

Agriculture Excellence

Montana State University College of Agriculture
& Montana Agricultural Experiment Station

2015 – 2016 Annual Report



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 Land Resources & Environmental Sciences | Tracy Sterling, PhD
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 Plant Sciences & Plant Pathology | John Sherwood, PhD
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 Eastern AES, Sidney | Chengci Chen, PhD
 Northern AES, Havre | Darrin Boss, PhD
 Northwestern AES, Creston | Robert Stougaard, PhD
 Southern AES, Huntley | Ken Kephart, PhD
 Western AES, Corvallis | Zach Miller, PhD
 Western Triangle AES, Conrad | Gadi Reddy, PhD

Affiliated Research Facilities

Animal Operations Manager | Bob Brekke
 Arthur H. Post Research Farm, Farm Operations Manager | Dave Gettel
 Plant Growth Center & Horticulture Farm Manager | David Baumbauer

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On the cover: MSU wheat taken for a story about Luther Talbert.
 MSU photo by Sepp Jannotta.

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Editor: Jenny Lavey

Photos by Kelly Gorham and MSU News Service, unless otherwise noted.

A Message from the Vice President of Agriculture

January 2016



Dear Friends,

After a year as your first Vice President, I write to our friends and family across the state with great expectations and to tell you that the College of Agriculture and Montana Agricultural Experiment Station have a superb team. As you might imagine, relocating from the central valley of California last January has led to some adjustments in dealing with the weather, in spite our mild winters. As different as California and Montana may seem, both share a rich history of partnerships between Land-grant universities and their respective state citizens. I am honored to be the first Vice President of Agriculture at Montana State University.

The College of Agriculture and Montana Agricultural Experiment Station have much to celebrate for the 2015–2016 year. This year, we welcomed our eighth year of increasing enrollment and our programs have landed on several nationally-ranked lists. In May, we graduated 130 students from our college and expect to continue our relationship with them as supportive alumni. Many of you, our friends and supporters, have given more than \$350,000 in private scholarships this year. This helps ease the financial obligation of our students while they earn their college degree and allows them to fully participate in all our educational opportunities outside of the classroom.

This year our college brought in \$28 million in research expenditures and we continue to garner national attention and funding in our agriculture research in animal health, food safety, agricultural economics, plant sciences, natural resources and pest management. Our Research Centers across the state continue their vital presence and their respective research profiles remind us the entire state of Montana is our campus. Certainly, the State of Montana during the 63rd Legislative session this year proved once again that scientific research, access to higher education and agriculture production and programs are vital to our collective success on a national and global scale.

As we offer you a comprehensive review of our year in this annual report, know that your College of Agriculture and Montana Agricultural Experiment Station continue to honor the Land-grant mission of educating Montana's sons and daughters while supporting industry and trade with scientific research. I am proud to join our state supporters, faculty scientists and students in honoring the incredible 122 year legacy of the Montana State University College of Agriculture and Montana Agricultural Experiment Station.

Sincerely,

Charles Boyer, PhD | Vice President of Agriculture Dean and Director,
 MSU College of Agriculture & Montana Agricultural Experiment Station

Barry Jacobsen, PhD | Associate Director of the Montana Agricultural Experiment Station & Research Center Department Head

Nora Smith, PhD | Assistant Dean for Academic Programs, College of Agriculture



The Year in Numbers

The College of Agriculture is the **2nd** fastest-growing college at MSU. Enrollment for Fall Semester 2015: **949** undergraduate and **143** graduate students, **1,143** total. It is the **8th** year of increasing enrollment.

4,240,762 impressions and **88,802** reached in our first-ever Twitter Town Hall, #BigSkyAgChat on July 2nd. In just over an hour, "BigSkyAgChat" reached almost **89,000** and **1,000** engagements.

Named **4th** best college in the country for agricultural majors by *Campus Explorer*.

Our Arthur H. Post Farm was ranked **28** out of 40 as the best college farms in the country.

1,500 blue and gold FFA jackets from Montana FFA chapters graced our campus this November for the annual John Deere Ag Expo.

COA/MAES awarded **\$369,897** to faculty for research and innovation grants to increase capacity in teaching and research. **\$427,038** awarded internally for equipment grants across COA/MAES. The College of Agriculture and Montana Agricultural Experiment Station accounts for **20%** of the total grants and contracts **30%** in total research expenditures for the entire university.

Two endowed chair creations, focused on the main economic drivers for the state of Montana; the grain and cattle industries: Montana Plant Science Chair in the Department of Plant Sciences & Plant Pathology and the Cameron Chair in Animal Physiology in the Department of Animal & Range Sciences.

130 students earned a degree from the College of Agriculture this spring; **103** bachelors, **26** masters and **9** PhDs. This December, the college awarded **63** degrees; **46** bachelors, **15** masters and **2** PhDs.

The **top 3** seeded winter wheat varieties planted in 2015 were MAES varieties; Yellowstone, Judee and Decade, accounted for **44%** of 2.4 million acres planted across Montana. Vida, another MAES variety, was the top spring wheat planted — accounting for **16.8%** of 2.8 million acres planted across the state. **One** new wheat variety — Egan, spring wheat.

\$390,000 — the total amount of individual scholarships given to agriculture students in 2014 from private philanthropy. **\$355,000** awarded for the 2015–2016 academic year in **271** awards to **181** students, with an average GPA of winners being 3.6.

Ten students enrolled in their first year of veterinary school in the Washington Idaho Montana Utah Regional Veterinary Program

100 years — the amount of time the Northern Agricultural Research Center has been an agricultural science presence along Montana's Hi-Line.

204 buildings, **1,099** sheep, **3,554** beef cattle, **85** horses, **one** herd dog and **one** guard dog.

One new website — visit and read all about our agriculture research at www.agresearch.montana.edu.

First MSU Vice President of Agriculture in his first year at MSU — Charles Boyer, PhD. **24** new faculty. **Two** big meetings: MSU hosted the United States Agency for International Development's Board for International Food and Agriculture Development on April 9th and 10th. MSU hosted Sonny Ramaswamy, the Director of the U.S. Department of Agriculture on July 30th. Dr. Ramaswamy presented a lecture on the work needed to ensure the nutritional security of the country's good supply, an increasing global population and food waste, in addition to a host of other agricultural challenges and successes.

College Enrollment

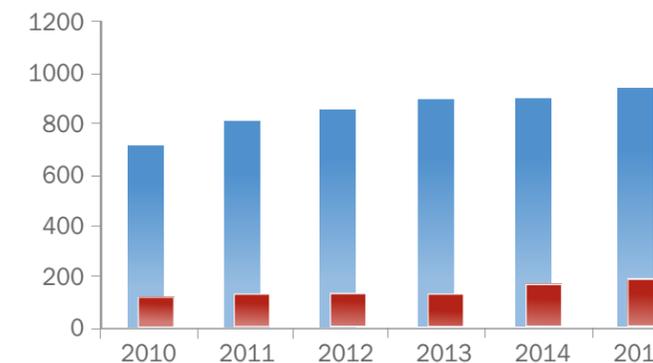
The MSU College of Agriculture is one of the fastest-growing three colleges at MSU, with the **8th straight year of increasing enrollment**. We're proud to serve an increased student enrollment and each semester we welcome newly filled hallways with diverse students wanting to pursue agricultural careers and fields.

MSU continues to see enrollment growth in most of its programs and majors. MSU is now the state's fastest-growing and largest Land-grant university with a total of **15,688** students. Across our five academic departments, we enroll **949** undergraduates and **194** graduates, for a total of **1,143** students.

Our college hosts **11** majors, **13** graduate programs, **22** options and **7** minors and our student body represents:

- **47** states and **17** countries:
 - **57%** students from Montana
 - **39%** from other US States
 - **4%** from other countries
- More students from New York (9) than Wyoming (7).
- **3%** non-traditional students.
- **40%** attended another institution before enrolling at MSU.
- **36** United States Veteran students.
- Largest department — Animal & Range Sciences, **331** students.
- Department with most graduate students — Land Resources & Environmental Sciences.
- **56%** of enrollment growth since 2007, **8%** increase from fall 2014 to fall 2015.

College Enrollment 2010–2015 | ■ Undergraduate ■ Graduate



2015 Enrollment by Department and Major

Agricultural Economics & Economics
Agricultural Business: 152
Graduate Students: 16

Agricultural Education
Ag Education: 50
Graduate Students: 6

Animal and Range Sciences
Animal Science: 262
Natural Resources & Rangeland Ecology: 87
Sustainable Foods and Bioenergy Systems: 4
Graduate Students: 22

Land Resources & Environmental Sciences
Environmental Sciences: 91
Geospatial & Environmental Analysis: 5
Land Rehabilitation: 9
Agroecology: 20
Graduate Students: 100

Plant Sciences & Plant Pathology
Biotechnology: 12
Environmental Horticulture: 62
Plant Science: 38
Crop Production: 26
Graduate Students: 27

Microbiology & Immunology
Microbiology: 20
Biotechnology, Microbial Systems: 15
Biotechnology, Animal Systems: 15
Pre-Vet: 89
Graduate Students: 18

General College: 10

Total Undergraduate: 952
Total Graduate: 194
Total College: 1,146

Program Excellence

MSU farm ranked one of best college farms in nation

October 20, 2015 — MSU News Service

One of Montana State University's research and teaching farms was recently ranked among the 40 best college farms in the nation by College Ranker, an independent online college decision source.

