

# Missouri Agricultural Experiment Station (MOAES)

## Self-Study Report

November 2020

### Introduction

The Morrill Land Grant Act of 1862 authorized the federal government to transfer land to each state to support the creation of a public university, creating the land-grant university system. In Missouri, the land-grant funds supported the founding of the College of Agriculture and Mechanical Arts at the University of Missouri (MU) in 1870. The Hatch Act of 1887, named for Missouri Congressman William Hatch who chaired the House Agriculture Committee, gave federal funds to state land-grant colleges in order to establish the Agricultural Experiment Station (the Morrill Act emphasized the education mission; it was the Hatch Act that emphasized the research mission and later the Smith-Lever Act brought in the Extension mission and funding).

In 1888, the Missouri Agricultural Experiment Station (MOAES) was created within the college to develop the agricultural sciences by practical research, particularly for taking the research to the communities we served. The MOAES research centers provide land, facilities, and expertise to accomplish MU's four strategic priorities: Research, Education, Outreach and Entrepreneurship. This is accomplished by providing these resources to College of Agriculture, Food and Natural Resources (CAFNR) faculty to bring basic research from the laboratory to the field as well as conducting applied research that can be readily adopted by stakeholders. Research centers collaborate with faculty, government agencies and private industry to be a conduit of this research to MU's stakeholders through field days, workshops, tours and media. Research centers also provide a resource for instruction for graduate and undergraduate students through hands-on education and work experience.

### Mission

***To conduct problem solving research that helps Missouri's citizens make the most effective use possible of the state's agricultural and natural resource base, including its human resources, in competing in an increasingly global economy and meeting our obligations as global citizens.***

In order to meet its mission, the MOAES maintains a set of off-campus research and education centers that are an integral part of CAFNR's efforts to address the challenges imposed by the geographic and climatic diversity of Missouri. Because of these geographic challenges, MOAES provides locations for site-specific research that cannot be accomplished on the central campus. Outlying centers provide close interaction among basic and applied research and outreach on issues important to Missouri. They enable new technology to be studied, demonstrated and adopted in different parts of the state.

Research and Extension activities at a center deal primarily with improving practices or dealing with issues endemic to the area. However, the work at the center must be a part of the overall strategic priorities of CAFNR and MU. The effort at each center must add strength to the fabric of the state, and regional and national programs of research, Extension and education.

### **Role of the Outlying Centers**

Missouri is an extremely diverse state with respect to soils and climate as stated earlier. The natural resource diversity of Missouri poses special challenges for MU agricultural research and Extension programs. Land and climate in the Columbia area represents a small portion of the state's natural resource base. Therefore, effective execution of the MOAES mission requires that CAFNR faculty have access to, and actively use, land resources at locations outside of central Missouri.

Outlying research and education centers exist for the following purposes:

1. Provide field laboratories for campus-based researchers to conduct research in a location outside the Columbia area over a range of land resources and climatic conditions.
2. Provide a location in the region (e.g. the Missouri Bootheel) to demonstrate, evaluate, and adapt new technology of potential interest or relevance to the area.
3. Provide a location for on-site research and demonstration addressing a specific problem that cannot be done on campus.
4. Provide a MU presence in the area to make local stakeholders aware of the University and its contributions to the educational and problem-solving needs of the area and the state.
5. Provide an avenue for collaboration between CAFNR and Extension with state and federal agencies and private companies for research and outreach activities.

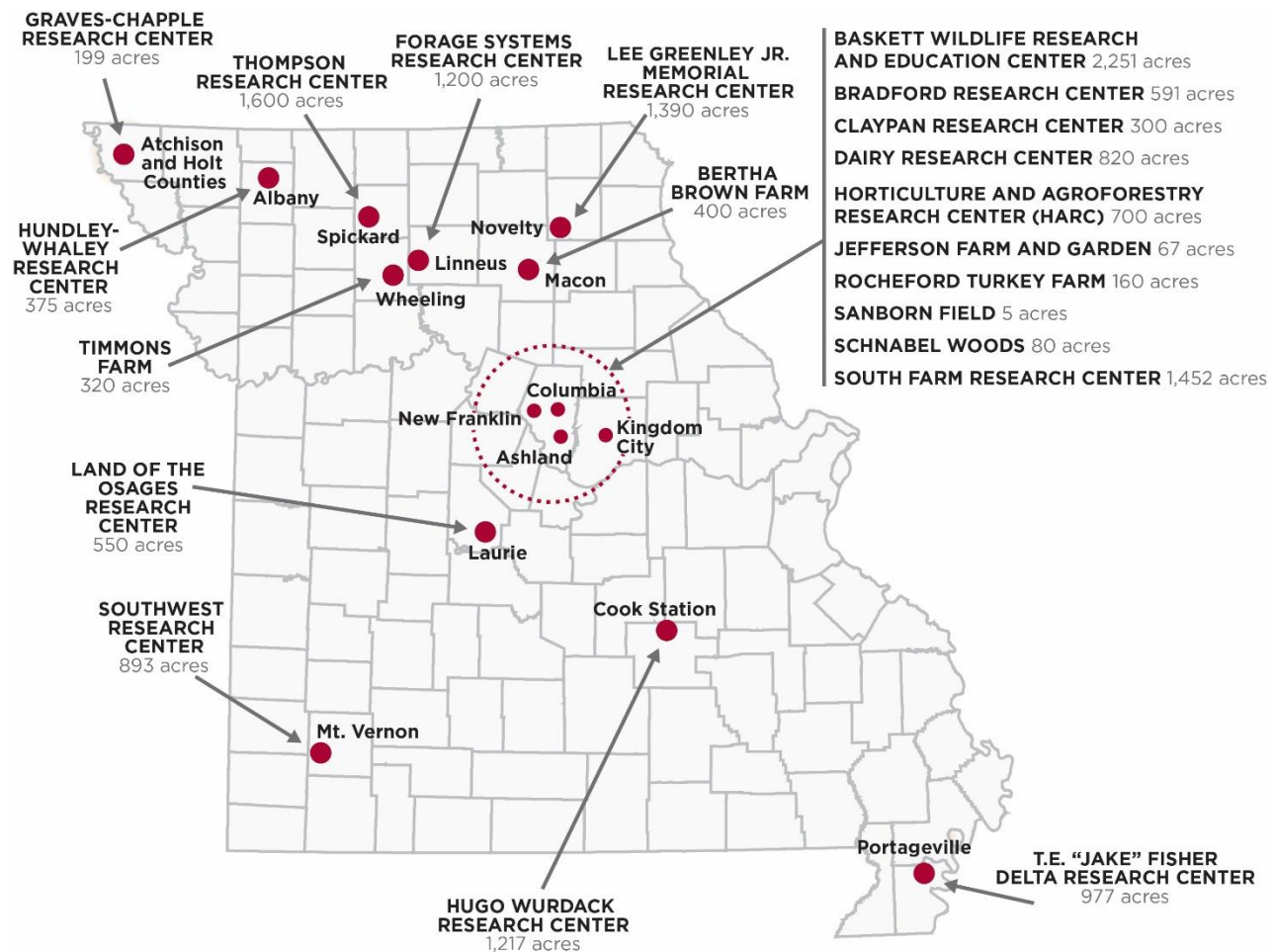
## Physical and Financial Snapshot

This internal report is intended to aid outside reviewers in understanding the recent history of the Missouri agricultural experiment station network. A brief overview of the center network is followed by their profiles.

As mentioned earlier, in 1888, the MOAES was created at the University of Missouri to develop agricultural sciences by practical research. The growth of the AES was encouraged in the 1930s by cooperation between Missouri's Department of Agriculture, the USDA and the College of Agriculture. Today's CAFNR research center network is depicted in Exhibit 1.

Eleven centers receiving general allocation funding from CAFNR are included in this report. These include eight out-state centers depicted in the map in Exhibit 1 with the addition of Bradford Research Center, the Horticultural and Agroforestry Research Center (HARC) and South Farm near Columbia, Missouri. Exhibits 2, 3 and 4 provide financial metrics summarizing the relative scope of operations for each center, based upon fiscal year 2017 to 2020 data.

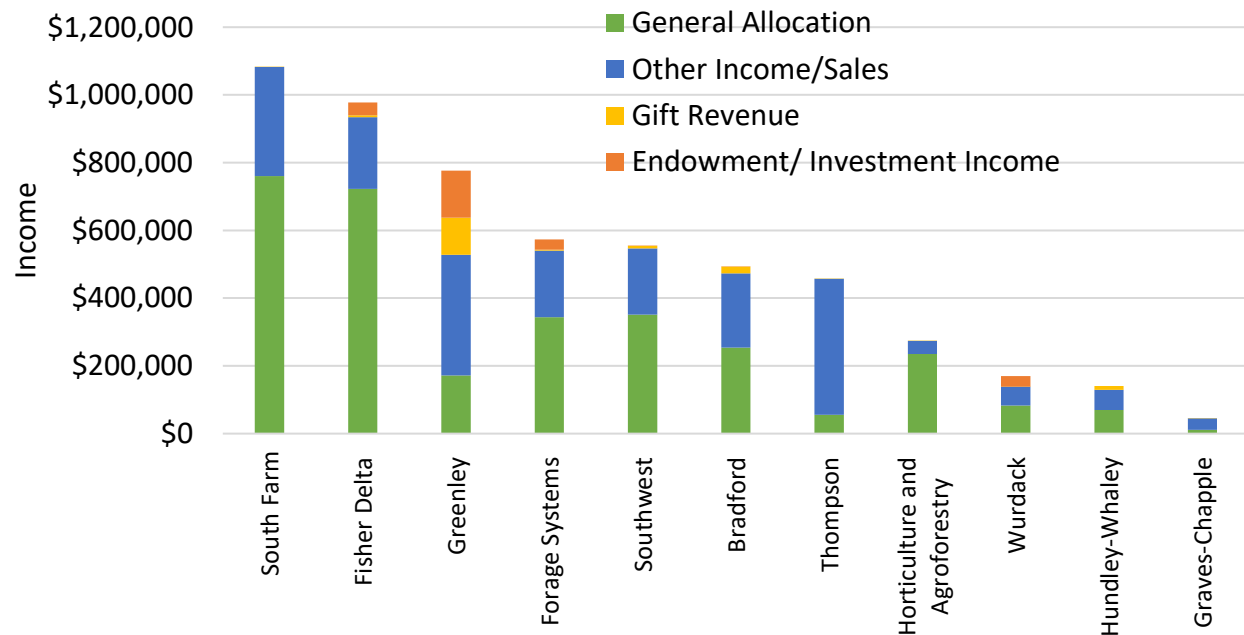
**Exhibit 1. Map of CAFNR research centers**



**Exhibit 2. Snapshot of physical and financial scope of CAFNR research centers**

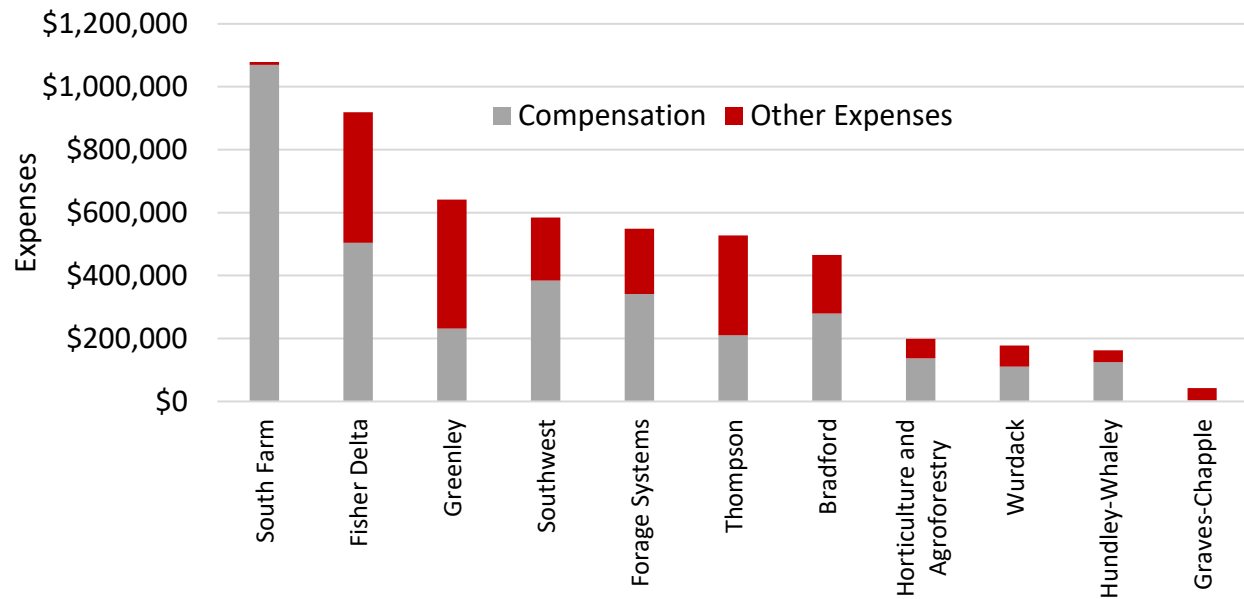
Research Center	Distance (miles from MU South Farm in Columbia, MO)	Total Acreage	General Allocation (2017-2020 avg.)	Total Income (2017-2020 avg.)
Bradford	6	591	\$254,245	\$494,185
Fisher Delta	288	1,119	722,166	977,348
Forage Systems (FSRC)	105	1,202	343,821	573,604
Graves-Chapple	250	199	11,581	46,097
Greenley	95	1,326	171,599	909,793
Horticulture and Agroforestry	28	700	235,361	274,712
Hundley-Whaley	201	375	69,695	140,196
South Farm	0	1,452	760,535	1,082,727
Southwest	198	897	350,906	555,474
Thompson	159	1,600	55,495	457,197
Wurdack	116	1,217	82,828	170,323

**Exhibit 3. CAFNR research centers, income by center (2017-2020 average)**



Note: Special state allocation to Greenley Research Center in FY 2019 and FY 2020 is not included in Exhibit 3.

