More Than CAFOs and Corn

A Statistical Analysis of Agriculture in Six Midwestern States

MIDWEST AGRICULTURE SUMMARY TABLES

This supplement to the main report is meant to be a resource for policymakers and activists. It provides state-level tables that cover the economic situation of farmers, farmer demographics, and use of fertilizers and chemicals, among other data. The supplement also includes brief written summaries for each state. More detailed arguments and statistics, many also available at the state level, are available in the main report.

Readers should refer to the glossary in the main report for explanations of technical terms and concepts used in this supplement.

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JANUARY 2024

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ILLINOIS

The Illinois farm economy had the fifth most receipts of any state in 2022. This made it roughly tied with Nebraska and Minnesota.[1]

The state's farm economy is principally based on corn and soy, responsible for almost 85% of receipts, along with some hog production (7%) and cattle production (2%).[2] The state had only 354 certified organic farms out of around 71,000 farms in 2021.[3]

To analyze Illinois farms that operate as businesses, we need to exclude the large number of non-farm rural properties, hobby farms, and similar operations that USDA counts as farms.[4] We do this with two somewhat crude classifications: USDA's category of "farm business" and farms with at least $150,000 in gross cash farm income (GCFI). In Illinois, about 36,000 farms are farm businesses (51% of the total).[5] About 23,400 farms had at least $150,000 in GCFI (32% of the total) in the most recent census data.[6] Farm businesses received 95% of sales and farms with at least $150,000 in GCFI received 93% of sales.[7] Therefore, these classifications capture the vast majority of farm production.

Illinois farms that operate as businesses have a strong financial position. Moderate sales farms, with GCFI between $150,000 and $349,999, have a median household income of roughly $150,000. Midsize farms, with $350,000 to $999,999 in GCFI, have a median household income of roughly $300,000. These figures are much higher than the Illinois rural median of roughly $61,500 in 2018.[8] Farms with over $1 million in sales have even higher incomes.

1. Econ. Rsch. Serv., USDA, Farm Sector Financial Indicators, State Rankings, https://data.ers.usda.gov/reports.aspx?ID=17839 (last updated Aug. 21, 2023).
2. Econ. Rsch. Serv., USDA, State Fact Sheets: Illinois, https://data.ers.usda.gov/reports.aspx?StateFIPS=17&StateName=Illinois&ID=17854 (last updated Oct. 25, 2023).
3. Nat'l Agric. Stat. Serv., USDA, Certified Organic Survey: 2021 Summary tbl. 1 (2022), https://downloads.usda.library.cornell.edu/usda-esmis/files/zg64tk92g/2z10z137s/r207w0388/cenorg22.txt/; Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Balance Sheet, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 10, 2023).
4. For more detail on this concept, see "Lifestyle and Retirement Farms" and "Low and no sales farms" in the main report.
5. Calculated by the authors from the Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income, Illinois 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 10, 2023).
6. Calculated by the authors from 2017 Census of Agriculture, USDA, Typology tbl. 14, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Typology/typology_il.pdf (last visited Nov. 10, 2023).
7. Calculated by the authors from using Econ. Rsch. Serv., USDA, *supra* note 5; 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14.
8. Steven Ruggles et al., IPUMS ACS USA: Version 13.0, https://doi.org/10.18128/D010.V13.0 (2019).

Household incomes of selected farm businesses and rural households, Illinois

	Moderate sales farms			Midsize farms			All rural households
	Non-farm income	Farm income	Household income	Non-farm income	Farm income	Household income	Household income
Median	$57,529	$84,664	$149,124	$60,400	$230,191	$305,738	$61,500
Average	$58,029	$78,075	$136,104	$105,073	$226,795	$331,868	$77,295

Source: Econ. Rsch. Serv., USDA, ARMS Tailored Reports, 2021 Operator Household Income, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 10, 2023); Steven Ruggles et al., IPUMS ACS USA: Version 13.0, https://doi.org/10.18128/D010.V13.0 (2019).