The Arthur H. Post Teaching and Research Farm at MSU was ranked number 28 out of 40 of the best college farms nationwide. The rankings are based on hands-on experience, student involvement, community outreach programs, workshops, classes, lectures, volunteer opportunities and degree plan options.

David Gettel, farm operations manager of the Arthur H. Post Farm, said the farm was honored to be recognized for its many efforts.

"We have an incredibly active farm in terms of research, activities and community engagement," Gettel said. "The people that are involved in plant breeding, pest management and crop rotation studies are absolutely the best in the nation. It's not surprising that we are nationally ranked. This farm and the people that are conducting research here are a priceless asset to Montana State University and the state of Montana."

The Arthur H. Post Farm is one of 12 active teaching and research farms affiliated with MSU, the MSU College of Agriculture and Montana Agricultural Experiment Station. The farm encompasses more than 254 acres of wheat and barley variety trials, cropping systems, pest management studies, and trials for Foundation seeds, or seeds developed by the experiment station for potential commercial production.

Additional institutions that made the list were Penn State University, Dartmouth College, Yale University and Cornell University.

MSU College of Agriculture named one of nation's best colleges for agriculture majors

November 16, 2015 — MSU News Service

An online service that helps more than 30 million students a year with college planning recently ranked the Montana State University College of Agriculture as one of the top four colleges of agriculture in the country for students wanting to pursue a career in agriculture.

According to Campus Explorer, MSU's College of Agriculture was ranked for its diverse six departments, working farms, specialized research centers and the popularity of agriculture on campus. Additionally, the ranking listed the college's ability to provide more than 100 scholarships in all disciplines of agriculture, available to every student in the college to apply through a single form.

MSU Vice President of Agriculture Charles Boyer said the college's diverse faculty, farms and research centers are an asset to students as they prepare for agriculture careers.

"Our college is continually ranked nationally and it is no surprise," Boyer said. "This success begins with our incredible faculty who provide hands-on learning and research experiences at our farms with students as partners, who make the overall experience of learning real and fun. We celebrate and live the unique mission of the Land-grant with a statewide presence and support by our agricultural community—a legacy that allows MSU to stand apart."

Additional institutions that made the list were Purdue University, Cal Poly San Luis Obispo and Utah State University.

The College of Agriculture includes six academic departments and seven off-campus research stations through the Montana Agricultural Experiment Station. It is the second-fastest growing college at MSU.

MSU-developed varieties are top planted wheat crops in Montana

December 3, 2015 — Jenny Lavey, MSU News Service

Montana farmers planted wheat varieties developed by the Montana State University Montana Agricultural Experiment Station (MAES) more than any other variety in 2015, according to the United States Department of Agriculture.

USDA statistics show that Montana planted 5.8 million acres of wheat this year, with 2.2 million acres of spring and winter wheat varieties developed by MAES. MSU wheat varieties accounted for approximately \$500 million of \$1.2 billion wheat sold by Montana farmers in 2015, according to MSU wheat breeding specialists. Some wheat varieties developed by MSU are sold by private companies. Montana exports 20 percent of agricultural products as foreign exports and 75 percent of its wheat to Asian markets, according to the USDA.

"This data clearly demonstrates that our producers and consumers value wheat varieties developed by Montana State, and that these varieties bring enormous value to the Montana and global economy," said Charles Boyer, MSU vice president of agriculture. "Our faculty scientists have deep experience, which provides the foundation for developing varieties that meet challenges and desires not only of Montana grain growers, but to the world market as well. Our university breeding program is vital to the state's highest-grossing industry, and we're committed to working with and alongside our producers for a robust grain industry in Montana."

Montana producers choose to plant MAES varieties because they are specifically adapted to Montana's climate and several are resistant to common diseases and pests found statewide, said Barry Jacobsen, associate director of MAES.

"Our breeding program develops varieties that are specifically bred for Montana's climate and pests, while at the same, they are high-yield, high-protein and have exceptional baking quality, so they perform well for our growers and customers," Jacobsen said. "Our varieties also have consistent protein content and noodle and bread making qualities, so desired by our global markets."

Student Excellence

Agriculture students represent MSU, Montana and the College of Agriculture in academics, service and leadership. Our students continue to benefit from student clubs, mentorships and research opportunities that help them define their MSU College of Agriculture experience.

The **2015 College of Agriculture Outstanding Senior** went to Dionne Zoanni, a Geospatial and Environmental Analysis major from LRES, nominated by her faculty advisor in LRES, Professor Rick Lawrence.

2015 Annual Award for Excellence Winners

- Russell Callahan (Environmental Science) and Tony Hartshorn, LRES
- Elena Combs (Animal Science) and Rebecca Mattix, Microbiology & Immunology
- Susan Massar (Plant and Crop Science) and Nora Smith, COA/MAES Assistant Dean
- Katie Noland (Environmental Science) and Stephanie Ewing, LRES



COA & MAES: Impacting Agriculture

The College of Agriculture and Montana Agricultural Experiment Station believe in sharing how we invest resources in Montana programs and the fiscal foundation for how we are able make a difference for agricultural production across the state.

Below is the base funding chart showing what MAES, MSU Instruction and Extension contribute to our total annual budget. The state fiscal year runs July through June.

FIGURE ONE: BASE SUPPORT FROM THE STATE FOR MAES

Base support from the State was critical as it provided nearly \$13 million toward MAES. The University contributed \$7 million from its general operating fund for instruction. Federal U.S. Department of Agriculture capacity funds (Hatch Act) provided \$2.9 million of the MAES total.

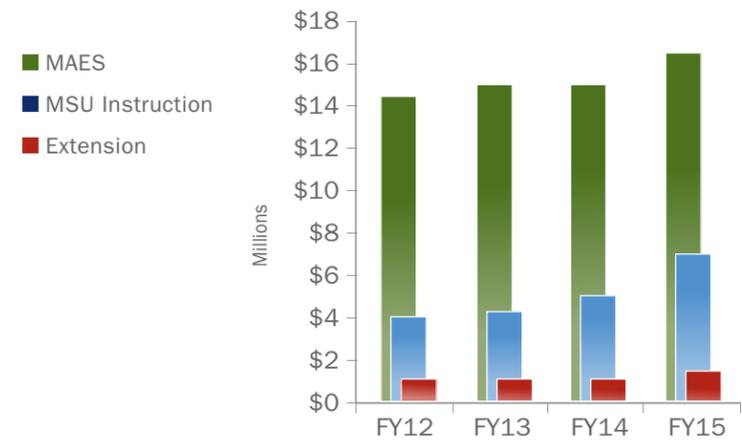


FIGURE TWO: BASE FUNDING, FEDERAL V. STATE

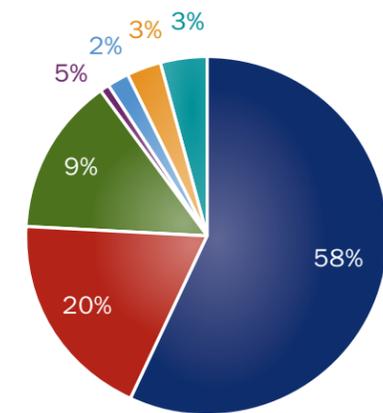
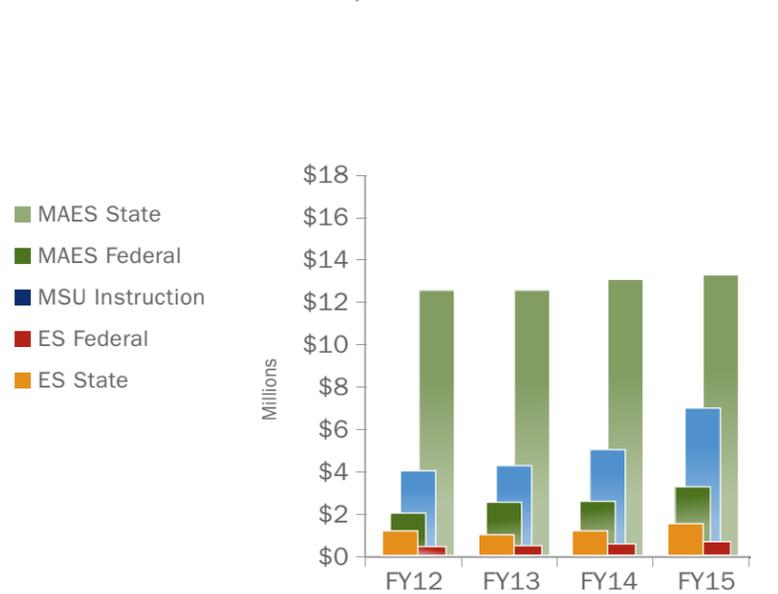


FIGURE THREE: MAES EXPENSES BY EXPENDITURE CATEGORY

MAES (and other funds) expenses cover base costs for 113 faculty, 213 in staff and labor, \$400,000 in graduate student stipends, 204 buildings, and 29,372 acres of land affiliated with COA/MAES.

■ Salary ■ Benefits ■ Operations ■ Overhead ■ Utilities ■ Maintenance ■ Capital

FIGURE FOUR: COLLEGE OF AGRICULTURE GRANT EXPENDITURES BY DEPARTMENT

The majority of the competitive grant money secured in the College and MAES faculty comes from the National Institutes of Health which funds critical projects in the biomedical sciences impacting human, livestock, and wildlife health. The College boasts three of the top five departments at MSU for grant expenditure funding; Microbiology & Immunology, Land Resources & Environmental Sciences and Plant Sciences & Plant Pathology. Faculty members compete for private grants and also those from State and National programs. The COA and MAES successfully used \$18 million of State and Federal money to leverage an additional \$20 million in grants from external sources to support teaching and research programs.