**Exhibit 4. CAFNR research centers, expenses by center (2017-2020 average)**



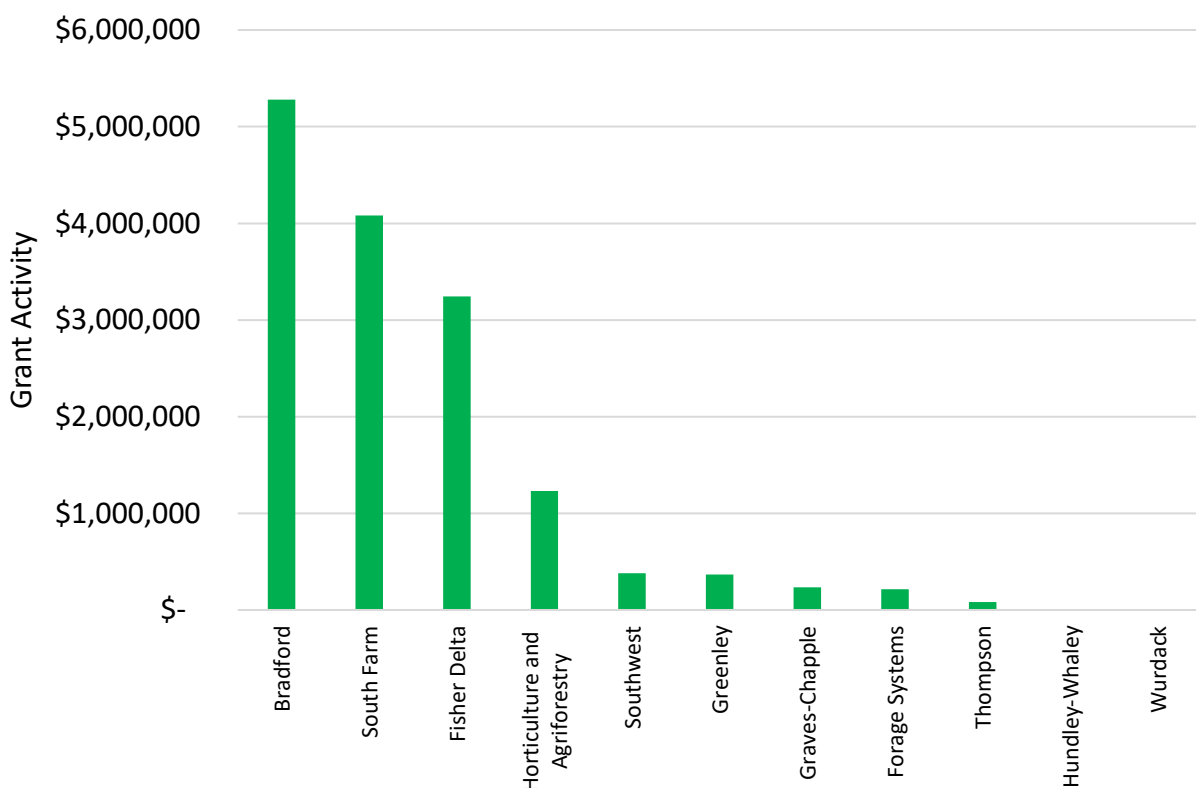
The South Farm Research Center includes the Agricultural Experiment Stations Field Operations for the Columbia-based research centers, which provides “fee for service” operations. Operations include construction services, rental vans and vehicles, mowing and lagoon cleaning.

## Faculty Engagement in Research

In October 2020, CAFNR conducted a faculty survey to better understand research faculty engagement with the agricultural experiment stations. Faculty were asked to identify which CAFNR research centers were used to support their grant funded research in FY 2017 to 2019. Additionally, faculty were asked to allocate a percentage of their funded research effort attributable to each center. Those responses were applied to actual grant activity (dollars) documented by CAFNR during the same time span to estimate the grant funding attributed to each of the eleven centers in this report.

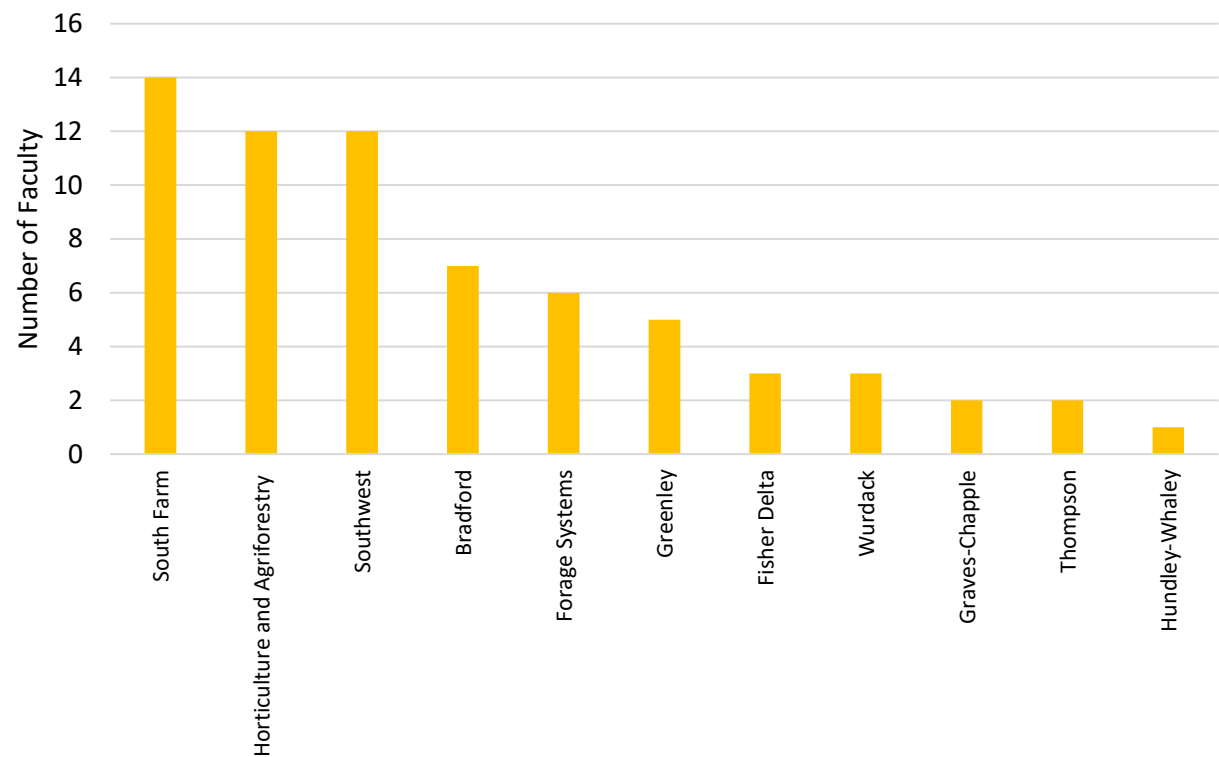
Exhibit 5 shows the results from the survey. A total of 55 responses were received from CAFNR faculty. Since not all research faculty responded to the survey, survey results should be considered an estimate useful for ranking, but not an exact measure of funding tied to centers.

**Exhibit 5. CAFNR survey, past grant activity attributable to center (2017-2020 cumulative)**



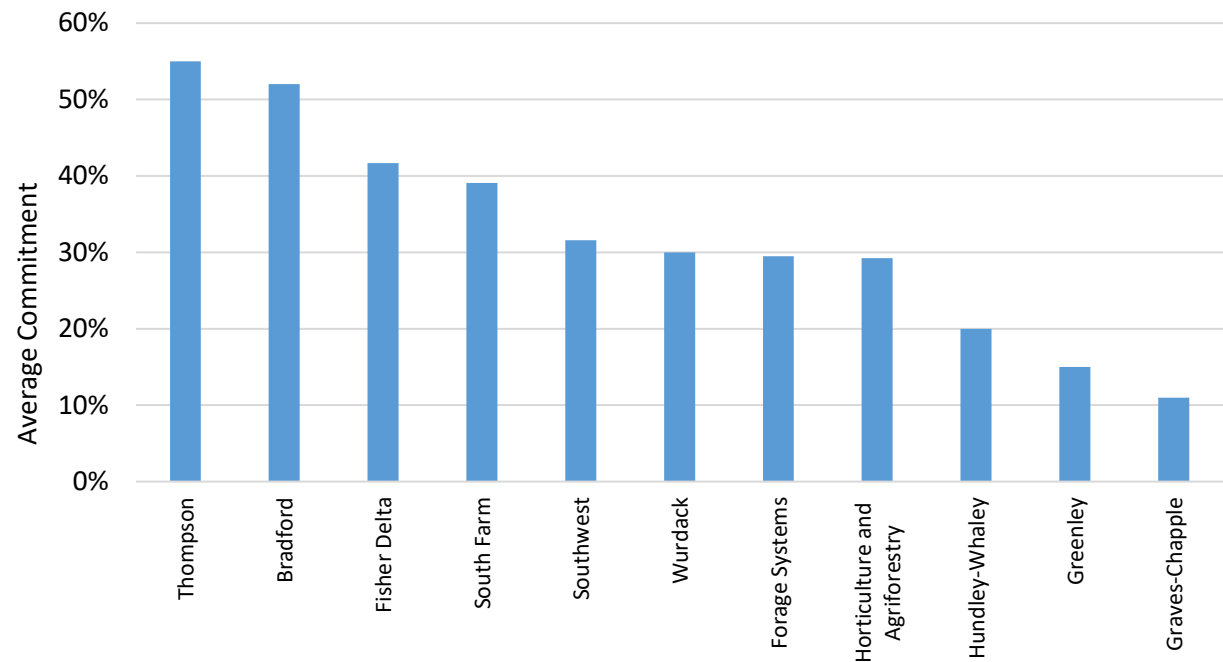
University of Missouri research faculty were asked in the survey to indicate their plans for future research engagement with each of the eleven experiment stations. The number of researchers planning to engage with each research center is depicted in Exhibit 6.

**Exhibit 6. Number of surveyed faculty planning to engage center in future research**



University of Missouri research faculty who indicated they were planning to engage with a particular research center were also asked to estimate what percentage of their expected future funded research they were planning to do at that center. This question was intended to capture the importance of research centers that might engage fewer researchers but engage them in more depth. Those results are depicted in exhibit 7.

**Exhibit 7. Faculty reported average expected future research commitment by center**



**Detailed Information by Center**

The following pages detail profiles of CAFNR research centers. Information includes location, leadership, size, research/education focus, asset allocation and financial metrics. Faculty engaged in research or extension are listed by center. Each center description includes land use, acreage available and farming machinery investment. A table depicts comparison crop yields, cash rents and farmland prices for the county where the center is located.

Centers generate income from a variety of sources, including plot fees, crop/timber sales, livestock sales, facility rental, cash rents, endowment revenue, gifts and other sources. Farming and leasing out unused land present opportunities to enhance center incomes.

To help reviewers understand Missouri farming costs and returns, the Appendix in this report contains the latest Missouri custom rate guide and the 2019 Illinois machinery cost estimates. Empirical costs of production from the Missouri Farm Business Management Association for corn, soybeans, and wheat are provided in the appendix from querying the University of Minnesota’s Farm Financial Management Database (FINBIN).



# **Bradford Research Center**

**Location:** Columbia (Boone County)

**Superintendent:** Andrew Biggs

**Focus:** Corn/soybean production, wastewater management, entomology, pest and weed control, native plants, alternative crops, vegetables, organic production, wildlife management, conservation, aquaculture and impact of weather.

**Visitor engagement:** In an average year, there are over 8,000 visitors to the property (not including fishermen and bird watchers).