Illinois farms pair these high incomes with substantial wealth. Moderate sales farms have a median household net worth of $1.4 million. Midsize farms have a median net worth of $2.8 million. Of course, larger farms have even higher net worths. For all farm sizes, the vast majority of farm household net worth comes from the farm, although their non-farm wealth is significant. (Note that net wealth accounts for debts.) Illinois farm net worth tends to be much larger than the median rural household net wealth (across all states) of $146,400.[9]

Wealth statistics for selected farm businesses in Illinois, 2021

	Moderate sales farms			Midsize farms		
	Non-farm net wealth	Farm net wealth	Total net wealth	Non-farm net wealth	Farm net wealth	Total net wealth
Median	$179,189	$1,067,067	$1,392,550	$395,996	$2,248,190	$2,839,626
Average	$410,184	$1,395,271	$1,805,455	$807,744	$3,273,090	$4,080,834

Source: Econ. Rsch. Serv., USDA, ARMS Tailored Reports, 2021 Operator Household Balance Sheet, Illinois 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 10, 2023).

Illinois farmers are almost all white. Over 99% of principal producers have a reported race of "white alone," not in combination with other races, in the latest census results.[10] This figure is almost identical for all producers.[11] The most common BIPOC reported races among principal producers were Native American, Black or African American, and Asian, ranging from about 130 to 270.[12] Less than 1% of principal producers and of all producers were Hispanic.[13] There were about 690 Hispanic principal producers the same year.[14]

9. Aditya Aladangady et al., *Changes in U.S. Family Finances from 2019 to 2022: Evidence from the Survey of Consumer Finances*, 103 Fed. Reserve Bull. 1, 12 tbl. 2 (2023).
10. Calculated by the authors from 2017 Census of Agriculture, USDA, State Level Data: Illinois tbl. 64, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Illinois/ (last visited Nov. 10, 2023). All race figures in this paragraph are for "alone or in combination with other races."
11. Calculated by the authors from *id.* at tbl. 63.
12. *Id.* at tbl. 64.
13. Calculated by the authors from *id.* at tbl. 60, 63, 64.
14. *Id.* at tbl. 60.

Reported race and ethnicity of farmers in Illinois, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Principal producers	127	218	271	686	93,315
All producers	197	267	332	934	115,605

Source: 2017 Census of Agriculture, USDA, supra note 10, at tbl. 60, 63, 64. Counts are for "alone or in combination with other races," except for white which is "white alone."

These counts are for every farmer on a farm enumerated by USDA, which includes rural properties and hobby farms. To get a more accurate picture of farmers who work on farms operated as businesses, we examine reported race and ethnicity by farm sales (see the table below). Over 70% of all non-white and of Hispanic farmers are on low sales farms, which we take as an approximation of farms that do not operate as businesses. If we consider what USDA calls commercial family farms, those with sales of at least $350,000, then we find 115 non-white commercial farmers, 192 Hispanic commercial farmers, and 31,639 white commercial farmers.[15]

Race and ethnicity of producers by farm sales category in Illinois, 2017

	Asian	African American	Native American	Multi-race	Hispanic or Latino	White
Low Sales	75.8%	81.2%	88.9%	75.2%	71.8%	65.8%
Moderate Sales	6.2%	1.7%	4.6%	10.2%	7.8%	11.0%
Midsize	6.2%	0.9%	5.6%	5.8%	7.8%	10.8%
Large	5.6%	4.4%	0.9%	3.7%	4.4%	5.3%
Very large	0.0%	0.0%	0.0%	0.0%	0.5%	0.3%
Nonfamily	6.2%	11.8%	0.0%	5.1%	7.6%	6.8%

Source: Calculated by the authors from 2017 Census of Agriculture, USDA, supra note 6, at tbl. 14.

