2016

DAFVM

ANNUAL REPORT

DIVISION OF AGRICULTURE, FORESTRY,
AND VETERINARY MEDICINE

VP LETTER

2016 has been a year of celebrating our progress and evaluating our priorities to be sure we are providing a strong return on the investment made in the Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine.

Our far-reaching work on a variety of issues related to businesses, communities, and families is possible because of the strong support we receive from Mississippi's leaders. From legislators to county boards of supervisors to business and community leaders and commodity groups, we rely on our partners to continue to advance our mission to provide research-based answers to Mississippi's most pressing challenges. In fact, ongoing support allows the Division to lead the state's efforts to promote food security, precision agriculture, and access to a nutritious food supply.

Early in the year, we took seriously the threat of highly pathogenic avian influenza coming to our state with the arrival of migratory birds. Long before the birds began heading south, Division personnel in the Department of Poultry Science, College of Veterinary Medicine, Extension Service, and Forest and Wildlife Research Center worked with partners in the Office of the State Veterinarian, Mississippi Emergency Management Agency, the poultry industry, Mississippi Poultry Association, and other state agencies to plan and prepare for the potential arrival of HPAI. Thankfully, Mississippi escaped the devastating losses HPAI brought to other states, and we know good biosecurity and management practices helped keep Mississippi's flocks safe.

One of the great advances of our university this year has been a recently announced partnership with the University of Mississippi Medical Center through the Myrlie Evers-Williams Institute for the Elimination of Health Disparities. This partnership solidifies existing long-term collaborations between investigators at both institutions. These efforts promise to advance one of the five research priorities for MSU—health and health disparities—and yield new initiatives in the Division, which will improve the health and well-being of people locally, nationally, and globally.

Division colleges contributed to MSU's record-breaking enrollment of 21,622 students in the fall. We are delighted to report an overall increase of 4.2 percent over 2015, and each of our three colleges set records: College of Agriculture and Life Sciences, 2,440 students; College of Forest Resources, 576 students; and College of Veterinary Medicine, 542 students. Total enrollment at MSU continues to increase and set new records. In the past five years, enrollment in the three Division colleges has accounted for two-thirds of the total increases at MSU.

We continue to upgrade and expand our facilities to better serve our growing student body and the need for state-of-the-art research facilities. Construction on the new $8 million Meat Science and Muscle Biology Lab is underway and should be completed in July 2017. We have funding for the new $16 million Animal and Dairy Science building, and we should be able to bid the project in spring 2017. We also have funding for the new $12 million Poultry Science building and plan to bid that project in early 2018. At Stoneville, a $2.1 million renovation of the Thad

Cochran National Warmwater Aquaculture Center has been initiated with the IHL Board and could begin in spring 2017.

The College of Agriculture and Life Sciences announced new academic offerings, including a minor in international studies in agriculture, and two new majors in the School of Human Sciences: human development and family science, and fashion design and merchandising.

Capable leaders joined Division administrative teams in 2016, including Dr. Keith Coble, head of the Department of Agricultural Economics; Dr. Jack D. Smith, associate dean for academic affairs at the College of Veterinary Medicine; and Dr. Richard Nader, director of the International Institute. Working together to deliver innovative, relevant, needs-based solutions is our purpose, and we thank you for your continued partnership.

Warm regards,

Gregory A. Bohach
Vice President

CALS

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

The College of Agriculture and Life Sciences (CALS) is home to 2,034 undergraduate students, 250 master's students, and 156 doctoral students.

Two new majors were added this year in the School of Human Sciences: Human Development and Family Science, and Fashion Design and Merchandising. Each major offers different concentrations reflective of the two separate industries.

These two programs have been spotlighted this year. A popular online resource for students seeking information on fashion careers and academic programs lists Mississippi State among the nation's top 50. The Child Development and Family Studies Center, a teaching laboratory for students in the Human Development and Family Science major, achieved accreditation by the National Association for the Education of Young Children. The university's Aiken Village also merged with the Center.

Studying abroad is an important component in the College of Agriculture and Life Sciences. The College added a minor in International Studies in Agriculture this year to help students develop skills needed in a global economy. Students traveled to Europe, Vietnam, China, and New Zealand through the study-abroad program this year.

Landscape Architecture hosted the 40th annual National Collegiate Landscape Competition this year. Some 750 students converged on the Starkville campus to test their skills in landscape design and construction. In addition to numerous national awards received this year by faculty and students in Landscape Architecture, the department celebrated 50 years of teaching students to plan, design, build, and manage regenerative communities.