**MU faculty engagement:** 36 faculty, 14 post-docs and 47 staff were involved in research or extension projects in 2020.

**MU student engagement:** 38 graduate students and 41 undergraduates involved with the center in 2020.



## **Bradford Research Center asset allocation**

<b>Employees:</b>	4.0 full-time equivalents (FTE). Note that Missouri Dept. of Conservation (MDC) grant pays for 0.4 FTE.		
<b>Buildings:</b>	67,623 square feet		
<b>Machinery/equipment for general farming:</b>	\$17,000 market value. Most equipment owned is greater than 10 years old or leased.		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	660	\$26	\$510
<b>Land:</b>	591 total acres		
	Research acres: 382 acres of research (includes cropland, grass alleyways and lakes) Wildlife habitat demonstration acres: 52 acres with MDC grant support Non-farmable (roads, buildings, large grass areas unsuitable for row crops, etc.): 157 acres		
	Center leases 195 acres from the Missouri Soybean Association to help with soybean breeding research. Also lease 35 acres in Callaway County from a private party and utilize about 48 acres of MU turkey farm for crop production and large-scale research.		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Bradford Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$259,486	\$259,484	\$237,869	\$260,139	\$254,245
Other income/sales <sup>3</sup>	255,456	236,508	152,780	229,406	218,538
Gift revenue	23,385	2,500	55,000	520	20,351
Endowment/investment income	926	995	1,123	1,164	1,052
Total income	539,253	499,488	446,772	491,229	494,185
<b>Expenses</b>					
Compensation	303,127	293,783	289,087	231,445	279,361
Other expenses	204,728	173,252	211,184	155,329	186,123
Total expenses	507,855	467,035	500,271	386,774	465,484
<b>Net transfers to plant funds</b>	0	0	25,000	0	6,250

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

<sup>3</sup> Other income to the center comes from crop sales, facility use charges and conference center.

## Bradford Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$123,546	\$836.18
Compensation <sup>1</sup>	69,840	472.69
Total expenses	116,371	787.62

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Boone County

Category	
Soybean yield ( <i>bushels per acre</i> ) (3-year avg.)	43.3
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	154.7
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$126.00
Pasture cash rent ( <i>dollars per acre</i> )	\$28.50
Farm land and buildings ( <i>dollars per acre</i> )	\$5,654

Source: USDA-National Agricultural Statistics Service

## **Fisher Delta Research Center**

**Location:** Portageville (288 miles from Columbia in Pemiscot County)

**Superintendent:** Grover Shannon

**Focus:** Cotton and rice production, irrigation, soybean and corn cropping systems, weed/insect/disease-control systems and improved soybean varieties.

**Visitor engagement:** 3,984 visitors in FY19

**MU faculty engagement:** 10 faculty (including post-docs) in 2020 with research or extension projects. Faculty include Pengyin Chen (soybean breeding), Ali Liakat (soybean breeding), Melissa Crisel (soybean breeding), Scotty Smothers (soybean breeding), Gene Stevens (cropping systems), Calvin Meeks (cotton production), Earl Vories (irrigation), Anthony Ohmes (agronomy), Kevin Bradley (weed science) and Reid Smeda (weed science).

**MU student engagement:** 5 graduate students in 2020 with research or extension projects at the center. There are 19 undergraduates and other part-time employees working at the center.



### **Fisher Delta Research Center asset allocation**

<b>Employees:</b>	10.3 full-time equivalents (FTE)		
<b>Buildings:</b>	116,518 square feet		
<b>Machinery/equipment for general farming:</b>	\$2,500,000 (market value)		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	733	\$3,411	\$510
<b>Land:</b>	1,119 total acres		
	Cropland acres: 805 (733 farmed, 72 rented out) Non-usable acres: 314		
	368 acres were used for income purposes only. 72 acres were rented out in 2020. The 24-acre South Dunklin farm rented from Missouri Agricultural Foundation.		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Fisher Delta Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$748,963	\$748,963	\$684,777	\$705,960	\$722,166
Other income/sales <sup>3</sup>	223,888	248,546	199,091	178,400	212,481
Gift revenue	12,500	3,000	3,000	1,750	5,063
Endowment/investment income	35,716	37,645	38,648	38,546	37,639
Total income	1,021,067	1,038,154	925,516	924,656	977,348
<b>Expenses</b>					
Compensation	591,158	548,909	451,166	424,173	503,852
Other expenses	345,787	396,114	483,173	434,659	414,933
Total expenses	936,945	945,023	934,340	858,832	918,785
<b>Net transfers to plant funds</b>	20,342	20,340	32,819	18,145	22,912

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

<sup>3</sup> Other income to the center comes from crop sales, plot fees, land rent and facility/house rent.

## Fisher Delta Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$94,888	\$873.41
Compensation <sup>1</sup>	48,918	450.27
Total expenses	89,202	821.08

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Pemiscot County

Category	
Soybean yield ( <i>bushels per acre</i> ) (3-year avg.)	48.3
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	171.5
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$128.00
Cropland cash rent, irrigated ( <i>dollars per acre</i> )	\$171.00
Pasture cash rent ( <i>dollars per acre</i> )	N/A
Farm land and buildings ( <i>dollars per acre</i> )	\$5,235

Source: USDA-National Agricultural Statistics Service

## **Forage Systems Research Center**

**Location:** Linneus (105 miles from Columbia in Linn County)

**Superintendent:** David Davis

**Focus:** Development and evaluation of forage systems for all classes of beef cattle. Grazing studies with cow-calf pairs, weanlings and yearling steers and heifers.



**Visitor engagement:** 754 visitors in FY19

**MU faculty engagement:** 10 faculty in 2020 with research or extension projects. Faculty include Harley Naumann, Craig Roberts, Robert Kallenbach, Ryan Lock, Kent Shannon, John Lory, Brian Shoemaker, Leon Schumacher, Dietrich Volkmann, Jordan Thomas and Dawna Voelkl.

**MU student engagement:** 76 students (undergraduate, graduate, veterinary medicine) in FY20 with teaching, research or extension projects.

### **Forage Systems Research Center asset allocation**

<b>Employees:</b>	6.0 full-time equivalents (FTE). Note this does not include student employees that are hired during summer and put on 0.70 FTE each.		
<b>Buildings:</b>	37,211 square feet		
<b>Machinery/equipment for general farming:</b>	\$383,000 (market value)		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	1,010	\$379	\$510
<b>Land:</b>	1,202 total acres		
	Pasture/hay acres: 1,010		
	Timber acres: 169		
	Buildings/storage/roads acres: 23		
<b>Livestock:</b>	No acres for cash rent purposes.		
	\$580,215 market value as of June 2020. Includes cows, bulls, heifers, steers and calves.		

## Forage Systems Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income<sup>2</sup></b>					
General revenue allocation <sup>3</sup>	\$350,984	\$364,356	\$320,781	\$339,162	\$343,821
Other income/sales	207,223	198,099	208,640	173,390	196,838
Gift revenue	0	600	4,825	4,780	2,551
Endowment/investment income	29,510	30,197	30,694	31,173	30,394
Total income	587,717	593,252	564,940	548,505	573,604
<b>Expenses</b>					
Compensation	374,484	314,960	364,447	311,171	341,266
Other expenses	209,068	228,399	209,156	186,119	208,186
Total expenses	583,552	543,359	573,604	497,290	549,451
<b>Net transfers to plant funds</b>	0	220,000	150,000	0	92,500

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> Some general revenue allocations or other income were due to building project commitments or reimbursement of expenses from MU campus.

<sup>3</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

## Forage Systems Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$95,601	\$477.21
Compensation <sup>1</sup>	56,878	283.91
Total expenses	91,575	457.11

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Linn County

Category	
Soybean yield ( <i>bushels per acre</i> ) (2016)	44.4
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	160.2
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$117.00
Pasture cash rent ( <i>dollars per acre</i> )	\$34.50
Farm land and buildings ( <i>dollars per acre</i> )	\$2,883

Source: USDA-National Agricultural Statistics Service

## Graves-Chapple Research Center

**Location:** Rock Port (250 miles from Columbia in Atchison County)

**Superintendent:** James Crawford

**Focus:** Projects are devoted to various agronomic practices under row crops, forages and alternative crops. Additional research efforts include soil conservation and water quality.

**Visitor engagement:** 900-1,000 visitors annually



**MU faculty engagement:** Four faculty in 2020 with research or extension projects. Faculty include Jim Crawford, Wayne Flanary, Tom Fowler (hops), Pat Guinan (weather), John Travlos (weather) and Kaitlyn Bissonette (soybean seed treatments).

**MU student engagement:** One graduate student in 2020 with a research or extension project.

### Graves-Chapple Research Center asset allocation

<b>Employees:</b>	0 full-time equivalents (FTE). Note the superintendent is fully funded by Extension rather than center.		
<b>Buildings:</b>	5,168 square feet		
<b>Machinery/equipment for general farming:</b>	\$150,000 (market value)		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	339	\$442	\$510
<b>Land:</b>	199 total acres (two sites)		
	Cropland acres: 165 Forage acres: 12 Timber acres: 20 Non-usable acres: 2		
	Note: 162 acres were rented in 2020. Approximately 60 acres cannot be used for research for several years due to recent flood. Land not used for research is planted for income.		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Graves-Chapple Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$12,203	\$12,203	\$10,958	\$10,958	\$11,581
Other income/sales <sup>3</sup>	23,861	65,604	0	44,899	33,591
Gift revenue	0	500	500	2,700	925
Total income	36,064	78,307	11,458	58,557	46,097
<b>Expenses</b>					
Compensation	4,683	4,062	2,636	2,478	3,465
Other expenses <sup>4</sup>	35,313	44,673	49,143	28,243	39,343
Total expenses	39,996	48,735	51,779	30,720	42,808
<b>Net transfers to plant funds</b>	0	0	0	0	0

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

<sup>3</sup> Other income to the center comes from crop sales, plot fees and products.

<sup>4</sup> Graves-Chapple has experienced significant Missouri River flooding in recent years. Crop insurance proceeds enter the MU accounting system as negative other expenses rather than as revenue.

## Graves-Chapple Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	N/A	\$231.64
Compensation <sup>1</sup>	N/A	17.41
Total expenses	N/A	215.11

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Atchison County

Category	
Soybean yield ( <i>bushels per acre</i> ) (3-year avg.)	51.6
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	174.5
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$187.00
Pasture cash rent ( <i>dollars per acre</i> )	\$51.00
Farm land and buildings ( <i>dollars per acre</i> )	\$4,903

Source: USDA-National Agricultural Statistics Service



# Greenley Research Center

**Location:** Novelty (95 miles from Columbia in Knox County)

**Superintendent:** Donnie Hubble

**Description/focus:** The Greenley Research Center is comprised of 3 farms. The Lee Greenley Jr. Memorial Research Center, the Grace Greenley Farm and the Ross Jones Farm. Focus of the center includes reduced tillage and alternative cropping practices, new technologies, variety testing, soil fertility and beef cattle backgrounding.



**Visitor engagement:** 1,350 visitors in FY19

**MU faculty engagement:** 16 faculty (including post-docs) in 2020 with research or extension projects. Faculty include Kelly Nelson (crop management), Gurbir Singh (crop management), Andrew Scaboo (soybean breeding), Felix Fritschi (plant physiology), Ranjith Udawatta (agroforestry), Steven Anderson (agroforestry), Wyatt Miller (irrigation), John Lory (irrigation), Bill Wiebold (crop variety trials), Katherine Grote (hydrologic), Peter Motavalli (nutrient management), Kaitlyn Bissonnette (disease management), Kristen Bilyeu (soybean breeding), Jordan Thomas (animal sciences), Zac Erwin (animal sciences) and Brenda Schreck (animal sciences).

**MU student engagement:** 6 graduate students in 2020 with research or extension projects. 4 undergraduates or part-time employees engaged with the center over the summer and are paid from grant projects.

## Greenley Research Center asset allocation

<b>Employees:</b>	3.75 full-time equivalents (FTE). There is also a full-time professor and research technician on staff, however they are employed by the MU Division of Plant Sciences.		
<b>Buildings:</b>	54,143 square feet		
<b>Machinery/equipment for general farming:</b>	\$641,000 (market value)		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	1,151	\$557	\$510
<b>Land:</b>	1,326 total acres		
	Research: 522 acres Pasture and forage: 316 acres Non-farmable: 175 acres Cropland for income purposes: 313 acres		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Greenley Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$184,314	\$180,462	\$163,024	\$158,597	\$171,599
Special allocation from state	0	0	266,750	266,750	133,375
Other income/sales <sup>3</sup>	460,094	387,662	241,801	336,353	356,477
Gift revenue	29,800	198,750	119,250	90,750	109,638
Endowment/investment income	115,791	141,802	147,120	150,101	138,703
Total income	789,998	908,675	937,945	1,002,552	909,793
<b>Expenses</b>					
Compensation	230,082	253,085	238,158	203,694	231,255
Other expenses	347,366	408,792	367,779	517,345	410,320
Total expenses	577,448	661,877	605,937	721,039	641,575
<b>Net transfers to plant funds</b>	0	150,000	0	0	37,500

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

<sup>3</sup> Other income to the center comes from crop sales, livestock sales, land rent and equipment rental.