Farms that operate as businesses in Illinois tend to bring in significant incomes. Moderate sales farms bring in about $85,000 in net income, while larger farms bring in much higher amounts. As mentioned earlier, farms with moderate sales or more are responsible for almost all sales in Illinois. Low sales farms, a large proportion of which are likely hobby farms or non-farm rural properties, bring in an average of just over $6,000 in net income. This is indicative of these farms' low production. (For more details on low sales farms, see "Low and no sales farms" in the main report.)

15. Calculated by the authors from *id.* at Typology tbl. 14; Econ. Rsch. Serv., USDA, Farm Household Well-being Glossary, https://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/glossary/ (last updated Aug. 31, 2023) (defining commercial farms). Note that USDA includes nonfamily farms but we look only at commercial family farms here.

Net cash farm income by farm size in Illinois, 2017

Farm type	Net cash farm income		
	Total (in thousands)	Per farm	Share
Low sales	$310,034	$6,292	6.1%
Moderate sales	$697,406	$84,822	13.8%
Midsize	$1,577,737	$202,898	31.3%
Large	$1,706,250	$539,270	33.8%
Very large	$224,378	$1,854,364	4.4%
Nonfamily	$527,497	$128,815	10.5%
Total	**$5,043,302**	**$69,418**	**100.0%**

Source: 2017 Census of Agriculture, USDA, supra note 6, at tbl. 14.

Most Illinois farmers receive support from government programs.[16] Among farms that received government payments, the average government payment was about $19,600 in 2021.[17] The average net cash farm income among participants was $156,200, as opposed to $51,000 for non-participants.[18] Farms with low sales actually received around a quarter of all payments, the vast majority of which came from conservation programs in 2017.[19] Farms with at moderate sales received about 75% of all payments that year.[20] Furthermore, these farms had over 90% of all acreage enrolled in crop insurance, almost all of which is subsidized by the federal government.[21] Larger farms also capture disproportionate shares of Commodity Credit Corporation (CCC) loans. CCC loans are subsidized loans that provide farmers with money in the period between harvest and sale, thereby helping them hold their products and wait for better prices.[22] For more details on other public benefits that farms receive, see the end of "Farmer Economic Conditions" in the main report.

16. Econ. Rsch. Serv., USDA, ARMS Data Analysis, Government Payments, Farm Payment Status, Illinois 2021 https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 10, 2023).
17. *Id.*
18. *Id.*
19. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Total Government Payments by Types, Illinois 2017 https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 10, 2023).
20. 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14.
21. Stephanie Rosch, Cong. Rsch. serv., r46686, Federal Crop Insurance: A Primer 2 (2021). Note that 90% of corn and soy are insured through the federal crop insurance program.
22. *See* Farm Serv. Agency, USDA, *Commodity Loans*, https://www.fsa.usda.gov/programs-and-services/price-support/commodity-loans/index (last visited Nov. 10, 2023).

Selected government supports by farm size in Illinois, 2017

Farm type	Government payments				Land enrolled in crop insurance		Commodity Credit Corporation Loans	
	Total ($1,000)	Share farms with payments	Per farm with payments	Share of total	Total acres	Share of land in crop insurance	Total loans ($1,000)	Share of total
Low sales	$141,972	57.2%	$5,033	27.2%	1,591,628	8.0%	2,991	2.6%
Moderate sales	$73,016	85.6%	$10,379	14.0%	2,829,542	14.2%	7,875	6.8%
Midsize	$128,014	91.6%	$17,980	24.6%	6,696,208	33.7%	34,040	29.6%
Large	$123,892	93.3%	$41,983	23.8%	6,337,480	31.9%	48,669	42.3%
Very large	$8,807	76.0%	$95,728	1.7%	602,613	3.0%	8,861	7.7%
Nonfamily	$45,528	77.8%	$14,299	8.7%	1,831,583	9.2%	12,570	10.9%
Total	**$521,229**	**66.9%**	**$10,727**	**100.0%**	**19,889,054**	**100.0%**	**115,006**	**100.0%**

Note: Government payments does not include crop insurance payments or CCC proceeds.

Source: 2017 Census of Agriculture, USDA, supra note 6, at tbl. 14.