The Undergraduate Research Scholars program continues to grow, with 32 students participating this year. Now in its fourth year, students continue to garner recognition for their research in university, regional, and national competitions. The Precision Agriculture certificate program, with support from Monsanto, was formally launched this year. A new curriculum was developed, a classroom was repurposed in Dorman Hall, and several new faculty were hired to accommodate the program. This program allows students to earn a certificate in precision agriculture while majoring in one of four programs: Agricultural and Biological Engineering; Agricultural Economics; Biochemistry, Molecular Biology, Entomology, and Plant Pathology; or Plant and Soil Sciences.

Dr. Keith Coble, a national and international expert on agricultural risk management and crop insurance, was named head of the Department of Agricultural Economics this year.

The College continues to be one of the fastest growing colleges at MSU. We have an exemplary student body, internationally renowned faculty, and excellent alumni mentors and support.

CALS

MAFES

MISSISSIPPI AGRICULTURAL & FORESTRY EXPERIMENT STATION

Scientists in the Mississippi Agricultural and Forestry Experiment Station (MAFES) are committed to increasing economic prosperity and environmental stewardship, building stronger communities, and improving the health and well-being of families. Through 16 branch stations, scientists work across soil types, topographies, and climates to improve agricultural and animal production systems while increasing food quality and safety.

MAFES scientists released a new rice variety, Thad, named for U.S. Senator Thad Cochran. Thad is a high-amylose conventional variety that produces the loose, fluffy, parboiled rice popular in U.S and Latin American markets. In the MAFES Official Variety Trials, Thad outperformed the most popular high-amylose variety by nearly 40 bushels per acre. Nearly half of the rice produced in the U.S. is exported, so the new variety gives growers an additional product to meet global demand.

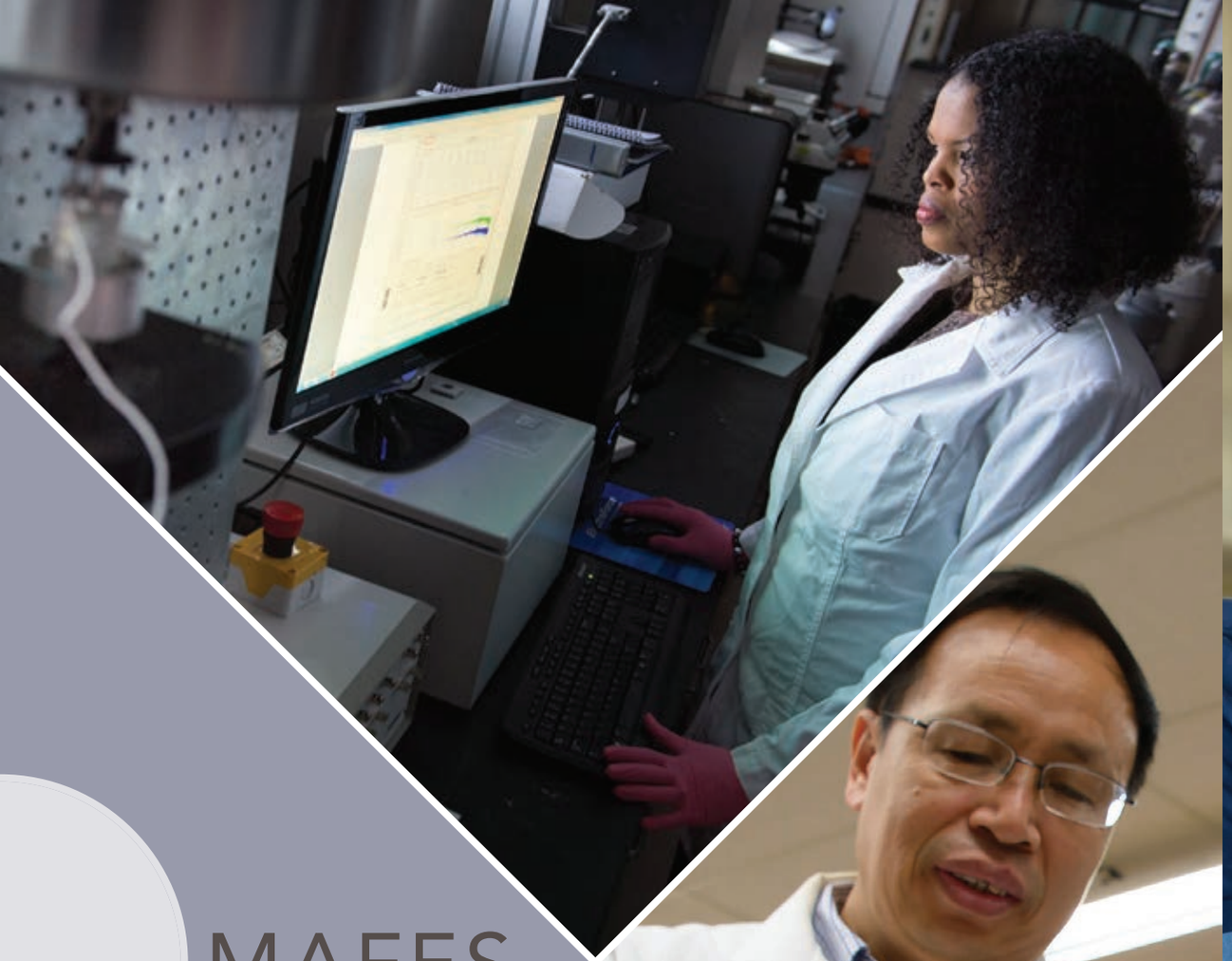
Final trials of the MSU-developed oral catfish vaccine and delivery system are underway, and researchers hope for commercial release in the near future. The catfish vaccine and delivery system protects catfish against enteric septicemia, the most commonly reported bacterial disease affecting the species. The disease is estimated to reduce production by 25 to 30 percent, costing the industry as much as $40 million annually. The vaccine is a collaborative project of MAFES and the MSU College of Veterinary Medicine.