## Greenley Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$242,611	\$686.12
Compensation <sup>1</sup>	61,668	174.40
Total expenses	171,087	483.84

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Knox County

Category	
Soybean yield ( <i>bushels per acre</i> ) (3-year avg.)	46.2
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	152.5
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$145.00
Pasture cash rent ( <i>dollars per acre</i> )	\$47.50
Farm land and buildings ( <i>dollars per acre</i> )	\$3,042

Source: USDA-National Agricultural Statistics Service

# Horticulture and Agroforestry Research Center

**Location:** New Franklin (28 miles from Columbia in Howard County)

**Superintendent:** Sarah Lovell and Barry Eschenbrenner

**Focus:** Tree nuts (Chinese chestnut, black walnut, others); tree fruits; berry crops; forest farming, riparian buffers, silvopasture, alley cropping, and windbreaks; flood tolerance and biofuel trials.

**Visitor engagement:** 4,534 visitors in FY19



**MU faculty engagement:** 22 faculty (including post-docs) in 2020 with research or extension projects. Faculty include Ron Revord, Chung-Ho Lin, Ranjith Udawatta, Ashley Conway, Hannah Hemmelgarn, Sarah Lovell, Andy Thomas, Mark Coggeshall, Sougata Bardhan, Michael Gold, Harley Naumann, Felix Fritschi, Allison Meyer, Michelle Warmund and Megan Hall.

**MU student engagement:** 10 graduate students in 2020 with research or extension projects. 56 undergraduates are engaged with the center.

## Horticulture and Agroforestry Research Center asset allocation

<b>Employees:</b>	3.0 full-time equivalents (FTE) paid by the center. Note 3 additional employees are primarily supported by Center of Agroforestry.		
<b>Buildings:</b>	36,353 square feet		
<b>Machinery/equipment for general farming:</b>	\$383,050 (market value)		
	Farmed acres (specialty crops)	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	377	\$1,017	\$510
<b>Land:</b>	700 total acres		
	Research acres: 335		
	Demonstration acres: 18		
	Farmable acres: 24		
	Non-farmable acres: 273		
	Other acres: 50		
	No acres for cash rent purposes.		
<b>Livestock:</b>	HARC's cow herd was sold in 2019.		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Horticulture and Agroforestry Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$246,754	\$246,754	\$213,823	\$234,113	\$235,361
Other income/sales <sup>3</sup>	38,713	39,095	50,235	27,320	38,841
Gift revenue	0	500	1,089	450	510
Total income	285,467	286,349	265,147	261,883	274,712
<b>Expenses</b>					
Compensation	130,874	137,603	143,251	134,953	136,670
Other expenses	73,964	82,203	63,205	31,792	62,791
Total expenses	204,838	219,806	206,456	166,746	199,462
<b>Net transfers to plant funds</b>	0	400,000	130,071	47,949	144,505

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

<sup>3</sup> Other income to the center comes from crop sales and in-service education (ISE).

## Horticulture and Agroforestry Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$91,571	\$392.45
Compensation <sup>1</sup>	45,557	195.24
Total expenses	66,487	284.95

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Howard County

Category	
Soybean yield ( <i>bushels per acre</i> ) (3-year avg.)	N/A
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	N/A
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$118.00
Pasture cash rent ( <i>dollars per acre</i> )	\$33.50
Farm land and buildings ( <i>dollars per acre</i> )	\$3,023

Source: USDA-National Agricultural Statistics Service

## **Hundley-Whaley Research Center**

**Location:** Albany (201 miles from Columbia in Gentry County)

**Superintendent:** Jennifer Miller

**Focus:** Improved management practices for corn, soybeans, industrial hemp, small acre entrepreneur crops (e.g. sunflower and pumpkins), horticultural crops, beekeeping, native warm season grasses and forbes, pollinator habitat, timber, bottomland soils and supporting research in alternative crop and Extension demonstration projects.



**Visitor engagement:** 5,000+ visitors in 2019

**MU faculty engagement:** 22 faculty (including post-docs) in 2020 with research or extension projects. Faculty include Kelly Nelson (corn/soybean, water management), Kevin Rice (pest management), Andrew Luke (pest management), Eris Oseland (pest management), Jim Humphrey (native warm season grass/legumes, prescribed burn management), Shawn Deering (native warm season grass/legumes, prescribed burn management), John Travlos (weather station), Pat Guinan (weather), William Weibold (corn and soybean varieties), Andrew Scaboo (soybean breeding), Dusty Walter (forestry) and Tom Fowler (horticulture).

**MU student engagement:** 2 graduate students and 2 undergraduates in 2020 are engaged with the center.

### **Hundley-Whaley Research Center asset allocation**

<b>Employees:</b>	2.6 full-time equivalents (FTE)		
<b>Buildings:</b>	31,620 square feet		
<b>Machinery/equipment for general farming:</b>	\$629,700 (market value).		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	175	\$3,598	\$510
<b>Land:</b>	375 acres total		
	Usable acres: 175 Timber acres: 200		
	Notes: starting to change timber into usable acres. No acres used for cash rent purposes.		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Hundley-Whaley Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$100,157	\$57,308	\$38,752	\$82,561	\$69,695
Other income/sales <sup>3</sup>	25,164	127,343	41,363	43,149	59,255
Gift revenue	11,235	10,125	16,650	6,975	11,246
Total income	136,556	194,776	96,765	132,685	140,196
<b>Expenses</b>					
Compensation <sup>4</sup>	129,183	131,396	121,798	115,414	124,448
Other expenses	68,045	37,118	(19,939)	66,559	37,946
Total expenses	197,227	168,513	101,859	181,973	162,393
<b>Net transfers to plant funds</b>	0	0	0	0	0

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

<sup>3</sup> Other income to the center included grain sales.

<sup>4</sup> Compensation was partially funded by the Bonnie Clark Endowment and the Dierenfeldt Gift.

## Hundley-Whaley Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$53,921	\$373.85
Compensation <sup>1</sup>	47,865	331.86
Total expenses	62,459	433.05

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Gentry County

Category	
Soybean yield ( <i>bushels per acre</i> ) (2017)	45.1
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	135.2
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$163.00
Pasture cash rent ( <i>dollars per acre</i> )	\$33.50
Farm land and buildings ( <i>dollars per acre</i> )	\$3,098

Source: USDA-National Agricultural Statistics Service

# South Farm Research Center

**Location:** Columbia (Boone County)

**Superintendent:** Tim Reinbott

**Focus:** Location of several research facilities including the Swine Research Center, the Beef Research and Teaching Center, the Turfgrass Research Center and the Equine Teaching Facility. Also supports research and demonstration projects in entomology, poultry and maize genetics. Missouri Foundation Seed program uses South Farm to increase the sales of newly developed seed varieties to dealers.



**Visitor engagement:** Approximately 15,000.

**Faculty engagement:** 37 faculty (including post-docs) in 2020 with research or extension projects. Faculty include Randy Prather, Kevin Wells, Tim Safranski, Marcia Shannon, Derek Brake, Jordan Thomas, Allison Meyer, Rocio Rivera, Sofia Ortega, Tom Spencer, Bryon Wiegand, Marci Crosby, David Braun, Lee Miller, Xiong Xi, Kevin Rice, Reid Smeda, Debbie Finke, Dean Volenberg, Megan Hall, David Trinklein, Newell Kitchen, Ken Sudduth, Sherry Flint Garcia, Jacob Washburn, Tim Bessinger, Kristin Bilyeu, Steve Anderson, Teng Lim, Noel Aloysius, Jim Birchler, Kathy Newton, Paula McSteen, Ruthie Angelovici, Toni Kazic, Aaron Saucier and Christopher Topp. 33 staff are engaged with center.

**MU student engagement:** 20 graduate students and 34 undergraduates/part-time employees are engaged with the center in 2020.

## South Farm Research Center asset allocation

<b>Employees:</b>	14.25 full-time equivalents (FTE) in Field Operations. 10 FTE from other programs.		
<b>Buildings:</b>	357,184 square feet at South Farm		
<b>Machinery/equipment for general farming:</b>	\$1,035,000 (market value)		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	972	\$1,064	\$510
<b>Land:</b>	1,452 total acres		
	Farmable: 972 acres		
	Non-farmable: 480 acres (buildings, roads, trees, fences, etc.)		
	Note: South Farm acreage farmed by divisions, but 500 crop acres for Foremost Dairy is farmed by South Farm.		
	0 acres used for cash rent purposes.		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary



## South Farm Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General allocation <sup>2</sup>	\$800,205	\$800,205	\$723,911	\$717,819	\$760,535
Dairy forage sales	132,365	145,246	175,598	192,203	161,353
Grants and contracts	19,997	53,403	52,458	87,159	53,254
Gift revenue	1,200	100	0	250	388
Other income/sales	113,455	177,102	87,671	50,559	107,197
Total income	1,067,222	1,176,056	1,039,638	1,047,990	1,082,727
<b>Expenses</b>					
Compensation	1,086,993	1,106,782	1,098,031	985,689	1,069,374
Other expenses	153,511	131,841	24,532	(271,128)	9,689
Total expenses	1,240,504	1,238,623	1,122,563	714,561	1,079,063
<b>Net transfers to plant funds</b>	112,413	81,362	72,383	72,384	84,636

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

The South Farm Research Center includes the Agricultural Experiment Stations Field Operations for the Columbia-based research centers. Field operations include construction services, rental vans and vehicles, mowing and lagoon cleaning.

## South Farm Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$75,981	\$745.68
Compensation <sup>1</sup>	75,044	736.48
Total expenses	75,724	743.16

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Boone County

Category	
Soybean yield ( <i>bushels per acre</i> ) (3-year avg.)	43.3
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	154.7
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$126.00
Pasture cash rent ( <i>dollars per acre</i> )	\$28.50
Farm land and buildings ( <i>dollars per acre</i> )	\$5,654

Source: USDA-National Agricultural Statistics Service



## Southwest Research Center

**Location:** Mt. Vernon (198 miles from Columbia in Lawrence County)

**Superintendent:** Reagan Bluel

**Focus:** Beef genetics, nutrition and management systems; horticultural and alternative crop demonstration and research; elderberry and grape cultivation; and newly certified Monarch Waystation and pollinator education plots.

**Visitor engagement:** 5,919 visitors in FY19



**Faculty engagement:** 45 faculty (including post-docs) in 2020 with research or extension projects. Faculty include Eric Bailey (animal science), Jordan Thomas (animal science), Tim Schnakenberg (forages), Andrew Thomas (horticulture, agroforestry), Kevin Bradley (plant science), Ryan Lock (plant science), Will McClain (plant science), Sougata Bardhan (plant science), Matt Massie (forages), Reagan Bluel (animal sciences), Sarah Lovell, Mike Gold, Chung-Ho Lin, Ron Revord, Michele Warmund, Mark Coggeshall, Chin-Feng Hwang, Zhen Cai, Adolfo Rosati, Bill Reid, Ken Hunt, Lloyd Sumner, Maria Jenderek, Patrick Byers, Kiruba Krishnaswami, Robert Smith, Nanci Ross, Matthew Albrecht, Hwei-Yiing Johnson, Mike Greenlief, Ingolf Gruen, George Rottinghaus, Mitch Johnson, Wendy Applequist, Paula Brown, Elizabeth Mudge, Melissa Bledsoe, Touria Eaton, Clement Akotsen-Mensah, Dennis Lubahn, Grace Sun, Zezong Gu, William Folk, Korey Brownstein, Arianna Bozzolo, Keith Striegler, Steve Campbell, Chris Baughman, Jennifer Lutes and Bryon Weigand.

**MU student engagement:** 17 graduate students and 8 undergraduates/part-time employees (not employed by center) in 2020 are engaged with the center.

**Other university engagement:** Missouri State University, Lincoln University, Washington State University, Drake University, St. Louis University, Kansas State University, University of Chicago and University of Arkansas – Fayetteville.

### Southwest Research Center asset allocation

<b>Employees:</b>	6.7 full-time equivalents (FTE)		
<b>Buildings:</b>	64,486 square feet		
<b>Machinery/equipment for general farming:</b>	\$66,675 (market value)		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	794	\$84	\$510
<b>Land:</b>	897 total acres		
	Research: 794 acres		
	Non-farmable: 91 acres		
	Other: 12 acres		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Southwest Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$368,666	\$368,666	\$319,862	\$346,428	\$350,906
Other income/sales <sup>3</sup>	159,047	262,435	184,930	175,684	195,524
Gift revenue	7,195	4,740	6,550	11,180	7,416
Endowment/investment income	682	923	1,231	1,499	1,084
Tuition and fees	0	0	0	2,177	544
Total income	535,590	636,764	512,573	536,968	555,474
<b>Expenses</b>					
Compensation	375,989	381,997	403,926	374,630	384,136
Other expenses	186,309	257,074	190,001	167,922	200,327
Total expenses	562,298	639,071	593,927	542,552	584,462
<b>Net transfers to plant funds</b>	0	140,000	0	(92,885)	11,779

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

<sup>3</sup> Other income includes cattle sales, fruit/horticultural sales, timber sales, fescue seed and room rental.