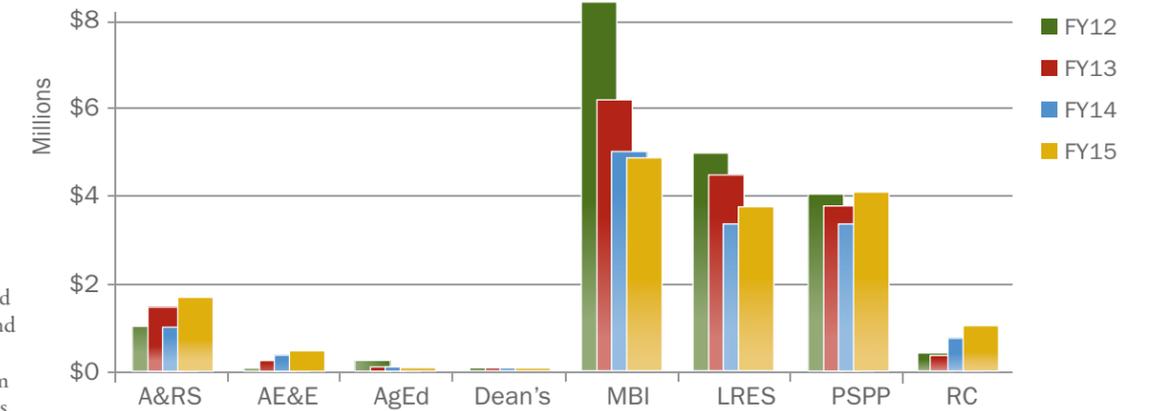


FIGURE FIVE: GRANTS BY AGENCY, EXTERNAL FUND SOURCES PROVIDING SUPPORT TO COA/MAES

The College and MAES are critical components to MSU research as evidenced by competitive grants secured from National Institutes of Health, National Science Foundation, USDA, NASA and the U.S. Department of Defense. Funds were also procured from the non-federal entities such as the Noxious Weed Trust Fund and the Montana Wheat & Barley Committee.

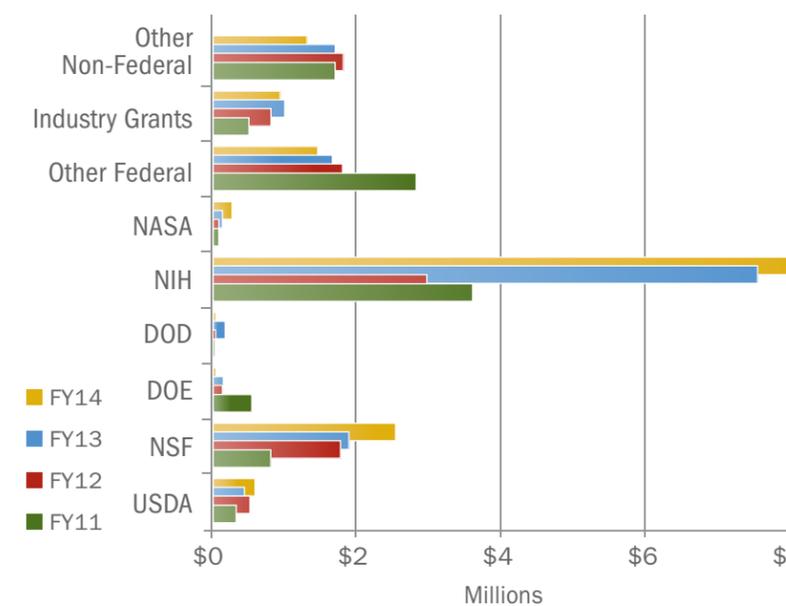
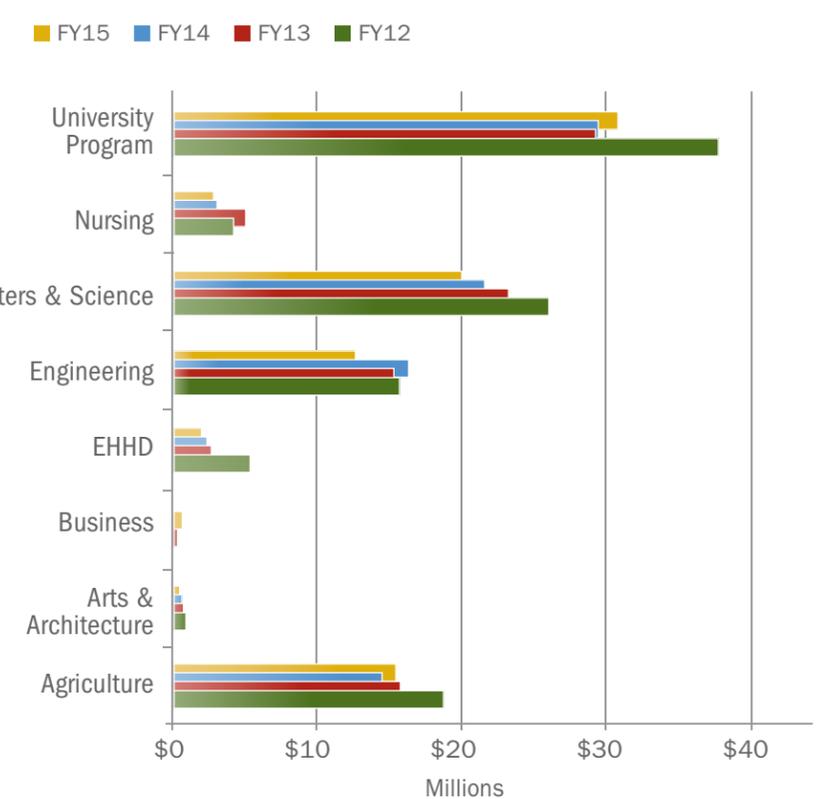


FIGURE SIX: RESEARCH EXPENDITURES BY COLLEGE AT MSU



Welcome, New Faculty

The College of Agriculture & Montana Agricultural Experiment Station welcomed 25 new faculty in the 2014–2015 year:

Diane Bimczok—Veterinary Medicine, WIMU
Hikmet Budak—PS, Mont. Plant Sciences Chair
Patrick Carr—AES, CARC
Michelle Flenniken—Plant Sciences
Roger Ondoua—AES, WTARC
Ryan Jones—Microbiology & Immunology
Doug Kominsky—Microbiology & Immunology
Lance McNew—Animal & Range Sciences
Scott Powell—LRES
Dustin Perry—Agricultural Education
Raina Plowright—Veterinary Medicine, WIMU
Ligia Prezotto—AES, NARC
Richard Ready—Ag Economics & Economics
Jessica Rupp—Plant Sciences
Whitney Stewart—Animal & Range Sciences
Ryan Thum—Plant Sciences
Amy Trowbridge—LRES
Megan Van Emon—Animal & Range Sciences
Jamie Sherman—Plant Sciences

Faculty who completed the Retention, Tenure and Promotion Process

Agricultural Economics & Economics

Anton Bekkerman—Tenure and Promotion
Eric Belasco—Tenure and Promotion
Greg Gilpin—Tenure and Promotion
Carly Urban—Retention

Animal & Range Sciences

Craig Carr—Retention
Jennifer Thomson—Retention
Carl Yeoman—Retention

Microbiology & Immunology

Blake Wiedenheft—Retention

Land Resources & Environmental Sciences

Tony Hartshorn—Retention
Jack Brookshire—Tenure and Promotion

Research Centers

Gadi Reddy—Retention

Faculty Excellence

The College of Agriculture and Montana Agricultural Experiment Station are pleased to support active and engaged faculty who regularly bring national and global notoriety and accomplishments to MSU, further advancing their fields and research contributions for the world.

Our faculty created and distributed 1,218 forms of intellectual contributions in the 2014–2015 year. These include web pages, newsletters, journal articles, research and technical reports, magazine and trade articles, Extension documents and manuscripts and working papers. Additionally, our faculty are active in garnering state and national awards:

Vice President Charles Boyer received the Honorary Fellow Award from the California Agricultural Leadership Program.

Ryan Jones, M&I, is the recipient of an \$18,000 grant from the National Geographic Society.

Jennifer Thompson, AnRS, was awarded the Robert Walton Graduate Support Award from the American Simmental Association and the MSU Faculty Excellence Instructional Innovation Award.

William Inskeep, LRES, was named as a Senior Scientist Joint Appointment from the DOE-Pacific Northwest National Laboratory and was awarded the MSU Provost's Award for Graduate Research and Creativity and Mentoring.

Kevin O'Neill, LRES, was awarded the MSU Anna K. Fridley Award for Distinguished Teaching.

Rachel Endecott, AnRS, was honored with an Achievement Award from the National Association of County Agricultural Agents.

David Weaver, LRES, was awarded the MSU Charles and Nora Wiley Faculty Award for Meritorious Research.

Adam Sigler, LRES, was honored with a Distinguished Service Award from the Montana Rural Water Systems, Inc.

Robert Lee was awarded with an Honorary Doctorate in Animal & Range Sciences.

Gary Strobel, PSPP and MSU Professor Emeritus, was honored with the Lowell Thomas Award from The Explorers Club.