MAFES has joined the Agricultural Data Coalition, an initiative dedicated to helping farmers better control, manage, and maximize the value of the data they collect every day. The coalition's goal is to build a national online repository where farmers can securely store and control the digital information collected by their tractors, harvesters, unmanned aerial vehicles, and other devices.

MAFES scientists recently discovered a bacterium that produces the compound occidiofungin, which shows significant fungicidal activity to various plant and animal fungal pathogens. Scientists have applied for two patents on the discovery, which has great potential as a novel pharmaceutical drug or as an agricultural fungicide.

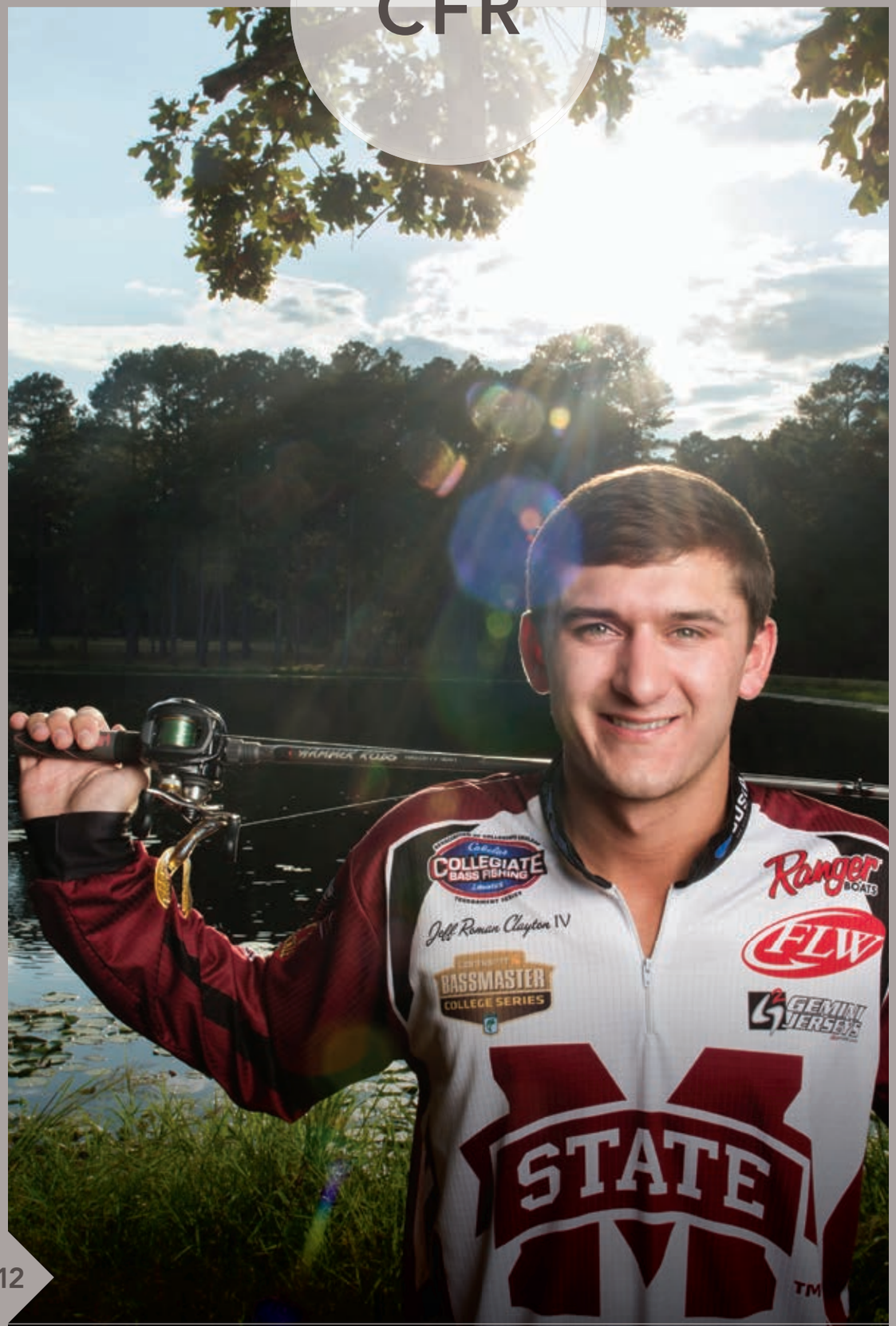
This year, MSU broke ground on a 15,000-square-foot Meat Science and Muscle Biology Laboratory. Slated for completion in summer 2017, the state-of-the-art facility will enhance the Experiment Station's meat production research. MAFES completed a new storage building and research facility for the Forage Unit at the H. H. Leveck Animal Research Center. Additionally, renovations on a poultry facility have provided the tools and infrastructure necessary to simulate current commercial poultry facilities.

