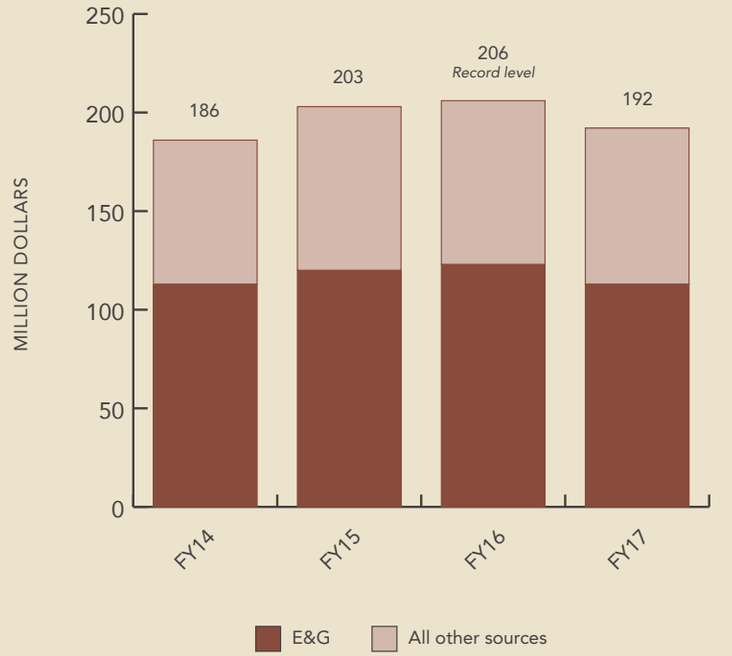
PRIVATE CONTRIBUTIONS



ENROLLMENT



TOTAL EXPENDITURES



Combines CVM, FWRC, MSUES, and MAFES. E&G funds include state, federal, tuition, sales, etc. All other sources include restricted and designated funds.

D A F V M MAP

MISSISSIPPI STATE UNIVERSITY™
DIVISION OF AGRICULTURE, FORESTRY, & VETERINARY MEDICINE

RESEARCH & EXTENSION CENTERS

1. Hiram D. Palmertree North MS Research & Extension Center VERONA
2. Delta Research & Extension Center STONEVILLE
3. Frank T. (Butch) Withers Central MS Research & Extension Center RAYMOND
4. Coastal Research & Extension Center BILOXI

MAFES BRANCHES & UNITS

5. North Mississippi Branch HOLLY SPRINGS
6. Pontotoc Ridge-Flatwoods Branch PONTOTOC
7. Northeast Mississippi Branch VERONA
8. Black Belt Branch BROOKSVILLE
9. Delta Branch STONEVILLE
10. Coastal Plain Branch NEWTON
11. E.G. (Gene) Morrison Brown Loam Branch RAYMOND
12. Truck Crops Branch CRYSTAL SPRINGS
13. South Mississippi Branch POPLARVILLE
14. Seafood Processing Lab PASCAGOULA
15. Prairie Research Unit
16. Beaumont Unit
17. White Sand Research Unit
18. McNeill Unit