Tommy Bass, AnRS, was named a 2015 recipient of the Soil and Water Conservation Society's President's Leadership Award.

Mark Jutila, M&I, received the WSU Distinguished Alumnus Award.

Blake Wiedenheft, M&I, received the MSU Award for Excellence.

Michelle Flenniken, PSPP, was the State of the Art Speaker for the American Society of Virology.

Jack Martin, PSPP, was named a fellow of the Crop Science Society of America.

Mary Burrows, PSPP, was honored with a Materials Award for "Francis the Farmer" from the American Society of Agronomy and the State Visionary Leadership Award for the MSU Extension Program Planning Working Group and Activity Insight Implementation Team.

Cathy Cripps, PSPP, was an honored Field Mycologist.

Chengci Chen, EARC, was named for an Editor's Citation for Excellence in Manuscript Review from the Agronomy Journal.

Whit Stewart, AnRS, received a Western Section of the American Society of Animal Science Young Scholar Award.

Edward Schmidt, M&I, was awarded the MSU President's Excellence in Teaching Award.

Perry Miller, LRES, was selected as a 2014 American Society of Agronomy Fellow.

Luther Talbert, PSPP, was invited to the National Academy of Inventors and was honored for Program Improvement through Global Engagement by the USDA-NIFA.

Lisa Rew, LRES, co-chaired a workshop entitled "Biosecurity in Mountains and High Latitudes," in Flen, Sweden.

Allen Harmsen, M&I, was a distinguished lecturer in the Provost's Distinguished Lecture Series.

John Priscu, LRES, was named an MUS Regents Professor, the highest honor for a professor in the MUS system.

Shannon Arnold, Agricultural Education, received a North American Colleges of Teachers of Agriculture Teaching Fellow.

Ed Davis, LRES, received the Outstanding Professional Staff Award from the Western Society for Weed Science.

Bob Stougaard, NWARC, was elected Fellow of the Western Weed Science Society.

Barry Jacobsen, AES, received the Lifetime Achievement Award from American Phytopathology Society Pacific Division.

Jane Mangold, LRES, received the Presidential Award from the Montana Weed Control Association.

Stephanie Ewing, LRES, received the NACTA Teaching Award of Merit and was awarded as a student mentor in a 2015 MSU Award for Excellence.

Joel Schumacher, DAEE, received the MSU Excellence in Outreach Award.

Tracy Dougher, Agricultural Education, received the NACTA teacher of the year and served as NACTA president this year, in addition to being accepted to the HERS Wellesley Institute.

Kevin O'Neill, LRES, was awarded the Phi Kappa Phi Anna K. Fridley Award for Distinguished Teaching.

Luke McKay, M&I, received a NASA Postdoctoral Fellowship from the NASA Astrobiology Institute to expand his work in Yellowstone.

William Inskeep, LRES, received the MSU Provost's Award for Graduate Research and Creativity Mentoring.

Scott Powell, LRES, received the MSU Excellence in Online Teaching Award.

Tony Hartshorn, LRES, received an award from the Campus Sustainable Advisory Council and was honored as a student mentor in a 2015 MSU Award for Excellence.

Darrin Boss, NARC, was honored with the Spirit of 4-H from the Hill County 4-H.

Gadi Reddy, WTARC, received President Obama's Volunteer Service Award, a national honor given in recognition of volunteer service.

Matt Rognlie, COA/MAES IT Director and Jane Mangold, LRES, completed LEAD 21, a leadership and professional development training for faculty and professionals within the Land-grant system.

Diana Cooksey, LRES, won the MSU President's Award for Service Learning.

Kate Fuller, DAEE, was honored with a Team Award with George Haynes, DAEE, from Epsilon Sigma Phi.

Tracy Sterling, LRES, awarded the 2016 MSU Women's Faculty Caucus Distinguished Mentor Award.

Joe Janzen, DAEE, and co-authors were awarded the Quality of Research Discovery Award by the European Association of Agricultural Economists for the paper "*Hedging and Speculative Trading in Agricultural Futures Markets.*" Janzen was elected Chair of the Agricultural Finance and Management (AFM) section of the Agricultural and Applied Economics Association.

Bob Peterson, LRES, awarded the 2016 MSU Excellence in Online Teaching Award.

Randy Rucker, DAEE, and his co-authors received the Quality of Research Discovery Award from the European Association of Agricultural Economics (EAAE) for their article, "Honeybee Pollination Markets and the Internalization of Reciprocal Benefits."

Jerry Nielsen, LRES professor emeritus, was recognized as the college's honorary alumni. Nielsen taught at MSU from 1966–'99 and was instrumental in the recent legislation naming the Scobey Soil Series as Montana's official state soil.



College of Agriculture Departments and Degree Programs

DEPARTMENT	MAJORS	OPTIONS				MINORS	
Agricultural Economics & Economics	<i>Agricultural Business</i>	<i>Agribusiness Management</i>	<i>Farm & Ranch Management</i>			<i>Agricultural Business</i>	
	<i>Financial Engineering</i>						
Agricultural Education	<i>Agricultural Education</i>	<i>Agriculture Relations</i>	<i>Broadfield Teaching</i>				
Animal & Range Sciences	<i>Animal Science</i>	<i>Equine Science</i>	<i>Livestock Management & Industry</i>	<i>Science</i>		<i>Animal Science</i>	
	<i>Natural Resources & Rangeland Ecology</i>	<i>Rangeland Ecology & Management</i>	<i>Wildlife Habitat Ecology & Management</i>			<i>Natural Resources & Rangeland Ecology</i>	
Land Resources & Environmental Sciences	<i>Environmental Sciences</i>	<i>Environmental Biology</i>	<i>Soil & Water Science</i>	<i>Geospatial & Environmental Analysis</i>	<i>Land Rehabilitation</i>	<i>Soil Science</i>	<i>Water Resources (LRES)</i>
Plant Sciences & Plant Pathology	<i>Plant Science</i>	<i>Crop Science</i>	<i>Plant Biology</i>				
	<i>Environmental Horticulture</i>	<i>Environmental Horticulture Science</i>	<i>Landscape Design</i>			<i>Environmental Horticulture</i>	
Immunology & Infectious Diseases	<i>Pre-Vet Non-degree Program</i>						
Multidisciplinary	<i>Biotechnology</i>	<i>Animal Systems (ImID)</i>	<i>Plant Systems (PSPP)</i>	<i>Microbial Systems (MICRO)</i>			
	<i>Sustainable Foods & Bioenergy Systems</i>	<i>Agroecology (LRES)</i>	<i>Sustainable Crop Production (PSPP)</i>	<i>Sustainable Livestock Production (A&RS)</i>			
						<i>Entomology (LRES A&RS and PSPP)</i>	

Visit ag.montana.edu for more information.

 Like us on Facebook: www.facebook.com/msucoa
 and follow us on Twitter: [@MSUCollegeofAG](https://twitter.com/MSUCollegeofAG)

DEPARTMENT OF Agricultural Economics & Economics

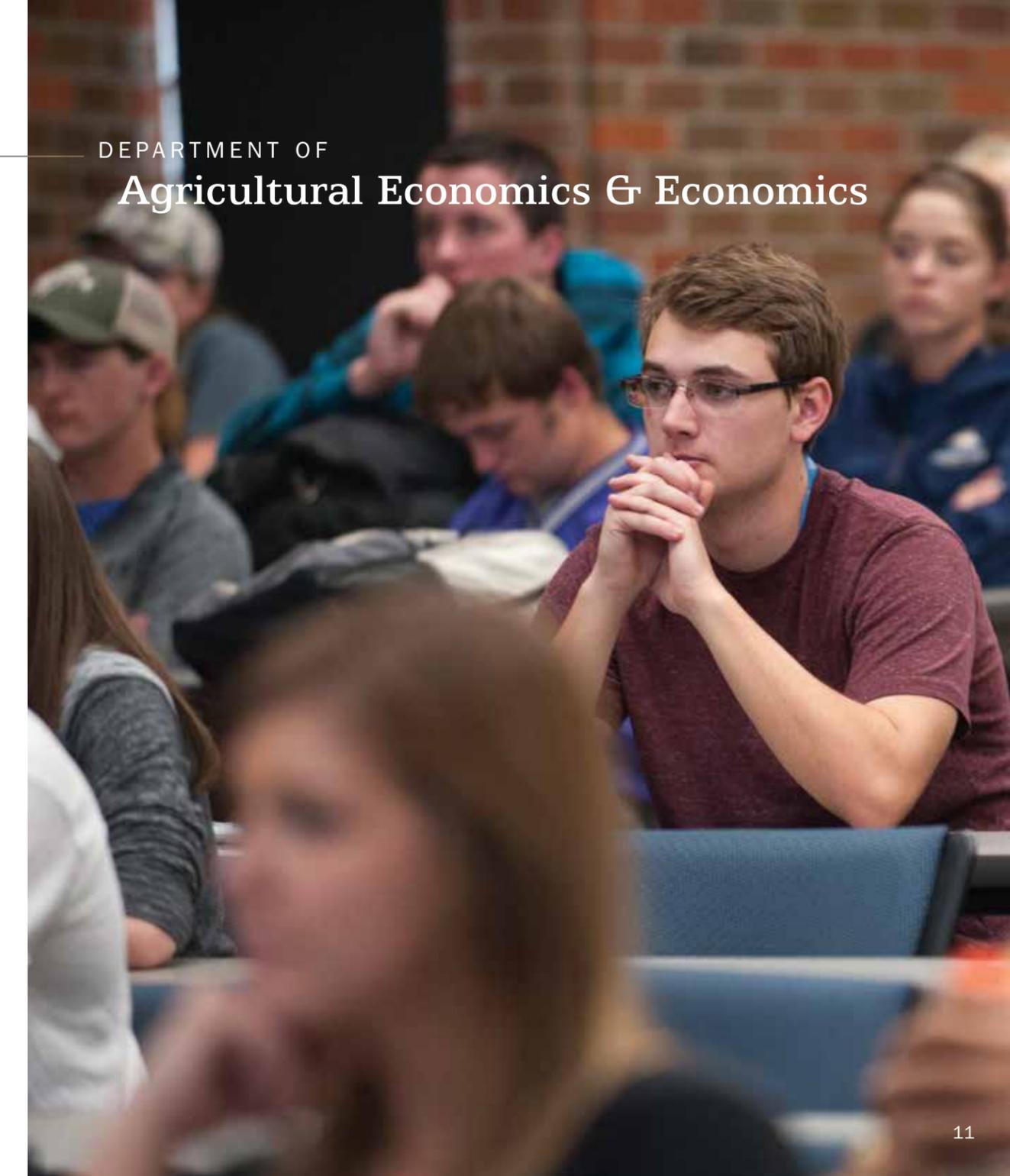
Faculty research continues to be a strength of the department, and several faculty members have had their work published or accepted for publication this last year. The work is wide-ranging, focusing on topics including the effect of parental involvement laws on teen birth control use, the impact of the 2014 Farm Bill on farm debt, the growing role of for-profit colleges, the impacts of primary election spending and analysis of the wild horse and burro program.