These are just a few of the advancements MAFES scientists are making every day to help producers improve yields and increase profits.



MAFES

CFR



COLLEGE OF FOREST RESOURCES

With growth of more than 8 percent this fall, enrollment in the College of Forest Resources (CFR) is at a 10-year high with 576 students. The total enrollment includes 434 undergraduates, 95 master's students, and 47 doctoral students. The College includes majors in Forestry; Natural Resources and Environmental Conservation; Sustainable Bioproducts; and Wildlife, Fisheries, and Aquaculture.

CFR students are among the best and brightest in the nation. The MSU student chapter of the Society of American Foresters is the number-one student chapter in the nation. This is not a new accomplishment for the chapter; it has been ranked as one of the top three student chapters for the past 18 years. The club is involved in a number of activities, oriented toward both the profession of forestry and service within the community.

Students in the MSU Bass Fishing Club enjoyed a first-place ranking for several weeks in the national Cabela's School of the Year competition. The team finished the season in fifth place. The team is housed in the MSU Department of Recreational Sports; however, since its establishment, the team has been led by College of Forest Resources students.

In addition to professional and recreational opportunities, CFR students learn to apply classroom learning to real-world natural resource issues in the Undergraduate Research Scholars Program. Since its inception in 2013, 31 students have participated in the program, working as junior colleagues within faculty research programs.

The College of Forest Resources, along with the Mississippi Forestry Association and the Mississippi Loggers Association, cohosted the Mid-South Forestry Equipment Show this year. The equipment show is the longest running, live, in-woods equipment show in the South. Over 7,000 people attended the two-day show where nearly 100 exhibitors displayed equipment to advance the timber industry. The biennial event is held at the John W. Starr Memorial Forest near the MSU campus in Starkville.

A new memorandum of agreement with Shandong Agricultural University (SDAU) in China will enhance students' educational experiences. Students from SDAU who have completed three years of study at their home institution will be eligible to transfer to MSU as part of the dual-degree program. Participants will be awarded a Bachelor of Science degree in forestry from MSU's College of Forest Resources and a Bachelor of Agriculture degree from SDAU.

Faculty, staff, and students in the College of Forest Resources continue to grow and lead in promoting, supporting, and ensuring the management, conservation, and use of forest and other natural resources.

CFR

FWRC

FOREST & WILDLIFE RESEARCH CENTER

With 200 active projects supported by more than 135 research sponsors, MSU Forest and Wildlife Research Center (FWRC) scientists study the conservation, development, and use of forests, forest products, and wildlife and fisheries resources at home and abroad.

Climate change and its effects on forest health, nutrient cycling, and water quality are the focus of several FWRC projects. Scientists are studying wildfires in Russia to understand how much carbon is lost to wildfires compared to how much is taken in as new forests begin to grow. Scientists are also working to determine how management of Southern pine forests can help mitigate climate change.