## Southwest Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$82,907	\$619.26
Compensation <sup>1</sup>	57,334	428.24
Total expenses	87,233	651.57

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Lawrence County

Category	
Soybean yield ( <i>bushels per acre</i> ) (3-year avg.)	40.7
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	127.8
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$62.00
Pasture cash rent ( <i>dollars per acre</i> )	\$31.00
Farm land and buildings ( <i>dollars per acre</i> )	\$3,198

Source: USDA-National Agricultural Statistics Service

## **Thompson Research Center**

**Location:** Spickard (159 miles from Columbia in Grundy County)

**Superintendent:** Jon Schreffler and Bill Lamberson

**Focus:** Beef reproductive performance, heifer development, supplementation strategies and animal health factors.

**Visitor engagement:** 186 visitors in FY19

**MU faculty engagement:** 5 faculty (including post-docs) in 2020 with research or extension projects. Faculty include Jordan Thomas (reproduction), Eric Bailey (feed lot/animal science), Jared Decker (hair shedding/animal science), Dusty Walter (forestry) and Jenna Monnig (reproduction).

**MU student engagement:** 4 graduate students in 2020 with research or extension projects at the center.



### **Thompson Research Center asset allocation**

<b>Employees:</b>	4.5 full-time equivalents (FTE)		
<b>Buildings:</b>	19,016 square feet		
<b>Machinery/equipment for general farming:</b>	\$160,000 (market value)		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	1,000	\$160	\$510
<b>Land:</b>	1,600 total acres		
	Farmable: 590 acres Research: 1,000 acres Non-farmable: 10 acres		
	Notes: farmable acres are leased for approximately \$150,000 per year. Center keeps 75 percent of annual lease payments.		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Thompson Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$55,572	\$55,572	\$64,613	\$46,223	\$55,495
Other income/sales	470,033	405,496	407,880	322,497	401,477
Gift revenue	0	500	0	400	225
Total income	525,605	461,568	472,493	369,120	457,197
<b>Expenses</b>					
Compensation	211,828	208,682	209,137	211,750	210,349
Other expenses	410,279	306,816	343,680	206,367	316,786
Total expenses	622,107	515,498	552,817	418,117	527,135
<b>Net transfers to plant funds</b>	0	0	100,000	0	33,333

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

## Thompson Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$101,599	\$285.75
Compensation <sup>1</sup>	46,744	131.47
Total expenses	117,141	329.46

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported..

## Agriculture comparison: Grundy County

Category	
Soybean yield ( <i>bushels per acre</i> ) (3-year avg.)	43.7
Corn yield ( <i>bushels per acre</i> ) (2018)	109.9
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$125.00
Pasture cash rent ( <i>dollars per acre</i> )	\$41.00
Farm land and buildings ( <i>dollars per acre</i> )	\$2,928

Source: USDA-National Agricultural Statistics Service

## **Wurdack Research Center**

**Location:** Cook Station (116 miles from Columbia in Crawford County)

**Superintendent:** Dusty Walter

**Focus:** Integrated livestock, forages, forestry and wildlife management.

**Visitor engagement:** 1,350 visitors in FY20

**MU faculty engagement:** 3 faculty (including post-docs) in 2020 with research or extension projects. Faculty include Jordon Thomas (cattle genetics/reproduction), Harley Naumann (sunn hemp/plant science) and Gatlin Buntin (sunn hemp/plant science).

**MU student engagement:** 4 graduate students and 2 undergraduates in 2020 with research or extension projects at the center.



### **Wurdack Research Center asset allocation**

<b>Employees:</b>	1.5 full-time equivalents (FTE)		
<b>Buildings:</b>	26,750 square feet		
<b>Machinery/equipment for general farming:</b>	\$210,000 (market value)		
	Farmed acres	Machinery investment/acre	Machinery benchmark/acre <sup>1</sup>
	280	\$750	\$510
<b>Land:</b>	1,217 total acres		
	Pasture or hay acres: 280		
	Woodland research acres: 80		
	Non-farmable/timber acres: 857		
	Notes: approximately 750 acres at center could be used for research in forestry. No acres for cash rent purposes.		

<sup>1</sup> Missouri Farm Business Management Analysis, 2019 Record Summary

## Wurdack Research Center financial snapshot<sup>1</sup>

Category	FY 2017	FY 2018	FY 2019	FY 2020	Average
<b>Income</b>					
General revenue allocation <sup>2</sup>	\$88,500	\$88,500	\$77,155	\$77,155	\$82,828
Other income/sales <sup>3</sup>	64,373	50,783	65,834	42,951	55,985
Gift revenue	0	500	500	200	300
Endowment/investment income	30,698	31,571	31,477	31,093	31,210
Total income	183,571	171,354	174,966	151,399	170,323
<b>Expenses</b>					
Compensation	114,912	115,113	111,044	102,298	110,842
Other expenses	65,927	59,959	67,797	75,419	67,276
Total expenses	180,839	175,071	178,842	177,717	178,117
<b>Net transfers to plant funds</b>	0	0	20,000	0	5,000

<sup>1</sup> Financial snapshot income and expenses may not match in any given year due to carryover balances from prior years; special transfers or reimbursed items from campus; grant funded research projects with some income or expenses not flowing through center; and other special situations.

<sup>2</sup> FY 2020 allocation has been adjusted for state withholding amount that occurred late in fiscal year.

<sup>3</sup> Other income includes cattle and timber sales.

## Wurdack Research Center financial metrics: Four-year average over units

Category	Per FTE	Per Total Acre
Total income	\$113,548	\$139.95
Compensation <sup>1</sup>	73,895	91.08
Total expenses	118,745	146.36

<sup>1</sup> Compensation per FTE calculated using 4-year average total compensation including benefits for all employees (part-time and full-time) divided by 2020 FTE reported.

## Agriculture comparison: Crawford County

Category	
Soybean yield ( <i>bushels per acre</i> ) (2-year avg.)	37.3
Corn yield ( <i>bushels per acre</i> ) (3-year avg.)	N/A
Cropland cash rent, non-irrigated ( <i>dollars per acre</i> )	\$23.00
Pasture cash rent ( <i>dollars per acre</i> )	\$15.50
Farm land and buildings ( <i>dollars per acre</i> )	\$2,583

Source: USDA-National Agricultural Statistics Service

*The CAFNR Research Center Review was completed by University of Missouri Extension under the leadership of Joe Horner and Ryan Milhollin, state specialists in agricultural business and policy. A special thanks goes to Tim Reinbott, Andrew Biggs, Kathy Haynes and superintendents at each research center for gathering and providing information used in this report.*

# Appendix

## A1. The MOAES Budget Model: Guiding Principles

DRAFT: NOVEMBER 2019

### **PRINCIPLES:**

1. The MOAES Budget Model will reinforce the drive to productivities and efficiencies reflected in the campus resource allocation model and the CAFNR budget model.
2. Strategy must drive the budget so that it reflects the goals of the CAFNR Strategic Plan.
3. The budget process must strive for simplicity in implementation, explanation and adoption while assuring transparency for the MOAES.
4. The budget model must promote that we are one experiment station.
5. The budget model must reflect MOAES' role in the land grant missions of research, teaching and engagement in support of all Missourians.
6. The budget model must empower Superintendents to develop creative approaches to supporting research, teaching and engagement.
7. Data used to determine annual research center and farm allocations will be based on three-year rolling averages.
8. The MOAES model will strive to minimize significant, short-term, shifts in resource allocations.
9. The MOAES model should consider sales potential of the research center but operate independently of endowment/gifts.

### **ALLOCATIONS:**

10. MOAES funding shall be used to support the following:
  - Bradford Research Center
  - Fisher Delta Research Center
  - Graves-Chapple Research Center
  - Forage Systems Research Center
  - Greenley Memorial Research Center
  - Horticulture and Agroforestry Research Center
  - Hundley-Whaley Research Center
  - Land of the Osages
  - South Farm Research Center
  - Southwest Research Center
  - Thompson Research Center
  - Wurdack Research Center

Periodic review of these operations will be conducted by the Director of the MOAES and the Assistant Director of the MOAES with input from CAFNR faculty to insure their efficient operation and productivity.

11. Distribution and use of annual allocations provided to the Research Centers are the responsibility of the Superintendent at each Research Center.



## A2. Missouri cash rental rates, dollars per acre

County	Cropland, non-irrigated		Cropland, irrigated		Pasture	
	2017	2019	2017	2019	2017	2019
Adair	91.50	99.00	--	--	30.50	28.50
Andrew	145.00	142.00	--	--	42.00	41.00
Atchison	188.00	187.00	--	217.00	--	--
Audrain	131.00	141.00	153.00	153.00	38.50	42.00
Barry	--	--	--	--	27.50	27.00
Barton	68.00	75.00	--	--	31.50	35.00
Bates	94.50	110.00	--	--	--	42.50
Benton	77.50	--	--	--	23.00	25.00
Bollinger	57.50	78.00	--	--	21.50	27.00
Boone	133.00	126.00	--	--	28.00	28.50
Buchanan	142.00	136.00	--	--	38.00	39.00
Butler	92.50	--	168.00	185.00	--	--
Caldwell	162.00	158.00	--	--	37.00	40.00
Callaway	127.00	117.00	--	--	23.50	21.00
Camden	24.50	25.50	--	--	20.50	19.00
Cape Girardeau	91.50	105.00	155.00	182.00	30.50	32.00
Carroll	164.00	157.00	--	--	38.00	41.00
Carter	19.00	18.00	--	--	12.50	--
Cass	83.00	96.00	--	--	38.00	37.00
Cedar	42.50	59.00	--	--	27.50	29.00
Chariton	125.00	124.00	--	--	34.50	38.00
Christian	42.00	48.00	--	--	26.50	26.00
Clark	132.00	120.00	--	--	38.00	40.00
Clay	146.00	150.00	--	--	41.00	37.50
Clinton	167.00	164.00	--	--	37.00	46.00
Cole	66.50	52.00	--	--	22.50	23.00
Cooper	95.00	105.00	--	--	34.50	35.50
Crawford	16.00	23.00	--	--	18.00	15.50
Dade	57.50	56.00	--	--	31.50	32.00
Dallas	26.50	30.00	--	--	24.00	24.00
Daviess	148.00	143.00	--	--	41.00	33.00
DeKalb	140.00	119.00	--	--	38.50	38.00
Dent	30.00	31.00	--	--	16.00	28.50
Douglas	23.00	22.00	--	--	20.00	20.50
Dunklin	115.00	111.00	182.00	161.00	--	--
Franklin	76.00	92.00	--	--	--	28.00
Gasconade	50.00	43.00	--	--	20.50	22.00
Gentry	172.00	163.00	--	--	38.50	33.50
Greene	35.50	43.00	--	--	--	--
Grundy	140.00	125.00	--	--	35.50	41.00
Harrison	149.00	151.00	--	--	35.50	33.00
Henry	79.50	77.50	--	--	34.00	--
Hickory	33.50	32.00	--	--	23.00	23.50
Holt	173.00	165.00	--	--	41.50	44.50
Howard	120.00	118.00	--	--	31.00	33.50
Howell	28.00	26.50	--	--	24.50	25.00
Iron	19.00	27.00	--	--	20.00	27.00
Jackson	106.00	105.00	--	--	38.00	36.50
Jasper	69.50	75.00	--	--	31.00	34.00
Jefferson	46.00	47.00	--	--	20.00	20.50
Johnson	76.50	74.50	--	--	--	--
Knox	137.00	145.00	--	--	51.00	47.50
Laclede	33.50	34.00	--	--	18.50	22.00
Lafayette	139.00	142.00	--	--	34.50	37.50
Lawrence	62.00	--	--	--	--	--
Lewis	138.00	143.00	--	--	41.50	43.50
Lincoln	112.00	103.00	--	--	25.50	36.50