The department graduated 29 students this fall, which represented the largest fall graduating class of the department; 19 undergraduates in Economics and 8 students in Agriculture Business. Eleven of these students graduated with honors or highest honors, meaning they earned GPAs of at least 3.25 or 3.70, respectively, during their time at MSU.

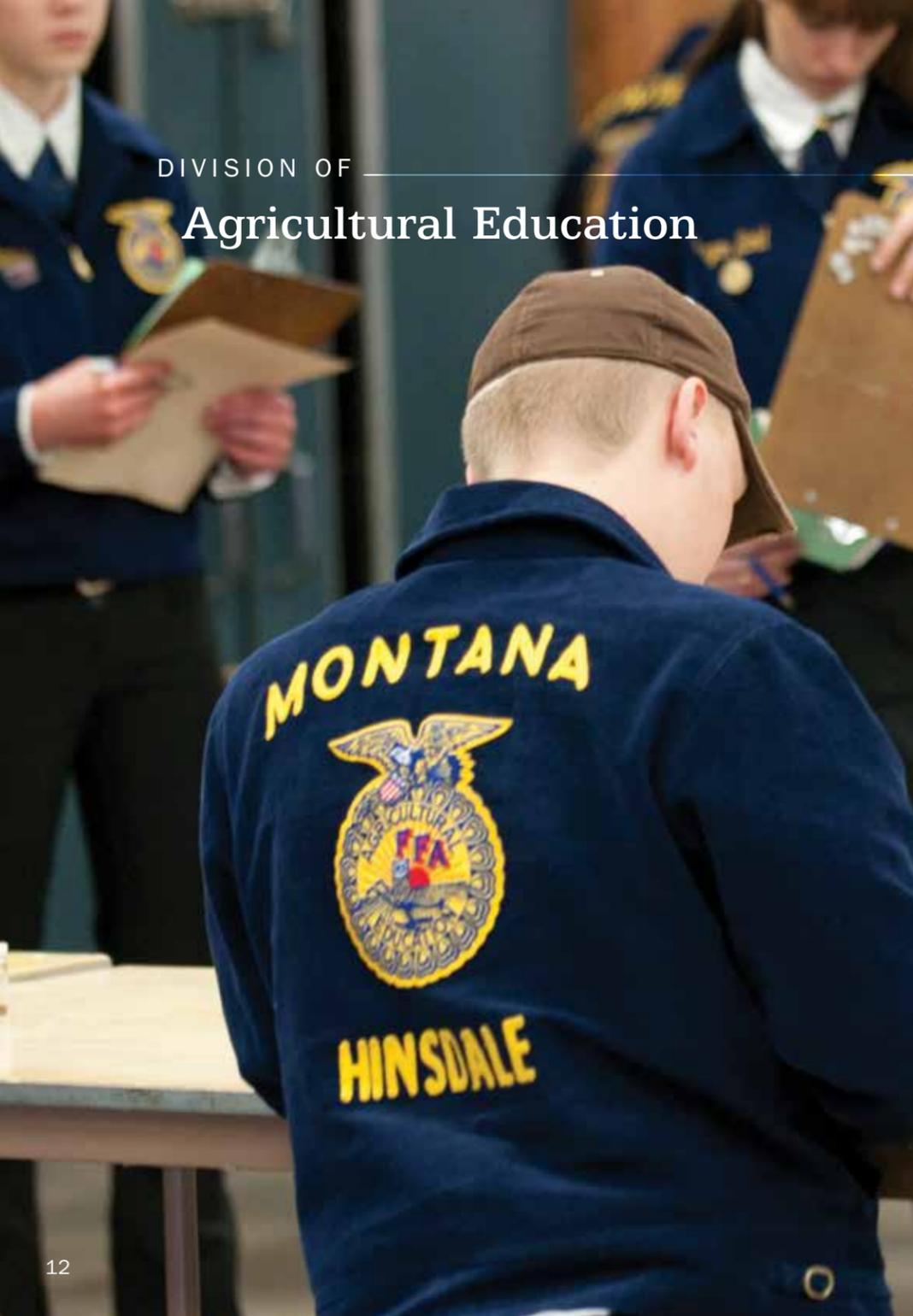
The Department of Agriculture Economics & Economics and MSU Extension hosted the annual outlook conference as part of the Celebrate Agriculture weekend, titled *Montana Agriculture: Global Trade to Local Foods* on November 6th at the Procrastinator Theater.

Christiana Stoddard and Carly Urban, with co-authors, presented "Does Salient Student Loan Information Affect Academic Behavior?" at Utah State University, the University of Illinois at Chicago, and Philadelphia Federal Reserve Bank's Consumer Credit Payment Conference. Their research translated into a study this fall semester, where students received letters with information about their student loan debt. They found the letter reduced borrowing in the subsequent semester by \$1,360 and also increased credits completed and GPAs. This research has since received national attention from *Bloomberg News*.

The department welcomes Richard Ready, whose research interests include environmental and natural resource economics.



Agricultural Education



Agricultural Education Division Head Tracy Dougher attended a national meeting of agricultural education outreach and educators in Washington, D.C. last January. Agricultural Education departments across the U.S. are seeing reduced research dollars and fewer calls for research focused on agricultural education, despite the fact that there is an ever increasing need to educate more people about agricultural issues.

The Division hosted the Montana Association of Agricultural Educators in June, with more than 70 agriculture teachers from across the state of Montana meeting at MSU for teacher development and program discussions.

Shannon Arnold, PhD, associate professor in agricultural education, has been awarded the 2016 President's Award for Excellence in Service Learning. The award recognizes a faculty member and community partners who use a service learning activity to meet a community need. To meet the need for increasing interest among youth in science, technology, engineering and math (STEM) education, Arnold's students collaborated with county 4-H leaders to design a STEM-based day camp held at MSU with students teaching 4-H youth. Overall results of a post-workshop test showed that youth increased their knowledge, interest and career aspirations in STEM and natural resource concepts as a result of attending the camp.

Dustin Perry, PhD, joined the Division as assistant professor in Agricultural Systems Technology, Teacher Education and Leadership Development. Perry's extended research plans include initiating collaborative efforts across multiple disciplines to allow the opportunity for a more holistic understanding of potential relationships among undergraduate education and critical thinking development, particularly those of undergraduate students enrolled in agricultural systems technology coursework at MSU.

This fall, the Division welcomed 1,500 Montana FFA members to campus during the annual John Deere Ag Expo, exposing thousands of Montana high school students to agricultural science, education and leadership opportunities at MSU.

The Division is currently working with the National Association of Ag Educators, through their "Teach Ag" campaign in the State Teach Ag Results (STAR) program to increase recruiting and retention of agriculture teachers across state levels. The STAR program is designed to assist states in creating sustainable and effective recruitment and retention plans. STAR states, of which Montana is included, receive in-kind design and consultation services, access to Teach Ag grant funds, priority preference for Teach Ag Ambassador positions, promotion and assessment summaries.

Animal & Range Sciences

The department continues to be the largest in student enrollment for the college.

Fall 2015 student numbers, by major:

- 23 Graduate Students
- 89 Equine
- 99 Livestock Mgmt./Industry
- 73 Science
- 36 Rangeland Ecology/Mgmt.
- 51 Wildlife Habitat Ecology
- 4 Sustainable Livestock

2015 Graduation:

- 5 Graduate Students
- 51 Animal Science
- 12 Range Science

87 total

375 total

Student Club Highlights

The Animal Science Academic Quadrathlon team took 2nd place at the Western Section American Society of Animal Science in 2015.