Emerging technologies provide new opportunities to apply the principles of precision conservation in natural resources management. Forestry scientists are using unmanned aerial vehicles to identify clones with the longest leaf retention, which informs varietal development. A clone's ability to retain its leaves late into the year provides more nutrient storage in the root system and superior growth the following year.

Scientists from 20 state, federal, and nonprofit organizations have come together to form the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative. Housed at MSU, the collaborative project involves scientists in the FWRC, Geosystems Research Institute, and U.S. Fish and Wildlife Service. The cooperative works to define, design, and deliver conservation strategies that help fish and wildlife species, communities, and ecosystems adapt to climate change and other stressors at the landscape level.

Finding new uses for natural resources is the mission of Sustainable Bioproducts scientists. Researchers have found a method to create graphene from the lignin in wood. Stronger than steel, graphene conducts heat and electricity efficiently. It has been shown to enhance batteries, solar cells, electronic transistors, and hundreds of other products. Efficient lignin-to-graphene conversion technologies could turn a byproduct into a high-value manufacturing material. Researchers also hope to improve wood durability through chitosan, derived from a substance found in the exoskeletons of lobsters, crabs, and shrimp. Scientists are also expanding wood use through an engineered composite lumber that includes wood and plant materials.

Finally, a new partnership between MSU and the U.S. Department of Agriculture's APHIS Wildlife Services program has made the university home to a national training academy. The Wildlife Services National Training Academy (NTA) is the country's first academy dedicated to safely resolving human-wildlife conflicts and safety-related risks. The academy is headquartered in the MSU Department of Wildlife, Fisheries, and Aquaculture's Center for Resolving Human-Wildlife Conflicts.

FWRC

CVM

COLLEGE OF VETERINARY MEDICINE

Since its establishment in 1974, the College of Veterinary Medicine (CVM) has provided a higher standard of living not just for animals and people involved in animal agriculture, but for all Mississippians. The College's goal as part of a modern land-grant institution is making advancements in teaching, research, globalization, and community service.

Over the past year, the CVM has elevated its ability to lead in rural veterinary medicine with a new expert in herd-health research. Dr. Amelia Woolums is working with cattle producers to help eliminate summer pneumonia outbreaks in calves. Students are enthusiastic about being part of these efforts and are learning firsthand to communicate with and help producers find efficient and cost-effective solutions leading to improved herd health.

CVM aquaculture specialists are expanding the work of the university's Global Center for Aquatic Food Security and providing expertise to ensure small, rural communities around the world have access to important and safe protein sources. Through targeted projects, researchers and veterinarians are providing fish-health plans to international communities; conducting faculty and student exchanges with international universities to share knowledge on aquatic disease control; and conducting training and certification on aquatic diagnostics, disease prevention, and best practices.

Through a partnership with the Institute of Marine Mammal Studies in Gulfport, the College's aquaculture, pathology, and veterinary radiology experts are collaborating with wildlife and marine studies researchers to help endangered species and perform special diagnostics on injured marine life. Specifically, assistant professor and board-certified veterinary radiologist Dr. Jennifer Gambino is serving as a resource for the institute in emergency rescue operations. She is using imaging technology to diagnose disease in marine mammals and help develop less invasive procedures for improving the health of marine life.

The College's commitment to involving underserved young people in veterinary medicine and the sciences has remained strong. CVM's Vet Aspire program has grown to include almost three times more high school students than in previous years. The students get hands-on experiences with current veterinary students and learn more about how to embark on a veterinary medical education and career. Additionally, veterinary students are volunteering at area schools and the local Boys and Girls Club to involve children in science-related activities.

Moving forward, the College stands committed to improving the health of animals and people, and to contributing to economic development in Mississippi and the region. The CVM will meet these goals by providing quality education, advancing research, and serving the community through excellent diagnostics, clinical care, and shared learning.

CVM

MSUES

MISSISSIPPI STATE UNIVERSITY EXTENSION SERVICE

Thousands of Magnolia State residents relied on educational programming and hands-on training opportunities offered by the Mississippi State University Extension Service during 2016.

Extension professionals worked with agricultural producers to support the state's $7.6 billion agriculture industry. To address the Delta's declining aquifer levels, the Row Crop Irrigation Science Extension and Research Program evaluates novel irrigation water management practices to improve crop water use efficiency and on-farm profitability.

Maintaining Mississippi farmers' lead in adopting the latest irrigation technologies remains one of Extension's top priorities. About 20 percent of Mississippi soybean producers—versus 1.5 percent nationally—use soil moisture sensors for irrigation decisions. Some farmers improved yields by as much as 50 percent. The sensors determine the best time and most efficient approach to watering crops.