MSUES UNIT

19. Crosby Arboretum PICAYUNE

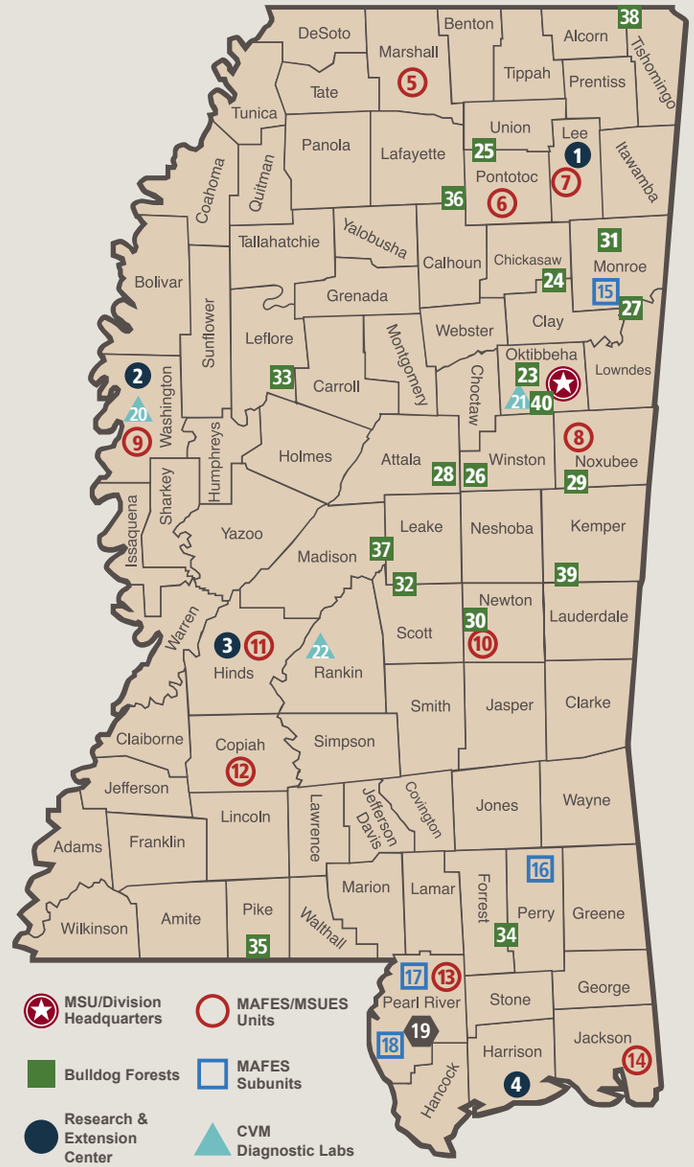
CVM DIAGNOSTIC LABS

20. Aquatic Research & Diagnostic Laboratory STONEVILLE
21. CVM-Diagnostic Laboratory Services MSU
22. Research & Diagnostic Lab/ Poultry Lab PEARL

BULLDOG FORESTS

23. Andrews Forestry & Wildlife Laboratory
24. Brand Forest
25. Brooking Forest
26. C.M. Chafee Forest
27. Columbus Air Force Base Property
28. Gober Forest
29. Hall Timberlands Forest
30. Harris Forest
31. H.K. & J.K. Holloway Reserve
32. Col. K.D. Johnson Forest
33. McGeary Sidon Plantation
34. Mortensen Forest
35. Norma Lea O'Quin Forest
36. Phillips Memorial Forest
37. John & Jane Player Property
38. Sharp Forest
39. Shaw-O'Reilly Property
40. J.W. Starr Memorial Forest

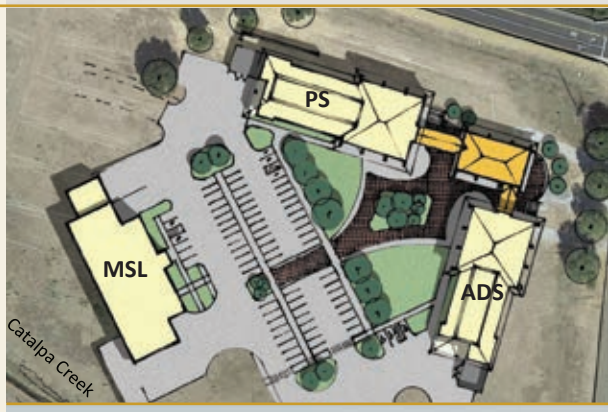
Two additional forests are unidentified at the request of anonymous donors.



An MSU Extension Service office is located in each of the 82 counties.

Thank you for your interest in the Division.
For more information about the photographs
in this report, please visit our online slideshow at
DAFVM.MSSTATE.EDU/ANNUALREPORT/2017/.

NEW FACILITY NAMING OPPORTUNITIES



MEAT SCIENCE AND MUSCLE BIOLOGY LABORATORY

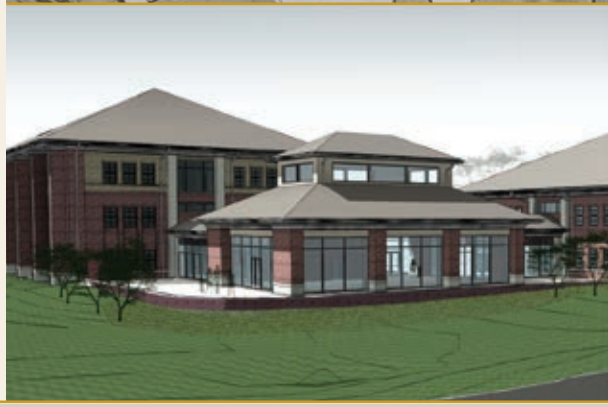
The 15,000-square-foot building includes a harvest area, demonstration area, and freezer space, as well as classrooms and research laboratories.

ANIMAL AND DAIRY SCIENCE BUILDING

This three-story building will contain about 34,500 square feet of offices, conference rooms, classrooms, and labs. Construction began in June 2017.

POULTRY SCIENCE BUILDING

This two-story building will contain 26,500 square feet of offices, conference rooms, classrooms, and labs. Construction is expected to begin in early 2018 with an anticipated completion date of December 2019.



IF INTERESTED, CONTACT:

JUD SKELTON 662-325-0643 **WILL STAGGERS** 662-325-2837

MISSISSIPPI STATE UNIVERSITY™
DIVISION OF AGRICULTURE, FORESTRY, & VETERINARY MEDICINE

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