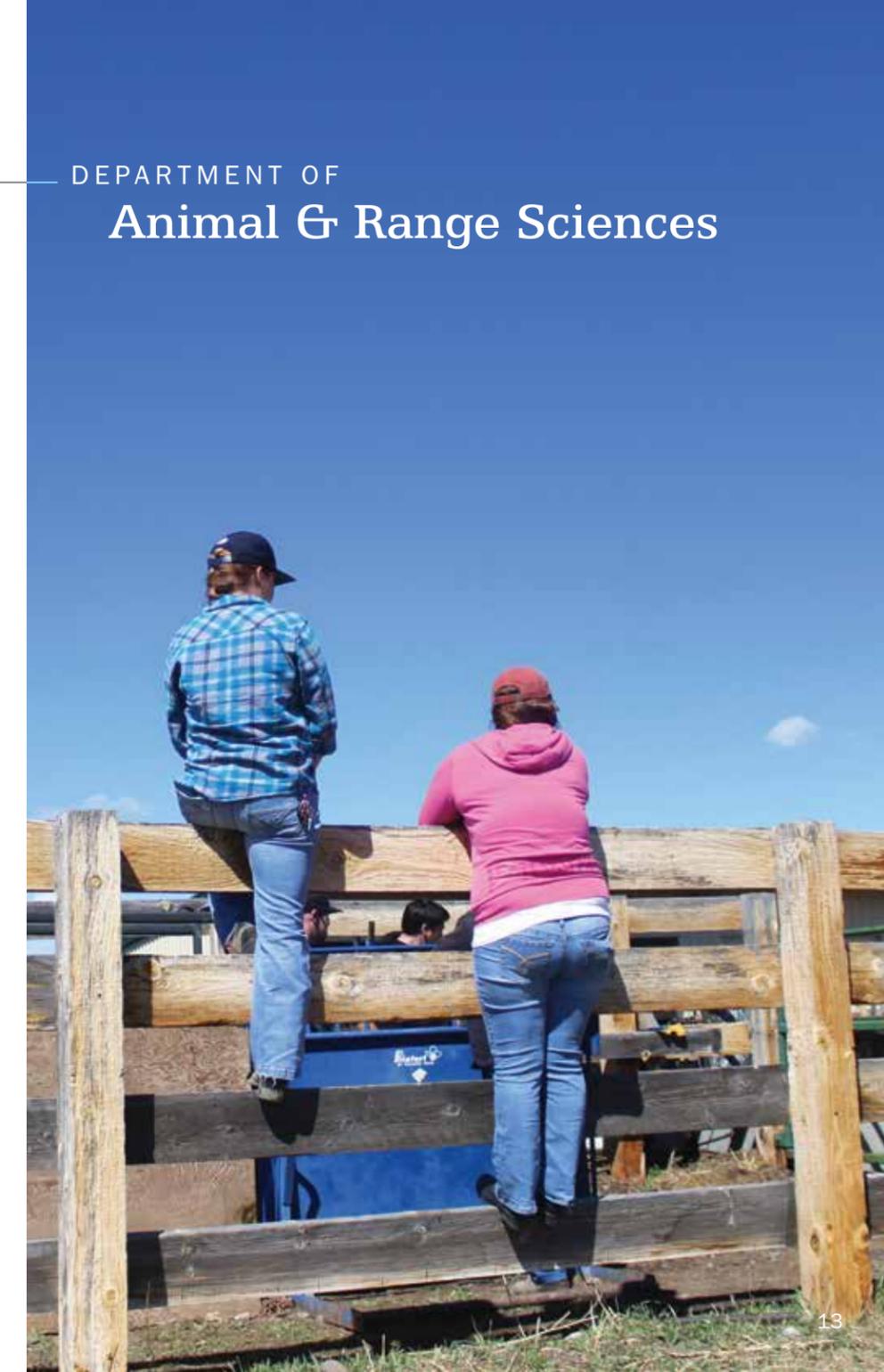
The department's Society for Range Management Plant Identification Team, placed nationally in the Undergraduate Range Management Exam:

- 3 students in top 50 and 1 in top 25 plant ID
- 137 students, 23 schools, 3 countries
- 9 students in top 50 and 5 in top 25 URME
- 159 students, 25 schools
- 1st place student in extemporaneous speaking
- 3 of the 4 executive positions on the SRM student conclave are MSU

In the past year, Animal & Range Sciences teaching, research, and extension faculty garnered \$1.49 million in competitive funds. The department currently has more than \$2 million in pending research and extension grants.

Nancy Cameron Chair in Animal & Range Science

With the help of dedicated agribusiness and fundraising efforts, \$2 million was raised to establish the first endowed chair dedicated to the beef industry for Montana. The Montana Stockgrowers Association pledged \$1M in support of graduate fellowships for the Chair, and recently raised more than \$260,000. The Bair Ranch Foundation recently contributed \$500,000 for graduate fellowships for the Cameron chair. Currently, the chair position description is posted and is attracting national candidates. A search committee has been formed and a review of applicants will begin as soon as applicant finalists are chosen.





DEPARTMENT OF
**Land Resources &
 Environmental Sciences**

Western Sustainable Agricultural Research and Education (WSARE) produced a video featuring a study led by Rick Engel and its subsequent recommendations for improving sustainability on Montana wheat farms.

Fabian Menalled and David Weaver were chosen as Premiere Presenters for the Entomological Society of America. Their presentation was highlighted in the Entomology 2015 Program Book.

LRES researchers have found that producers throughout Montana who grow cover crops cite soil health as their main reason for growing those crops. The research findings came from a survey that addressed producers' perceptions and ideas about management of cover crops and the barriers and incentives for cover crop adoption. The survey was part of a larger study by researchers, including Clain Jones, Perry Miller and Cathy Zabinski on soil quality and agronomic responses to cover crop mixtures.

The Hayden Ferguson Soils Lab in Leon Johnson Hall was rededicated after receiving a face lift earlier this year. Students walking down the second floor hallway can now see into the lab through a 24 foot window and admire the magnificent monoliths hanging in the lab.

Summarizing more than 40 years of work by the authors and students, LRES Associate Professor, Jack Brookshire, and Ecology Professor Emeritus, Tad Weaver, who co-founded the study in 1969, published their findings in *Nature Communications*. By monitoring a mountain meadow northeast of Bozeman — analyzing plants and examining regional climate records — the two scientists documented a sustained decline of more than 50 percent in native grassland productivity because the Greater Yellowstone Ecosystem has gotten drier over the last four decades.

Weed Science

OUTREACH AND EDUCATION FROM MAES AND THE COLLEGE OF AGRICULTURE

Agricultural Economics & Economics
 Kate Fuller, Extension Economist

Animal & Range Sciences
 Craig Carr, Rangeland Ecology
 Pat Hatfield, Range Sheep Nutrition
 Jeff Mosley, Rangeland Ecology & Management
 Bret Olson, Rangeland Ecology & Management
 Cecil Tharp, Pesticide Education Specialist

Land Resources & Environmental Sciences
 Edward Davis, Agricultural Specialist
 Erik Lehnhoff, Invasive Plant Ecology
 Jeff Littlefield, Biological Control of Weeds
 Jane Mangold, Integrated Invasive Plant Mgmt.
 Bruce Maxwell, Agroecology
 Fabian Menalled,
 Weed Ecology & Management
 Zach Miller, Plant Ecology

Robert Peterson, Plant-Insect Interactions
 Lisa Rew, Non-native Plant Ecology
 Sharlene Sing (Affiliate Research Professor from US Forest Service),
 Biological Control of Weeds
 Tracy Sterling, Weed Physiology
 David Weaver, Entomology

Montana Noxious Weed Education Campaign
 Shantell Frame-Martin, Coordinator

Plant Sciences & Plant Pathology
 Mary Burrows, Plant Pathology
 Bill Dyer, Weed Physiology
 Matt Lavin, Botany
 Ryan Thum, Aquatic Plant Genetics & Ecology

Research Centers
 Prashant Jha, Weed Science

RESEARCH AND EDUCATIONAL PARTNERSHIPS

Working together to improve invasive species management



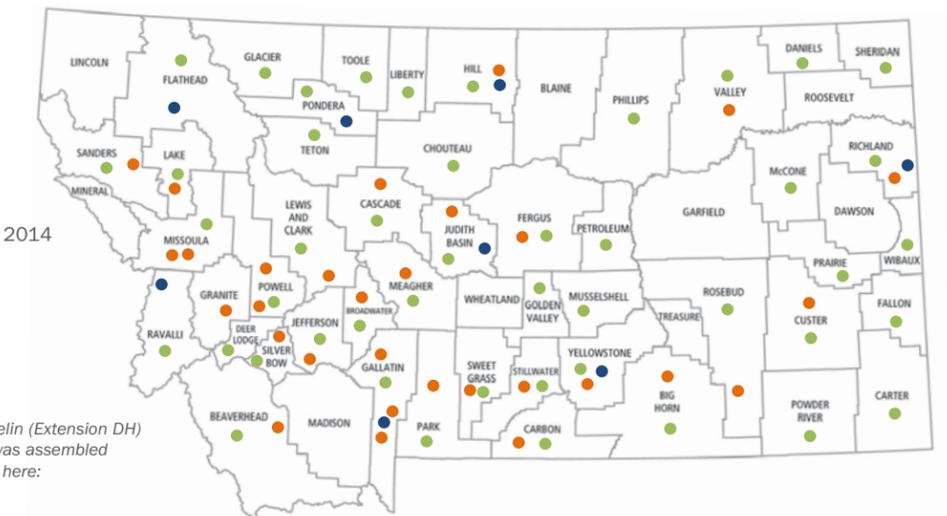
**INVASIVE
 PLANTS**

MAES RESEARCHERS AND EXTENSION SPECIALISTS CONTRIBUTING TO EDUCATION AND OUTREACH

● **Off-Campus MSU Weed Education Programs**
 Programs delivered (2014): 72
 Individuals reached (2014): 3,550