Extension's family and consumer sciences outreach efforts continue emphasizing health education. Administrators signed a memorandum of understanding between MSU and the Myrlie Evers-Williams Institute for the Elimination of Health Disparities at the University of Mississippi Medical Center.

Extension agents and specialists continued offering natural resources conservation programs. For the first time, Extension headed the annual Mississippi Coastal Cleanup and organized about 2,400 volunteers to pick up more than an estimated 10 tons of litter.

Local governments around Mississippi partnered with Extension's Center for Technology Outreach to develop websites and social media presence, as well as maintenance strategies. More than one-third of Mississippi's counties received technology-education information, and hundreds of government officials interacted with Extension's professional staff.

For the 36th consecutive year, Extension offered the Mississippi Association of Tax Assessors and Collectors Certified Appraisers Certification. Efforts to increase broadband adoption continue among rural and low-income households.

Approximately 60,000 participants in the Mississippi 4-H youth development program experienced another impactful year. Young residents completed individual 4-H projects and learned leadership skills.

Extension's 103rd year of service saw the 25th anniversary of the Mississippi Master Gardeners volunteer program and the 40th anniversary of the Mississippi needlepoint map hanging in the Bost Conference Center. Celebrating these milestones reinforces Extension's mission to extend knowledge and change lives.

MSUES

ADMINISTRATION

MARK E. KEENUM

President | Mississippi State University

GREGORY A. BOHACH

Vice President | Agriculture, Forestry, & Veterinary Medicine

KENT C. HOBLET

Dean | College of Veterinary Medicine

GEORGE H. HOPPER

Director | Forest & Wildlife Research Center

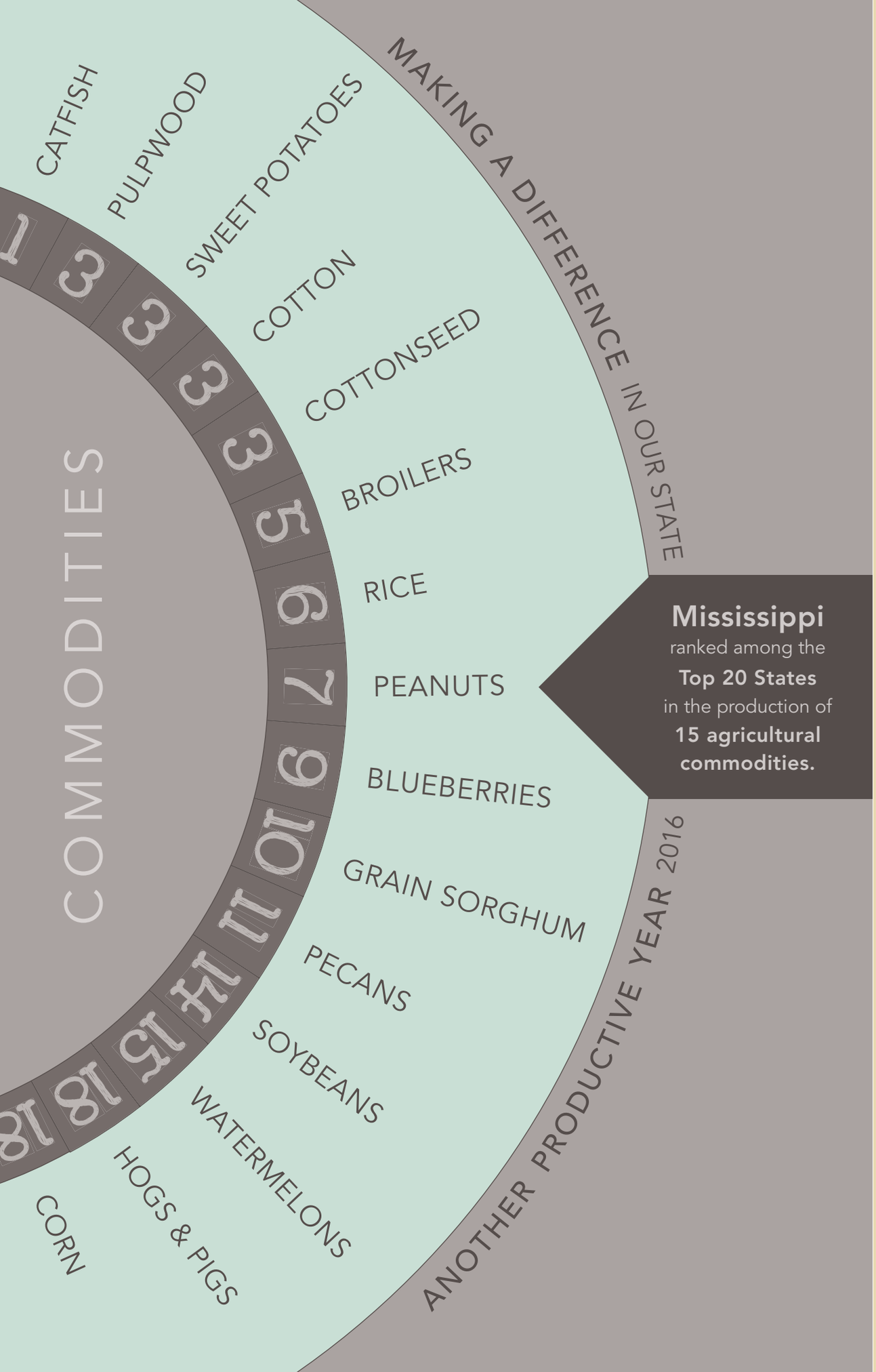
Director | Mississippi Agricultural & Forestry Experiment Station