Linn	108.00	117.00	--	--	37.00	34.50
Livingston	168.00	166.00	--	--	38.00	34.50
Macon	112.00	113.00	--	--	39.50	37.00
Madison	25.00	23.50	--	--	20.00	26.50
Maries	28.50	30.50	--	--	19.00	24.50
Marion	172.00	166.00	246.00	--	36.50	44.00
McDonald	59.50	68.00	--	--	26.00	25.50
Mercer	--	102.00	--	--	36.00	47.00
Miller	54.50	53.50	--	--	20.00	20.50
Mississippi	159.00	147.00	180.00	172.00	--	--
Moniteau	86.50	86.50	--	--	31.50	--
Monroe	134.00	136.00	--	--	42.50	36.50
Montgomery	101.00	102.00	--	--	25.50	27.50
Morgan	89.50	81.50	--	--	28.50	30.00
New Madrid	127.00	--	177.00	185.00	--	--
Newton	46.00	52.00	--	--	32.50	36.00
Nodaway	171.00	171.00	--	--	--	--
Oregon	--	--	--	--	19.50	25.00
Osage	91.00	66.00	--	--	--	22.00
Ozark	32.50	31.00	--	--	18.00	16.00
Pemiscot	125.00	128.00	171.00	171.00	--	--
Perry	97.00	109.00	--	--	35.50	32.50
Pettis	99.00	99.00	--	--	--	--
Phelps	27.50	26.00	--	--	18.00	20.50
Pike	117.00	123.00	--	--	46.00	38.00
Platte	144.00	152.00	--	--	41.00	35.00
Polk	34.00	36.00	--	--	28.00	28.00
Pulaski	21.50	18.50	--	--	17.00	13.50
Putnam	--	--	--	--	40.00	47.00
Ralls	139.00	140.00	--	--	37.50	44.50
Randolph	119.00	122.00	--	--	39.00	35.00
Ray	139.00	159.00	--	--	37.50	45.50
Reynolds	26.00	24.50	--	--	11.50	12.00
Ripley	38.00	31.00	--	--	16.00	15.50
St. Charles	127.00	134.00	--	--	--	--
St. Clair	78.50	74.00	--	--	31.00	37.50
St. Francois	45.00	--	--	--	19.00	18.50
Ste. Genevieve	76.00	78.50	--	--	24.50	22.00
St. Louis	123.00	--	--	--	--	--
Saline	150.00	157.00	--	--	44.00	42.50
Schuyler	119.00	--	--	--	44.50	43.50
Scotland	132.00	122.00	--	--	36.00	35.50
Scott	176.00	189.00	193.00	210.00	--	--
Shannon	--	--	--	--	17.00	20.00
Shelby	146.00	150.00	--	--	37.50	47.50
Stoddard	116.00	104.00	188.00	198.00	--	32.50
Stone	--	33.00	--	--	25.50	23.50
Sullivan	88.50	86.00	--	--	37.50	38.00
Taney	22.50	31.50	--	--	18.50	22.00
Texas	34.50	31.50	--	--	21.00	--
Vernon	79.50	85.00	--	--	32.00	--
Warren	94.50	113.00	--	--	--	--
Washington	29.50	25.50	--	--	13.00	14.50
Wayne	28.00	--	--	--	23.00	22.50
Webster	34.00	39.00	--	--	22.00	24.50
Worth	159.00	156.00	--	--	40.50	46.00
Wright	21.00	30.00	--	--	23.50	23.50
STATE	121.00	122.00	180.00	186.00	31.00	32.00

Source: USDA, National Agricultural Statistics Service

### A3. FINBIN enterprise analysis for Missouri, corn, soybeans and wheat

<b>Crop Enterprise Analysis (Farms Sorted By Years)</b>				
<b>Corn on Owned Land</b>				
	<b><u>Avg. Of All Farms</u></b>	<b><u>2019</u></b>	<b><u>2018</u></b>	<b><u>2017</u></b>
Number of farms	87	22	30	35
Acres	138.61	142.08	139.00	136.10
Yield per acre (bu.)	146.11	130.79	131.35	169.08
Operators share of yield %	100.00	100.00	100.00	100.00
Value per bu.	3.48	3.78	3.45	3.34
Total product return per acre	507.87	493.77	453.01	565.13
Hedging gains/losses per acre	0.03	0.13	-	-
Crop insurance per acre	22.68	45.53	23.52	6.95
Other crop income per acre	38.24	62.60	37.09	23.26
Gross return per acre	568.82	602.03	513.62	595.34
<b>Direct Expenses</b>				
Seed	88.01	74.11	94.50	91.46
Fertilizer	100.07	92.16	92.49	111.89
Crop chemicals	55.61	48.83	51.20	63.92
Cover crop expense	0.36	0.07	0.21	0.67
Crop insurance	16.70	11.29	19.67	17.65
Drying expense	1.79	1.51	0.65	2.97
Storage	1.43	1.26	1.40	1.58
Fuel & oil	17.78	20.32	18.62	15.38
Repairs	33.24	37.32	29.31	34.01
Custom hire	12.02	14.83	5.92	15.52
Hired labor	2.92	7.98	1.45	0.89
Machinery leases	2.21	1.63	2.62	2.24
Utilities	1.37	1.11	0.83	2.02
Marketing	0.65	0.34	0.67	0.85
Operating interest	5.42	6.76	5.12	4.82
Miscellaneous	0.84	0.20	1.22	0.94
Total direct expenses per acre	340.44	319.72	325.86	366.80
Return over direct exp per acre	228.38	282.31	187.76	228.55
<b>Overhead Expenses</b>				
Custom hire	10.73	0.75	15.28	13.30
Hired labor	16.61	11.92	19.61	17.07
Machinery leases	0.72	1.28	0.16	0.83
RE & pers. property taxes	10.36	10.72	10.30	10.17
Farm insurance	9.42	9.76	9.34	9.26
Utilities	2.60	2.81	2.50	2.55
Dues & professional fees	3.74	3.09	2.98	4.83
Interest	30.64	29.89	36.63	25.88
Mach & bldg depreciation	44.48	46.85	39.66	47.15
Miscellaneous	15.37	27.81	8.26	13.42
Total overhead expenses per acre	144.66	144.88	144.72	144.47
Total dir & ovhd expenses per acre	485.10	464.60	470.57	511.27
Net return per acre	83.72	137.43	43.05	84.08
Government payments	13.95	15.20	13.90	13.17
Net return with govt pmts	97.67	152.63	56.95	97.25
Labor & management charge	39.51	38.85	38.32	41.00
Net return over lbr & mgt	58.15	113.78	18.63	56.25
<b>Cost of Production</b>				
Total direct expense per bu.	2.33	2.44	2.48	2.17
Total dir & ovhd exp per bu.	3.32	3.55	3.58	3.02
Less govt & other income	2.81	2.61	3.02	2.77
With labor & management	3.08	2.91	3.31	3.01
Net value per unit	3.48	3.78	3.45	3.34
Machinery cost per acre	117.43	123.36	107.23	122.47
Est. labor hours per acre	2.56	2.23	2.59	2.76

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***Crop Enterprise Analysis (continued)***  
***(Farms Sorted By Years)***

***Corn on Owned Land***

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Data Source(s):  
Missouri Farm Business Management Analysis, 87 farms

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Report Summary

1. Report number	731742
2. Location	
State:	Missouri
3. Farm Characteristics	
Year(s):	2019, 2018, 2017
Crop tenure type:	Owned Land
Organic Transition:	No
	No Answer

Suggested citation:  
FINBIN (2020). Center for Farm Financial Management: University of Minnesota.  
Retrieved from <http://finbin.umn.edu> (originally created September 29, 2020).

[Click to open CSV file.](#)

**Crop Enterprise Analysis  
(Farms Sorted By Years)**

**Soybeans on Owned Land**

	<u>Avg. Of All Farms</u>	<u>2019</u>	<u>2018</u>	<u>2017</u>
Number of farms	99	27	35	37
Acres	193.88	199.61	207.84	176.50
Yield per acre (bu.)	48.02	45.20	47.05	51.42
Operators share of yield %	100.00	100.00	100.00	100.00
Value per bu.	8.89	8.35	8.97	9.20
Total product return per acre	426.87	377.42	422.18	472.90
Hedging gains/losses per acre	0.09	0.07	0.04	0.16
Crop insurance per acre	10.21	24.22	6.31	2.98
Other crop income per acre	57.63	70.40	76.90	25.63
Gross return per acre	494.80	472.10	505.44	501.67
<b>Direct Expenses</b>				
Seed	67.54	61.06	68.20	72.15
Fertilizer	48.12	51.91	52.16	40.50
Crop chemicals	54.87	43.55	52.97	66.32
Crop insurance	10.43	7.35	12.01	11.21
Storage	0.84	0.98	0.54	1.07
Fuel & oil	12.04	11.85	12.00	12.25
Repairs	23.04	28.01	19.67	22.70
Custom hire	7.61	12.28	4.26	7.48
Hired labor	2.44	6.72	0.57	0.99
Machinery leases	1.44	0.85	1.27	2.12
Utilities	0.46	0.52	0.44	0.44
Operating interest	3.69	7.61	2.56	1.71
Miscellaneous	0.65	0.74	0.70	0.53
Total direct expenses per acre	233.18	233.42	227.35	239.47
Return over direct exp per acre	261.62	238.68	278.09	262.20
<b>Overhead Expenses</b>				
Custom hire	4.79	0.32	6.40	6.69
Hired labor	11.25	7.74	14.13	10.94
Machinery leases	0.81	2.34	0.22	0.19
RE & pers. property taxes	7.86	7.84	8.31	7.39
Farm insurance	5.70	4.48	6.07	6.29
Utilities	2.09	2.00	2.12	2.13
Dues & professional fees	1.88	1.79	1.63	2.23
Interest	24.17	23.95	29.29	18.64
Mach & bldg depreciation	30.91	35.88	20.63	38.26
Miscellaneous	8.47	13.52	6.99	5.94
Total overhead expenses per acre	97.92	99.86	95.79	98.71
Total dir & ovhd expenses per acre	331.10	333.28	323.14	338.18
Net return per acre	163.70	138.83	182.30	163.50
Government payments	16.85	16.28	17.22	16.90
Net return with govt pmts	180.54	155.11	199.52	180.40
Labor & management charge	24.34	24.94	23.07	25.26
Net return over lbr & mgt	156.20	130.17	176.44	155.14
<b>Cost of Production</b>				
Total direct expense per bu.	4.86	5.16	4.83	4.66
Total dir & ovhd exp per bu.	6.90	7.37	6.87	6.58
Less govt & other income	5.13	4.92	4.73	5.69
With labor & management	5.64	5.47	5.22	6.18
Net value per unit	8.89	8.35	8.97	9.20
Machinery cost per acre	79.21	90.40	63.46	87.52
Est. labor hours per acre	1.57	1.42	1.66	1.58

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***Crop Enterprise Analysis (continued)***  
***(Farms Sorted By Years)***

***Soybeans on Owned Land***

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Data Source(s):  
Missouri Farm Business Management Analysis, 99 farms

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Report Summary

1. Report number	731744
2. Location	
State:	Missouri
3. Farm Characteristics	
Year(s):	2019, 2018, 2017
Crop tenure type:	Owned Land
Organic Transition:	No
	No Answer

Suggested citation:  
FINBIN (2020). Center for Farm Financial Management: University of Minnesota.  
Retrieved from <http://finbin.umn.edu> (originally created September 29, 2020).

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**Crop Enterprise Analysis  
(Farms Sorted By Years)**

**Wheat, Winter on Owned Land**

	<u>Avg. Of All Farms</u>	<u>2018</u>	<u>2017</u>
Number of farms	16	6	7
Acres	69.53	82.57	50.86
Yield per acre (bu.)	59.31	57.14	74.94
Operators share of yield %	100.00	100.00	100.00
Value per bu.	5.11	5.10	4.66
Total product return per acre	303.20	291.34	349.34
Crop insurance per acre	25.78	-	1.71
Other crop income per acre	26.40	15.01	8.83
Gross return per acre	355.38	306.35	359.88
<b>Direct Expenses</b>			
Seed	48.99	65.39	35.63
Fertilizer	76.73	62.40	104.06
Crop chemicals	64.45	76.77	62.40
Crop insurance	11.01	14.07	9.97
Fuel & oil	13.59	13.66	11.15
Repairs	29.56	25.32	21.99
Custom hire	1.64	2.33	0.17
Hired labor	9.61	10.26	15.49
Machinery leases	3.56	2.97	7.01
Utilities	1.01	1.53	0.30
Operating interest	4.60	6.11	3.41
Miscellaneous	0.48	0.53	0.75
Total direct expenses per acre	265.23	281.33	272.32
Return over direct exp per acre	90.15	25.02	87.57
<b>Overhead Expenses</b>			
Hired labor	6.55	5.60	4.28
RE & pers. property taxes	6.45	7.12	6.59
Farm insurance	5.71	6.57	4.56
Utilities	1.50	1.44	1.18
Dues & professional fees	0.49	0.48	0.51
Interest	30.85	32.54	47.53
Mach & bldg depreciation	23.00	25.72	12.86
Miscellaneous	10.20	4.33	2.09
Total overhead expenses per acre	84.75	83.81	79.60
Total dir & ovhd expenses per acre	349.98	365.14	351.92
Net return per acre	5.40	-58.79	7.96
Government payments	14.17	7.17	26.19
Net return with govt pmts	19.57	-51.62	34.15
Labor & management charge	22.01	21.08	12.52
Net return over lbr & mgt	-2.44	-72.70	21.63
<b>Cost of Production</b>			
Total direct expense per bu.	4.47	4.92	3.63
Total dir & ovhd exp per bu.	5.90	6.39	4.70
Less govt & other income	4.78	6.00	4.21
With labor & management	5.15	6.37	4.37
Net value per unit	5.11	5.10	4.66
Machinery cost per acre	71.10	68.61	55.21
Est. labor hours per acre	1.31	1.27	1.11

A minimum of 5 farms required per column. Some columns were omitted.