● **MSU MAES Research Centers**

● **MSU Schutter Diagnostic Lab**
 Weed samples identified (2012–2014): 1,506
 Counties which submitted plant sample(s) to MSU Schutter Diagnostic Lab in 2014



Excerpt from a full report coordinated by LRES Department Head Tracy Sterling and Steve Siegelin (Extension DH) in their roles as agency reps for the MT Noxious Weed Trust Fund Advisory Council. The report was assembled and designed by Emily Rindos, using data provided by the faculty. The full report can be viewed here: http://weedeco.msu.montana.edu/documents/nox_weeds_reports/2015.pdf



Research Highlights

Jovanka Voyich, PhD, received a \$1.5 million grant from the state's first large-scale research initiative of \$15 million to bolster economic development through research for the state of Montana. Voyich will research ways to reduce the impacts of inflammatory and infectious disease on animal and human health, with a focus on developing therapies to adjust the human and animal immune responses to reduce the burden on antibiotic use and to develop new treatments for inflammatory disorders.

Mark Skidmore, associate professor of geology in the MSU College of Letters & Science, and Eric Boyd, M&I assistant professor, co-authored "Rock Comminution as a Source of Hydrogen for Subglacial Ecosystems" with colleagues from the U.K., Norway and Ohio. *Nature Geoscience* is the number one-ranked multidisciplinary geoscience journal.

Mark Quinn, PhD, was the senior author of a paper detailing a chemical compound that shows potential for treating rheumatoid arthritis. The paper was published in the June issue of the *Journal of Pharmacology and Experimental Therapeutics* (JPET).

Ed Schmidt, M&I professor, is a co-author of a newly published study in *Nature Communications*. Schmidt and his collaborators at the Karolinska Institute published their findings in the March issue *Nature Communications*, a scientific journal affiliated with the prestigious international journal, *Nature*.

The department is pleased to highlight faculty who garnered national awards and recognition this year:

- Amgen Young Investigator Award: Blake Wiedenheft
- Thorbecke Award from the Society of Leukocyte Biology: Diane Bimzcok
- Sabbatical Assistantship Award from the Swedish Wenner-Gren Foundation: Ed Schmidt
- Editorial Board, Applied and Environmental Microbiology: Eric Boyd

MBI students continue to garner impressive scholarships and awards:

- Kopriva Graduate Fellowship: Alayna Caffrey
- American Society for Microbiology Travel Grants: graduate students Laura Camilleri and Greg Krantz
- Fermin Guerr, MBI graduate student, was awarded a talk at a Gordon Conference (Italy) and was awarded the Carl Storm Underrepresented Minority (CSURM) Fellowship. He also received a Society for Leukocyte Biology (SLB) travel award and a talk for the September 2015 SLB meeting in North Carolina.
- Megan Price won the prestigious American Society of Clinical Pathology award.
- Madison Martin is a McNair Graduate Student Fellow.

In spring 2015, the department graduated:

Horticulture Science: 3
Landscape Design: 1
Plant Science: 4
Sustainable Foods & Bioenergy Systems,
Crop Production: 2
Masters in Plant Science: 2
Doctorate in Plant Science: 4

This fall, the department graduated:

Horticulture Science: 3
Landscape Design: 3
Plant Sciences: 1
Sustainable Food & Bioenergy Systems,
Sustainable Crop Production: 6
Doctorate in Plant Science: 1
Masters in Plant Science: 1

Montana Plant Sciences Chair housed in Plant Sciences & Plant Pathology

Hikmet Budak, PhD, started as Montana's First Plant Sciences Chair in January 2016. Budak is considered a world leader in cereal genetics and he is expected to build a significant integrative research program addressing Montana's challenges in the grains industry. The next milestone for the chair is completing the \$5 million fundraising effort. With the help of producers and agribusinesses, more than \$2.7 million has been raised so far.

The department welcomed four new faculty and two professionals this year:

Michelle Flenniken, PhD Flenniken's lab studies the molecular mechanisms underlying host-pathogen interactions in agriculturally important systems, including honey bees. Projects in the lab focus on five principal aspects of honey bee biology.

Jamie Sherman, PhD Sherman is the college's barley breeder and research interests include wheat and barley genetics—identifying genes of interest in wheat, utilizing these genes for improvement.

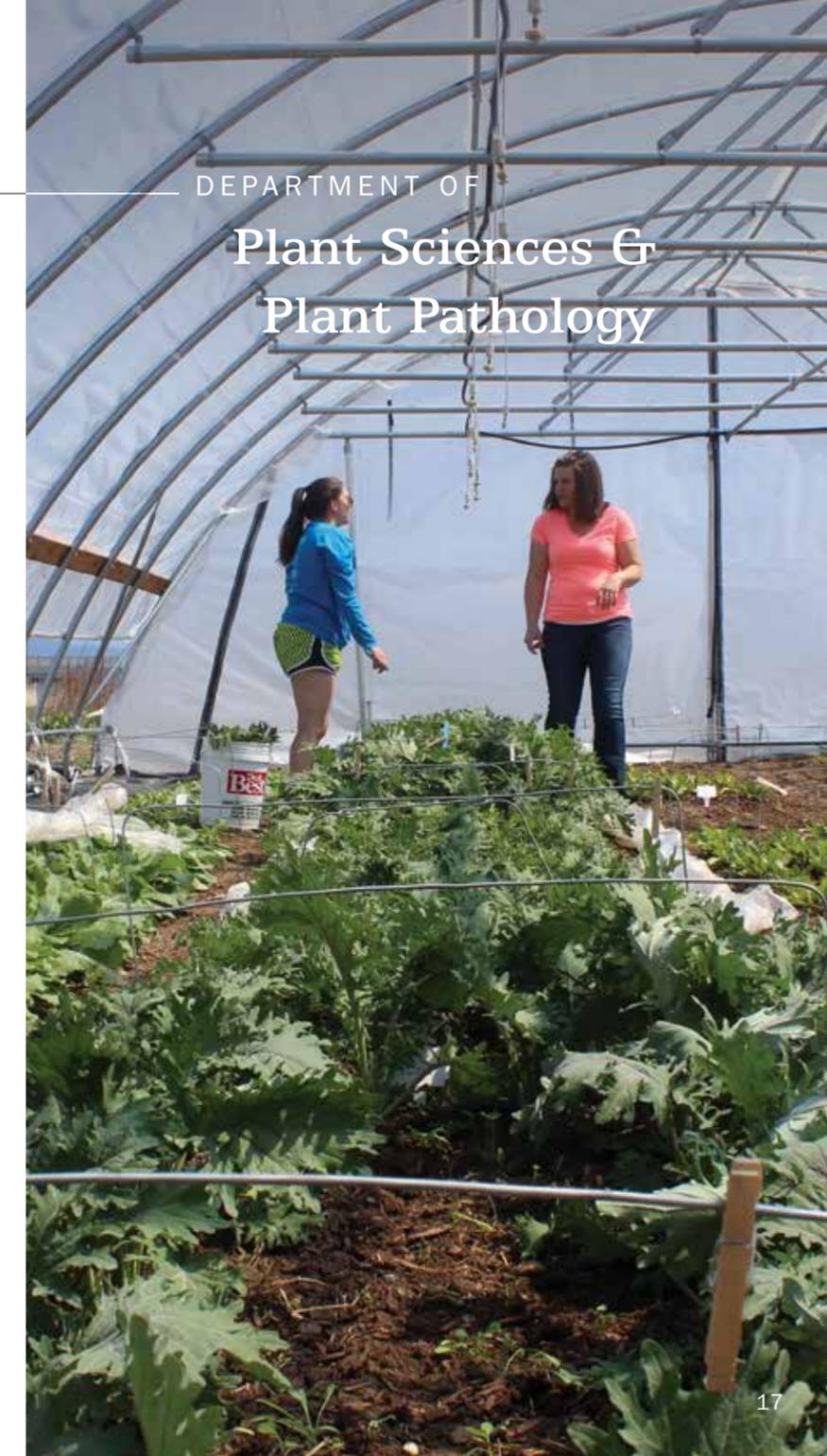
Ryan Thum, PhD Thum's research interests are evolutionary and molecular ecology, with a specific emphasis on invasive aquatic species.

Jessica Rupp, PhD Rupp's research program is focused on plant disease problems facing Montana seed potato and sugarbeet growers. The main areas of focus are: field research, storage research and genetics.

Heather Rimel (professional) assumed management of the Montana Seed Growers Association and **Bridget Westfall** (professional) now manages the Montana State Seed Lab.

New Pollinator Garden at the Bozeman Agricultural Teaching and Research Farm

Numerous departmental volunteers planted primarily native plants, including Blanketflower (*Gaillardia aristata*), Rocky Mnt. Penstemon (*Penstemon strictus*), Silver Leaf, Phacelia (*Phacelia hastata*), Hairy False Golden Aster (*Heterotheca villosa*), Hairbell (*Campanula rotundifolia*), Yarrow (*Achillea millefolium*) and Bee Balm (*Monarda fistulosa*) at a new pollinator garden at the BART farm this summer. This site features bee friendly forage and habitat, a pavilion, an equipment shed for educational and beekeeping materials and eight honey bee colonies.