Dean | College of Agriculture & Life Sciences

Dean | College of Forest Resources

GARY B. JACKSON

Director | Mississippi State University Extension Service



$7.6 BILLION

2016 **farm-gate** value of ag and forestry production

(includes government payments)

$16.5 BILLION

2016 **value added** to the Mississippi economy by ag and forestry

$106.5 MILLION

R&D expenditures by MSU in agricultural sciences

SOYBEAN YIELDS
48 bushels/acre*

COTTON YIELDS
1,228 pounds/acre*

PEANUT YIELDS
4,100 pounds/acre*

SOYBEAN PRODUCTION
97 million bushels*

BROILER PRODUCTION VALUE
$2.82 billion*

COTTON PRODUCTION
1.1 million bales

SWEET POTATO PRODUCTION VALUE
$116 million*

* record/near record level

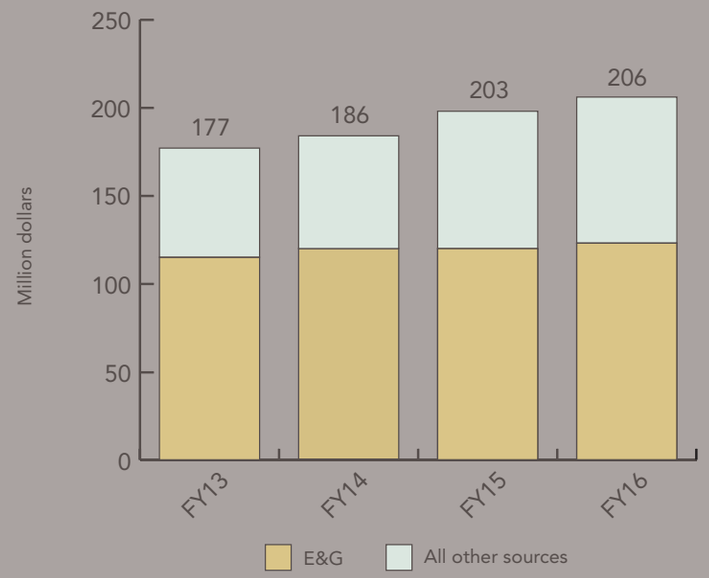
RANKED #6 NATIONALLY

TOP 10 SINCE 1998

In Total Higher Education R&D Expenditures in Ag Sciences | FY 2015

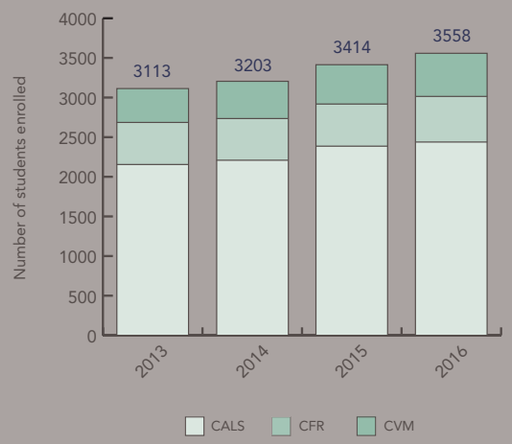
Source: National Science Foundation Higher Education Research and Development Survey | FY 2015