Report number 731747

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***Crop Enterprise Analysis (continued)***  
***(Farms Sorted By Years)***

***Wheat, Winter on Owned Land***

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Data Source(s):  
Missouri Farm Business Management Analysis, 16 farms

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Report Summary

1. Report number	731747
2. Location	
State:	Missouri
3. Farm Characteristics	
Year(s):	2019, 2018, 2017
Crop tenure type:	Owned Land
Organic Transition:	No
	No Answer

Suggested citation:  
FINBIN (2020). Center for Farm Financial Management: University of Minnesota.  
Retrieved from <http://finbin.umn.edu> (originally created September 29, 2020).

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#### A4. Machinery cost estimates, 2019

# FARM BUSINESS MANAGEMENT

## Machinery Cost Estimates: Summary

Department of Agricultural and Consumer Economics • College of Agricultural, Consumer and Environmental Sciences  
University of Illinois at Urbana-Champaign

### MACHINERY COST ESTIMATES: SUMMARY

June 2019

More details on costs in this publication are given in four publications available in the management section of *farmdoc* ([www.farmdoc.uiuc.edu](http://www.farmdoc.uiuc.edu)) within the machinery cost section.

Table 1. List Prices and Estimated Costs Per Hour for Tractors of Different Sizes.

Tractor <sup>1</sup>	List Price <sup>2</sup>	Costs				Fuel Use Per Hour
		Total	= Overhead	+ Fuel	+ Labor	
	\$/tractor	\$ per hour				gal.
85PTOHp Tractor	114,488	<b>65.40</b>	34.30	10.20	20.90	3.7
95PTOHp Tractor	121,164	<b>68.60</b>	36.30	11.40	20.90	4.1
110PTOHp Tractor	154,168	<b>80.30</b>	46.20	13.20	20.90	4.8
120PTOHp Tractor	161,538	<b>83.80</b>	48.40	14.50	20.90	5.3
140PTOHp Tractor	177,022	<b>90.80</b>	53.00	16.90	20.90	6.1
155PTOHp Tractor	186,904	<b>95.60</b>	56.00	18.70	20.90	6.8
175PTOHp Tractor	196,751	<b>100.90</b>	58.90	21.10	20.90	7.7
190PTOHp Tractor	241,267	<b>116.10</b>	72.30	22.90	20.90	8.3
225PTOHp Tractor, FWA	274,867	<b>130.30</b>	82.30	27.10	20.90	9.9
240PTOHp Tractor, FWA	285,882	<b>135.40</b>	85.60	28.90	20.90	10.5
270PTOHp Tractor, FWA	365,010	<b>162.70</b>	109.30	32.50	20.90	11.8
290PTOHp Tractor, FWA	391,421	<b>173.10</b>	117.30	34.90	20.90	12.7
310PTOHp Tractor, FWA	410,256	<b>181.10</b>	122.90	37.30	20.90	13.6
370 Engine Hp Tractor, 4WD	358,736	<b>173.00</b>	107.50	44.60	20.90	16.2
420 Engine Hp Tractor, 4WD	386,955	<b>187.40</b>	115.90	50.60	20.90	18.4
470 Engine Hp Tractor, 4WD	415,174	<b>201.90</b>	124.40	56.60	20.90	20.6
570 Engine Hp Tractor, 4WD	487,819	<b>235.70</b>	146.10	68.70	20.90	25.0
620 Engine Hp Tractor, 4WD	516,085	<b>250.20</b>	154.60	74.70	20.90	27.2

<sup>1</sup> "FWA" indicates a front wheel assist tractor. "4WD" indicates a four wheel drive tractor.

<sup>2</sup> List prices for 2019. Purchase price is assumed to be 85% of the list price.

<sup>3</sup> Sum of overhead, fuel, and labor costs.

<sup>4</sup> Includes depreciation, interest, insurance, housing, and repair costs. These per hour charges are appropriate for calculating rental costs when the person renting the tractor provides fuel and labor.

<sup>5</sup> Fuel costs are based on a price of \$2.50 per gallon for diesel fuel. Fuel costs vary depending on fuel use. Use varies with load on the tractor.

<sup>6</sup> Labor costs are based on a \$19.00 per hour labor charge. Labor time is assumed to be ten percent higher than tractor hours.



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**Table 2. Per Acre Field Operation Costs.**

Operation	Total =	Tractor Overhead +	Implement Overhead +	Fuel & Lube +	Labor	Fuel Use
<b>Primary tillage</b>	----- \$ per acre -----					gal
Chisel plow	<b>12.70</b>	5.10	4.50	2.10	1.00	0.8
Disk Ripper (disk, chisel, rolling bk)	<b>25.70</b>	8.10	10.70	5.30	1.60	1.9
Vertical tillage, rolling basket	<b>11.70</b>	4.00	5.70	1.20	0.80	0.4
Moldboard plow	<b>39.80</b>	17.40	12.30	5.70	4.40	2.1
Mulch tiller (disk, chisel)	<b>21.40</b>	10.10	5.40	3.30	2.60	1.2
Offset disk	<b>14.70</b>	5.80	4.80	1.90	2.20	0.7
Strip tillage	<b>16.70</b>	5.30	8.90	1.60	0.90	0.6
V-ripper (shanks only)	<b>22.50</b>	13.40	2.70	4.10	2.30	1.5
<b>Secondary tillage</b>						
Field cultivator	<b>9.90</b>	3.70	4.40	1.10	0.70	0.4
Mulch finisher (disk, chisel, drag)	<b>15.40</b>	5.40	7.50	1.60	0.90	0.6
Tandem disk	<b>12.60</b>	4.20	6.00	1.40	1.00	0.5
<b>Planting</b>						
Broadcast seeding	<b>8.90</b>	4.30	0.70	1.30	2.60	0.5
Conventional planter	<b>14.40</b>	2.80	9.70	0.90	1.00	0.3
Split-row planter <sup>1</sup>	<b>12.50</b>	2.90	7.60	1.00	1.00	0.4
No-till planter	<b>17.20</b>	4.00	10.90	1.30	1.00	0.5
Grain drill	<b>14.50</b>	4.50	6.80	1.40	1.80	0.5
No-till drill	<b>25.80</b>	7.60	12.80	2.40	3.00	0.9
Air Seeder	<b>16.80</b>	5.50	8.70	1.70	0.90	0.6
<b>Crop care</b>						
Rotary hoe	<b>5.90</b>	1.80	2.80	0.60	0.70	0.2
Row cultivating	<b>11.40</b>	4.50	4.20	1.50	1.20	0.5
<b>Spraying and ammonia application</b>						
Self-propelled	<b>4.40</b>		4.10	0.10	0.20	0.04
Pull-type	<b>3.90</b>	0.70	2.60	0.20	0.40	0.1
Anhydrous ammonia	<b>16.50</b>	5.10	9.00	1.50	0.90	0.5
Liquid Fertilizer Applicator	<b>7.20</b>	2.30	3.50	0.70	0.70	0.3
<b>Mowing<sup>2</sup></b>	<b>23.50</b>	9.10	7.90	2.90	3.60	1.0

<sup>1</sup> Cost applies to soybean acres only.

<sup>2</sup> Mowing costs are \$136.70 per hour

**Table 3. Summary of Harvesting Costs.**

<b>Combining<sup>1</sup></b>	
Corn	\$37.60 per acre
Soybean	\$32.70 per acre
<b>Grain Cart<sup>2</sup></b>	
Corn	\$14.20 per acre
Soybean	\$7.80 per acre
<b>Grain Hauling<sup>3</sup></b>	\$0.10 per bu.

<sup>1</sup> Based on a 470 HP combine used on 2,500 acres.

<sup>2</sup> Based on a \$57,500 grain cart used on 1,900 acres.

<sup>3</sup> Hauling costs from field to storage will vary depending on distance to storage, unloading time, and other factors.

**Table 4. Costs of Forage Operations.**

Operation	Total =	Tractor Overhead +	Implement Overhead +	Fuel & Lube +	Labor
<b>Cutting and conditioning hay</b>					
	----- \$ per acre -----				
Sickle bar mower	<b>23.30</b>	10.20	3.50	3.40	6.20
Rotary mower	<b>15.30</b>	5.40	4.80	1.80	3.30
Pull-type mower/conditioner	<b>19.20</b>	6.50	7.20	2.90	2.60
Self-propelled mower/conditioner	<b>29.10</b>	--	23.00	4.00	2.10
Rake (side delivery)	<b>9.40</b>	3.00	3.60	1.00	1.80
Rake (wheeled)	<b>6.50</b>	2.70	1.20	0.90	1.70
Tedder	<b>8.30</b>	3.30	1.90	1.10	2.00
<b>Baling hay</b>					
Small square baler	<b>30.50</b>	11.10	8.10	4.90	6.40
1,000 lb. square baler	<b>28.20</b>	6.40	16.40	3.00	2.40
Round baler	<b>27.80</b>	10.20	7.20	4.50	5.90
<b>Forage harvesting as silage</b>					
Pull-type forage harvester					
First cut hay	<b>34.10</b>	14.20	9.00	7.30	3.60
Remaining cuts	<b>27.90</b>	11.60	7.40	5.90	3.00
Corn silage	<b>105.10</b>	43.10	28.90	22.20	10.90
Self-propelled forage harvester					
First cut hay	<b>31.00</b>	--	16.20	12.30	2.50
Remaining cuts	<b>25.40</b>	--	13.20	10.10	2.10
Corn silage	<b>138.10</b>	--	117.40	17.10	3.60

From *Machinery Cost Estimates: Field Operations* and *Machinery Cost Estimates: Forage Field Operations* available on [farmdoc](http://farmdoc.illinois.edu) ([www.farmdoc.illinois.edu](http://www.farmdoc.illinois.edu)).



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# Custom Rates for Farm Services in Missouri

**T**he rates reported in this guide summarize a statewide survey conducted online and by solicitations of University of Missouri Extension specialists in the winter of 2019-2020. We asked farmers, agribusiness firms and land improvement contractors to provide the rates they were charging or paying in 2019 for custom services, excluding the cost of materials being applied. Thank you to those who provided information — even if it was just for one activity.

Fewer people respond to this survey every time it is taken — every three years. There may be fewer farmers using custom operators or fewer businesses conducting custom activities. But it is still a very popular Extension guide.

The number of responses to many questions asked was too low to have statistical confidence in the results. However, the results presented here have been compared to custom rates guides in Kansas and Iowa to see if our rates are in line with their rates. These results have also been compared to previous custom rates surveys to see if the direction and magnitude of changes seems reasonable.

Custom rates cover the cost of machinery, fuel, labor and, occasionally, a product such as lime or bale wrap. The USDA reports that machinery values and labor costs have increased by about 5 percent and 11 percent, respectively, since our last custom rate survey in 2016. Diesel prices have increased by 20 percent in the last three years. This increase in the costs of inputs into custom activities suggest that custom rates should have increased over the past several years.

There is no assurance that the average rates reported in this guide will cover your costs for performing the service or that you will be able to hire a custom operator in your area for the rates shown. *Calculate your own costs carefully before deciding the rate to charge or pay. Before entering into an agreement, discuss with the other party all the details of the specific job to be performed.*

## Explanation of the rates in this guide

Rates in this guide reflect each respondent's judgment of a "normal" job. Operators may add charges if they consider a job abnormal, such as distance from the operator's base location, the amount of product or labor involved, the difficulty of the terrain, or special requirements of the customer or location.

The "Number reporting" and "Range in rates" columns are important. The "Average rate" column indicates the average charge for all of the rates in that row. The "Mid" rate had an equal number of responses higher and lower.

As in past years, this guide reports the average rate, and the low, mid and high rates reported by those providing responses. When few responses are averaged, a single response can move the average a lot. Because of the low response rate and the undue influence a single response may have on the average, this year two new columns are reported for all custom activities: second lowest response and second highest response. By comparing the two lowest and the two highest responses, users can see if perhaps the extreme responses were not representative of the next closest responses. In this situation, the extremes may have unduly influenced the average reported. The lowest and highest responses also give the user an idea of how variable the rates charged for field activities might be.

Possible explanations of the wide ranges are the type or size of equipment used, the mix of labor and equipment used, or different income needs of full-time custom operators compared to local farmers supplementing their income.