MAES & THE DEPARTMENT OF Research Centers

We consider the entire state of Montana our campus. Seven research centers are strategically located across Montana, totaling a combined 80 faculty and staff working on agricultural challenges for the state of Montana. Collectively, the Research Centers and faculty on the MSU-Bozeman campus and our statewide research centers constitute the Montana Agricultural Experiment Station (MAES). Each of our Research Centers are guided by independent advisory councils to keep our research localized so that we can meet the needs and challenges of Montana's farming, ranching and agribusiness communities.

Faculty and staff conduct research and outreach programs addressing crop and animal production methods, market growth opportunities, pest management, environmental quality issues and agricultural water management research.

We provide a long heritage and trustworthy source of science-based agricultural research and support. And we're not just from Montana; we represent the entire globe, from all corners, crops, landscapes cultures and climates. We have Chinese, Ghanaian, Ethiopian, Cameroon, Indian, Philippine, Peruvian and Portuguese scientists. We consider our diversity a rich asset to the state of Montana that provides a deep and important global mindset in crop and livestock production for Montana's rural towns and cities.

MAES and Research Center Highlights in 2015

Barry Jacobsen and Bruce Maxwell (LRES) are the lead PIs for the State of Montana Ag MREDI Grant, which has brought \$2.276 million to MSU and \$258,000 directly to the Research Centers. The proposal, "Increasing profitability by Improving Efficiency of Montana's Farm and Ranch Lands" includes three interrelated goals over the course of 18 months:

- Intensify pulse and cover crop production of 4.6 million acres of land left fallow each year.
- Develop new, improved or quality differentiated products, crops or farm practices.
- Increase adoption of precision agriculture technologies through On-Farm Precision Experimentation and optical based sensors for weed control.

Montana farmers planted wheat varieties developed by the MSU MAES more than any other variety in 2015, according to the United States Department of Agriculture (USDA). USDA statistics show that Montana planted 5.8 million acres of wheat this year, with 2.2 million acres of spring and winter wheat varieties developed by MAES. MSU wheat varieties accounted for approximately \$500 million of \$1.2 billion wheat sold by Montana farmers in 2015, according to MSU wheat breeding specialists.

NARC in Havre celebrated 100 years of agricultural legacy along the Hi-Line and dedicated a building to Gregg R. Carlson during their centennial celebration in July.

MSU MAES has hired a nationally renowned cropping systems specialist who brings a regional understanding of agricultural production in Montana. Patrick Carr, currently a research professor at North Dakota State University - Dickinson Research and Extension Center, has joined the faculty of MSU's Central Agricultural Research Center at Moccasin in February as an associate professor of cropping systems.

Honoring Our Friends in Agriculture

Outstanding Agricultural Leaders for 2015

The College of Agriculture presented its annual Outstanding Agricultural Leader Awards during the annual Celebrate Agriculture weekend, held this November. In the fall of 2014, Don Burnham from Helena and Sky Anderson and Monica Switzer from Shields Valley were honored with the award.

This last November, the college presented Lola Raska, executive vice president of the Montana Grain Growers Association (MGGA), and Max and Kirsti Cederberg, owners of the Hot Rod Ranch of Turner, Mont. with their annual Outstanding Agricultural Leader award during the Celebrate Agriculture weekend. This year's Celebrate Agriculture!! event was combined with the college's annual Student Scholarship Award Banquet, where scholarship donors and recipients celebrated 191 individual students receiving \$380,000 in scholarship funds.

Recipients exhibited outstanding leadership in Montana public service as agricultural producers, industry advocates, agri-business leaders and friends of the college. They also have a rich and lengthy history in leadership roles as agricultural producers, farm and crop policy advocates and public service leaders. A selection committee comprised of three Montana agricultural representatives, a College of Agriculture faculty member and a student, review applications for the award, presented by the college since 1999.



Lola Raska

During her time at MGGA, Raska has emerged as a respected leader in Montana and the country on federal farm and crop policy issues and farm policy education. This has been most evident in her work representing Montana producers in the 2008 and 2014 Farm Bills, where she advocated for Montana's agricultural producers. Raska has also supported a variety of MSU projects, most notably her position in fundraising with the Montana Grains Foundation and her search committee position for the Montana Plant Sciences Chair. Raska also dedicates much of her free time to public service and volunteer groups including Belt Public Schools, the Great Falls and Montana chambers of commerce, state and national grain growers associations, Montana Society of Association Executives and the Treasure State Resource Industry Association.



Max & Kirsti Cederberg

Max and Kirsti Cederberg have provided more than 30 years of direct support to the Northern Agricultural Research Center (NARC) in Havre through their multi-generation ranch, Hot Rod Ranch Inc., near Turner, which was homesteaded in 1928 by Max's great uncle. The family's property and agricultural legacy has been a long-standing source of leadership and support for the agricultural community in the tri-county area of Hill, Blaine and Phillips counties. In addition to serving as crop-research collaborators with NARC, both Max and Kirsti have also donated their time and agricultural passion as members of NARC's Advisory Board, including positions as chair and vice chair.

The 1893 Society

Montana State University's success is rooted in the vision and investment of its founders and the dedication of many to create the state's first institution of higher learning in 1893. Today, members of the 1893 Society continue to invest in the future of the university. The 1893 Society honors and recognizes those who have made a planned gift commitment, as a gift through their estate, a charitable gift annuity, or charitable remainder trust.

Through planned gifts, more than 500 alumni and friends have shared their vision for the University's next generation of successes.

Please consider making MSU and the College of Agriculture part of your legacy. To learn more contact the Estate, Trust and Gift Planning team at the MSU Alumni Foundation, 406-994-7099 or email plannedgiving@msuaf.org.

1893 Society Donor Roll

Marjorie Annin	Tiffanie Huson Labbe & Christopher Labbe
Harold Armstrong	Dorothy Malcolm
Clayton Berg	Margaret Moore
Richard & Renate Bertoia	Jerry & LaVonne Nielsen
Merlin & Patricia Boxwell	Francis Niven
James & Corale Brierley	Kathryn Rinehart
Martin & Helen Burris	Carl & Helen Rostad
William Carrico	John & Connie Rumely
Carol Davis	Andrew & Loretta Schwan
Ernest & Marian DeAlton	Mary & August Sobotka
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Robert & Edna Duncan	Curt Kochner & Susan Thomas
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Graham Gilchrist	Richard & Cecilia Whitman
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Isabelle Johnson	
Pearl Johnson	
Bill & Anita Jones	
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John & Susan Kultgen	
Justine & Bill Kuschel	

WHAT IT TAKES

The Campaign for MONTANA STATE UNIVERSITY

MSU LAUNCHES WHAT IT TAKES CAMPAIGN

This fall, MSU launched What it Takes: The Campaign For Montana State University. This is the university's first comprehensive fundraising campaign and it couldn't come at a better time. We are building on unprecedented success and our opportunity to capitalize on that momentum is now. The Campaign is key to the university's ability to deliver on its mission and to continue to serve the sons and daughters of Montana and beyond. Campaigns like this one allow MSU to ask our alumni and friends who care about the institution to financially invest in the university's future, our students and the communities we serve. These private dollars, separate and apart from state funding and tuition, provide the margin of excellence for our People, Places and Programs. The campaign will also allow us to raise our profile among regional and national peers and further establish Montana State as a leader in academic excellence.

Montana State University is a very special place. The faculty and staff who choose to work here, the students who choose to come here, and the alumni and friends who choose to philanthropically invest in the campus make for a rare combination of quality, authenticity, and ambition that few American universities can claim. It is an inspiring place and an exciting time.

MSU's College of Agriculture has a reputation for excellence in teaching, research and outreach. Investing in the College of Agriculture is an investment in Montana's prosperity and well-being. MSU's College of Agriculture & Montana Agricultural Experiment Station has distinguished itself with research that advances science and informs public policy to the benefit of people in Montana and around the world.

World-class teaching and research demand world-class funding. Your support of the College of Agriculture is essential to the success of our students and the continued excellence of our programs. Join us in advancing innovative student programming and fellowships for graduate research that safeguard Montana's natural resources and sustain our competitive edge in agricultural markets.

You help make MSU what it is today and you fuel the university's future through your giving and engagement. Thank you for making a difference and for having What it Takes to make your university the best it can be.



POPULUS TREMULOIDES

Winning Entry for the 2015 Science as Art Contest

Emma Bode, Environmental Sciences (LRES), won the College's "Science as Art" contest this fall. Bode classified and edited the Gallatin County soils GIS data in ArcMap to create the image of an Aspen tree.

The connection between science and art in the geospatial sciences is overwhelmingly apparent to me. Stuart Challenger's GIS courses stress the importance of good design. Taking this experience a step farther, I created a purely aesthetic interpretation of spatial data. I created this piece using soils data for the Gallatin Valley. Soils data is an ideal data set for artistic manipulation because it is made of many small polygons that are each unique, much like a child's Color By Number worksheet. In order to differentiate classes of polygons, I selected and exported them as a new shapefile. I created several shapefiles for the leaves, three shapefiles for the trunk, and one for the roots. I then manipulated the colors of each shapefile to produce the desired image.

— Emma Bode



MONTANA
STATE UNIVERSITY

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