DAFVM TOTAL EXPENDITURES

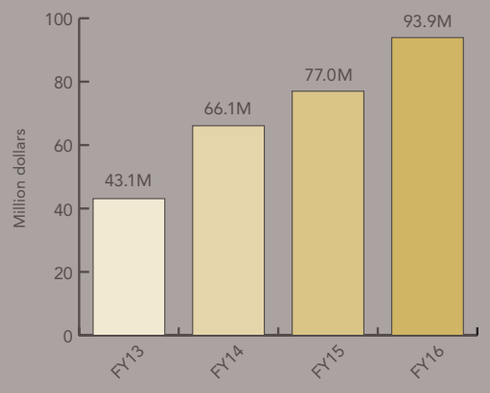


Combines CVM, FWRC, MSUES, and MAFES. E&G funds include state, federal, tuition, sales, etc.
All other sources include restricted and designated funds.

DAFVM ENROLLMENT



DAFVM GRANTS & CONTRACTS RECEIVED



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 STATION UNITS & SUBUNITS

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. Crosby Arboretum PICAYUNE
15. Seafood Processing Lab PASCAGOULA
16. Prairie Research Unit
17. Beaumont Unit
18. White Sand Research Unit
19. McNeill Unit

CVM DIAGNOSTIC LABS

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

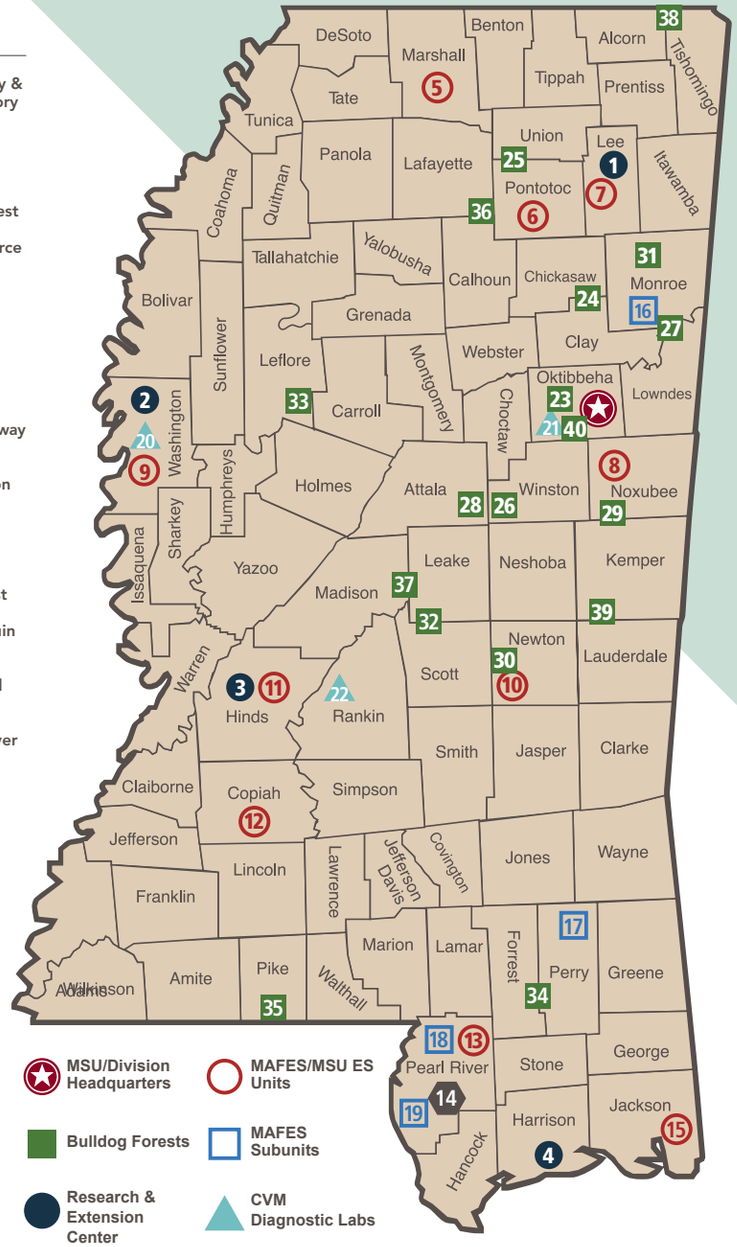
BULLDOG FORESTS

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.

MISSISSIPPI STATE UNIVERSITY™

DIVISION OF AGRICULTURE, FORESTRY, AND VETERINARY MEDICINE



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/2016/.

MISSISSIPPI STATE UNIVERSITY™

DIVISION OF AGRICULTURE, FORESTRY, AND VETERINARY MEDICINE

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