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Revised by  
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**Table 1. Field work activities.**

Activity	Average rate	Range in rates					Number reporting
		Lowest	Second lowest	Mid	Second highest	Highest	
V-rip or subsoil plowing	\$23.63 / acre	\$18.00	\$18.00	\$21.00	\$30.00	\$35.00	8
Chisel plow	18.25 / acre	16.00		18.00		20.00	6
Heavy or offset disking	14.92 / acre	12.00		15.50		17.50	6
Tandem disk	14.79 / acre	10.00	10.00	15.00	20.00	20.00	14
Vertical tillage tool	16.60 / acre	10.00	12.00	16.50	20.00	25.00	10
Field cultivator	13.50 / acre	8.00	8.00	14.00	16.00	20.00	13
Cut brush (brush hog)	88.75 / hour	50.00	65.00	85.00	100.00	150.00	8
Mow pasture or CRP land	85.00 / hour	50.00	75.00	95.00	100.00	100.00	7
	21.25 / acre	14.00	16.00	21.00	25.00	30.00	8

**Table 2. Planting activities.**

Activity	Average rate	Range in rates					Number reporting
		Lowest	Second lowest	Mid	Second highest	Highest	
Conventional planting							
Corn or grain sorghum: <i>plant only</i>	\$17.65 / acre	\$10.00	\$10.00	\$18.00	\$22.00	\$35.00	24
Corn or grain sorghum: <i>plant and apply fertilizer or chemicals</i>	20.00 / acre	15.00		20.00		25.00	6
Soybean: <i>plant 15- or 30-inch rows</i>	18.00 / acre	10.00	10.00	18.00	22.00	35.00	17
Soybean: <i>drill 7- or 9-inch rows</i>	16.75 / acre	12.00	15.00	17.00	20.00	20.00	8
Small grains, grass or clover: <i>drill</i>	16.60 / acre	15.00	15.00	16.00	20.00	20.00	10
No-till planting							
Corn or grain sorghum: <i>plant only</i>	18.72 / acre	12.00	14.00	18.00	24.00	35.00	23
Corn or grain sorghum: <i>plant and apply fertilizer or chemicals</i>	21.33 / acre	15.00		20.00		30.00	6
Soybean: <i>plant 15- or 30-inch rows</i>	17.82 / acre	10.00	12.00	18.00	24.00	25.00	21
Soybean: <i>drill 7- or 9-inch rows</i>	17.78 / acre	14.00	15.00	18.00	20.00	22.00	9
Small grains, grass or clover: <i>drill</i>	16.75 / acre	15.00	16.00	16.00	20.00	20.00	8

**Table 3. Fertilizer and chemical application.**

Application	Average rate	Range in rates					Number reporting
		Lowest	Second lowest	Mid	Second highest	Highest	
Deliver and spread fertilizer (not including the cost of fertilizer)							
Dry fertilizer on cropland: <i>single spread</i>	\$6.18 / acre	\$4.00	\$4.00	\$6.00	\$8.00	\$10.00	15
Dry fertilizer on cropland: <i>double spread</i>	9.64 / acre	6.00	7.00	8.00	14.00	18.00	11
Dry fertilizer on cropland: <i>variable rate</i>	8.67 / acre	7.00		9.00		10.00	6
Dry fertilizer on pasture (topdressing)	6.31 / acre	4.00	5.00	6.00	7.00	10.00	12
Dry fertilizer plus seed	8.60 / acre	6.00	7.00	8.00	10.00	14.00	10
Spray liquid fertilizer	6.67 / acre	6.00		6.50		8.00	6
Spray liquid fertilizer and other chemicals	6.69 / acre	5.00	6.00	6.50	8.00	8.50	8
Inject anhydrous ammonia	14.39 / acre	10.00	12.00	15.00	15.00	20.00	9
Lime							
Deliver and spread: <i>including lime</i>	23.03 / acre	19.00	20.00	23.00	25.00	30.00	9
Spread only	8.00 / ton	5.00		6.00		16.00	6
Apply chemicals (not including the cost of chemicals)							
Spray with self-propelled crop sprayer	6.94 / acre	5.00	6.00	7.00	8.00	8.00	16

**Table 4. Harvesting and hauling activities.**

Activity	Average rate	Range in rates					Number reporting
		Lowest	Second lowest	Mid	Second highest	Highest	
Combining							
Corn	\$34.69 / acre	\$28.00	\$28.00	\$35.00	\$50.00	\$50.00	40
Soybean	33.62 / acre	25.00	25.00	34.00	45.00	48.00	41
Grain sorghum	34.13 / acre	30.00	30.00	33.50	39.00	40.00	8
Small grains	31.41 / acre	25.00	25.00	30.00	39.00	40.00	17
Making corn or grain sorghum silage							
Field chop only	8.50 / ton	7.00		8.00		10.00	6
Chop, haul and pile/fill bunker	10.96 / ton	8.75		10.00		15.00	6
Hauling grain or seed							
Field to farm storage with farm vehicle or wagon	0.14 / bushel	0.10	0.10	0.11	0.30	0.30	17
Bin to market with large grain truck over 20 miles	0.26 / bushel	0.15	0.20	0.25	0.30	0.45	9
	4.15 / loaded mile	3.00	3.45	4.13	5.00	5.00	8
Hauling livestock							
Hauling livestock long distance with gooseneck trailer or farm truck	3.61 / loaded mile	2.00	2.40	3.75	4.00	6.00	8

**Table 5. Harvesting and hauling hay.**

Activity	Average rate	Range in rates					Number reporting
		Lowest	Second lowest	Mid	Second highest	Highest	
Hay preparation							
Cutting hay with disk cutter or sickle bar	\$12.88 / acre	\$5.00	\$10.00	\$12.00	\$15.00	\$25.00	8
Cutting and conditioning	14.96 / acre	7.00	7.50	15.00	20.00	30.00	13
Raking hay	6.64 / acre	3.00	5.00	6.00	10.00	10.00	14
Hay tedding	7.14 / acre	3.00	4.00	8.00	10.00	10.00	7
Round baling only							
Small bales (750–1,000 lb.)	10.69 / bale	9.00	10.00	10.00	12.00	12.50	8
Medium bales (1,000–1,500 lb.)	13.29 / bale	9.00	10.00	14.00	15.00	18.00	7
Large bales (1,500+ lb.)	12.90 / bale	10.00		12.00		18.00	5
Cut, rake and bale							
Small bales (750–1,000 lb.)	21.29 / bale	18.00	18.00	20.00	25.00	25.00	7
Medium bales (1,000–1,500 lb.)	24.63 / bale	18.00	19.00	24.50	30.00	32.00	8
Cut, rake, bale and net wrap							
Small bales (750–1,000 lb.)	20.00 / bale	15.00	17.00	20.00	25.00	28.00	14
Medium bales (1,000–1,500 lb.)	20.58 / bale	16.00	16.00	20.00	24.00	25.00	12
Large bales (1,500+ lb.)	25.25 / bale	22.00		25.00		29.50	6
Bale and net wrap							
Small bales (750–1,000 lb.)	10.81 / bale	10.00	10.00	10.00	12.50	14.00	8
Medium bales (1,000–1,500 lb.)	13.13 / bale	9.00	10.00	13.00	14.00	20.00	8
Large bales (1,500+ lb.)	13.79 / bale	11.00	12.00	13.50	16.00	16.00	7
Other hay activities							
Small square baling only (50-100 lbs.)	0.97 / bale	0.75	0.75	0.90	1.10	1.50	7
Wrap individual round bale in plastic: <i>including plastic cost</i>	9.14 / bale	6.00	9.00	10.00	10.00	10.00	7
Move round bales on-farm or locally	4.29 / bale	2.50	2.50	5.00	5.00	5.00	7



**Table 6. Earth moving and heavy equipment jobs.**

Job	Average rate	Range in rates					Number reporting
		Lowest	Second lowest	Mid	Second highest	Highest	
By type of equipment used (including operator labor)							
Bulldozer: <i>under 100 hp</i>	\$106.43 / hour	\$90.00	\$90.00	\$100.00	\$115.00	\$150.00	7
Bulldozer: <i>100–150 hp</i>	133.21 / hour	100.00	100.00	127.50	175.00	175.00	14
Bulldozer: <i>over 150 hp</i>	158.16 / hour	125.00	130.00	150.00	225.00	225.00	19
Scraper: <i>under 10 cubic yard capacity</i>	126.67 / hour	95.00		127.50		175.00	6
Scraper: <i>10–15 cubic yard capacity</i>	142.50 / hour	100.00	125.00	145.00	165.00	180.00	12
Scraper: <i>over 15 cubic yard capacity</i>	198.00 / hour	80.00	150.00	182.50	300.00	300.00	10
Track-type loader: <i>100 hp or larger</i>	142.78 / hour	95.00	125.00	150.00	175.00	185.00	9
Track hoe/excavator: <i>mini (2–6 tons)</i>	103.67 / hour	75.00	85.00	100.00	130.00	135.00	15
Track hoe/excavator: <i>medium and large</i>	139.32 / hour	80.00	95.00	140.00	175.00	175.00	22
Back hoe	89.23 / hour	60.00	75.00	90.00	100.00	125.00	13
Skid loader	87.63 / hour	60.00	65.00	85.00	110.00	110.00	19
Tiling machine	0.96 / linear ft.	0.35	0.40	1.00	1.50	1.56	9
Trencher	1.61 / linear ft.	1.00	1.25	1.45	2.50	3.00	11
By job performed							
Building ponds and lakes	3.34 / cu. yd.	2.50	2.75	3.13	4.00	4.50	7
	154.50 / hour	125.00	125.00	147.50	200.00	225.00	14
Land leveling	155.00 / hour	125.00	125.00	150.00	200.00	225.00	15
Land clearing: <i>cut brush and trees; pile on site</i>	158.31 / hour	125.00	130.00	150.00	200.00	200.00	13
Land clearing: <i>remove brush, trees, stumps; pile on site</i>	163.20 / hour	130.00	130.00	150.00	200.00	225.00	15
Building terraces: <i>conventional gradient</i>	147.92 / hour	100.00	125.00	142.50	175.00	200.00	12
Building terraces: <i>parallel, cut and fill to grass outlets</i>	3.80 / linear ft.	2.98		3.75		5.00	6
	147.50 / hour	100.00	125.00	140.00	175.00	200.00	12
Building terraces: <i>parallel, with storage to tile outlets</i>	3.80 / linear ft.	2.95	3.00	4.00	4.30	5.00	7
	146.77 / hour	100.00	125.00	140.00	188.00	200.00	13
Building terraces: <i>diversion</i>	3.91 / linear ft.	3.00		4.00		5.00	5
	147.92 / hour	100.00	125.00	142.50	175.00	200.00	12
Building terraces: <i>grade and shape grass waterways</i>	142.50 / hour	90.00	100.00	140.00	175.00	200.00	14
Building terraces: <i>ditch construction</i>	144.09 / hour	90.00	115.00	145.00	175.00	175.00	11



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## A6. Missouri FBMA Farm Summary, 2019

<b>Crop Production and Marketing Summary</b> <b>2019 Missouri FBMA Farm Summary</b> <b>(Farms Sorted By Net Farm Income)</b>						
	<b>Avg. Of All Farms</b>	<b>Low 20%</b>	<b>20 - 40%</b>	<b>40 - 60%</b>	<b>60 - 80%</b>	<b>High 20%</b>
Number of farms	109	21	22	22	22	22
<b>Acreage Summary</b>						
Total acres owned	391	277	276	211	449	736
Total crop acres	795	646	431	501	851	1,539
Crop acres owned	219	189	164	72	207	459
Crop acres cash rented	313	314	168	295	335	454
Crop acres share rented	263	142	98	134	308	627
Total pasture acres	98	66	51	136	78	158
Percent crop acres owned	28 %	29 %	38 %	14 %	24 %	30 %
Mach invest/crop acre cost	464	549	339	434	325	552
Mach invest/crop acre market	510	626	457	475	351	577
<b>Average Price Received (Cash Sales Only)</b>						
Soybeans per bushel	8.63	8.44	8.08	8.54	8.38	9.08
Corn per bushel	3.76	3.69	3.86	3.80	3.55	3.84
Wheat, Winter per bushel	4.91	5.26	-	4.37	4.52	-
Hay, Mixed per ton	67.59	-	-	-	-	-
CRP per \$	1.00	-	-	-	-	-
Rented Out per \$	1.01	-	-	-	-	-
Prevented planting per unit	1.00	-	-	-	-	-
Hay per ton	74.03	-	-	-	-	-
<b>Average Yield Per Acre</b>						
Soybeans (bushel)	46.55	47.16	35.35	48.89	45.61	47.59
Corn (bushel)	141.28	139.74	125.17	140.08	143.72	141.74
Hay (ton)	2.70	-	-	2.48	-	-