BIPOC farmers do not share equally in farm income or government payments. Only Asian farmers have sales proportionate to their share of farms, while all other BIPOC farmers have less.[23] This is likely because BIPOC farmers tend to operate smaller farms than white farmers.[24] All BIPOC farmers also receive a lower share of government payments than their share of Illinois farms, except Black farmers who receive roughly a proportional share.[25] These farmers likely receive low shares because they tend to operate smaller farms, which receive proportionately lower government subsidies, and possibly because of discrimination by USDA officials.[26]

23. *Id.*
24. 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14.
25. 2017 Census of Agriculture, USDA, *supra* note 10, at tbl. 62.
26. 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14. For a brief discussion of discrimination, see Alyssa R. Casey, Cong. Rsch. Serv., R46969, Racial Equity in U.S. Farming: Background in Brief 8 (2021).

Farm revenue statistics by reported race and ethnicity of principal operator in Illinois, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Farms	119	175	257	641	72,399
Share farms	0.2%	0.2%	0.4%	0.9%	99.7%
Sales ($1,000)	$27,238	$20,630	$24,344	$123,243	$16,961,065
Share sales	0.2%	0.1%	0.1%	0.7%	99.7%
Government payments ($1,000)	$595	$839	$1,159	$3,743	$520,089
Share payments	0.1%	0.2%	0.2%	0.7%	99.8%
CCC loans ($1,000)	Not reported	$0	$728	$2,708	$113,945
Share CCC loans	N/A	0.0%	0.6%	2.4%	99.1%

Note: The sum of shares in a row may not add to 100% because the reported races and ethnicities are not mutually exclusive. The same person can report multiple races and can report they are Hispanic or Latino. Note: Reported race is for "alone or in combination with other races," except white, which is white alone.

Source: 2017 Census of Agriculture, USDA, supra note 10, at tbl. 1, 6, 59, 62.

Beginning farmers are more likely to operate lower GCFI farms than more experienced farmers (see the first table below).[27] This is probably because they are getting started in the industry and need time to acquire more re Sources. An analysis of government subsidies (in the second table below) shows beginning farmers receive lower shares of conservation payments, other federal payments, and CCC loans than their share of Illinois farmers.[28] This is likely because they tend to operate smaller farms.[29] Future researchers may want to investigate why beginning farmers operate nonfamily farms at such a high rate in Illinois.[30]

Comparison of beginning and non-beginning farmers by GCFI categories in Illinois, 2017

	Beginning farmers		Not beginning farmers	
	Count	Share	Count	Share
Moderate sales	1,988	31.3%	10,803	32.4%
Midsize	1,522	24.0%	11,021	33.1%
Large	707	11.1%	5,406	16.2%
Very large	32	0.5%	274	0.8%
Nonfamily	2,095	33.0%	5,838	17.5%

Source: 2017 Census of Agriculture, USDA, supra note 6, at tbl. 14.

27. 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14.
28. Denominators for shares are taken from 2017 Census of Agriculture, USDA, *supra* note 10, at tbl. 6. See 2017 Census of Agriculture, USDA, *supra* note 10, at tbl. 69 for amounts for beginning farmers.
29. 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14.
30. *Id.*

Selected government subsidies received by beginning farmers in Illinois, 2017

		Farms	Conservation payments	Other government payments	CCC loans
Beginning farmers	Amount ($1,000)	15,947	$25,660	$43,685	$13,162
	Share across all farms	22.0%	17.8%	11.6%	11.4%

Note: Beginning farmer statistics are for farms where "any principal producer is a new and beginning farmer."

Source: The authors calculated amounts for beginning farmers (any principal producer is a beginning farmer) using 2017 Census of Agriculture, USDA, supra note 10, at tbl. 69. Authors calculated denominators using id. at tbl. 6.

The available data suggest that the largest farms tend to use the most fertilizers and chemicals (insecticides, herbicides, etc.). Among farms with at least $50,000 in fertilizer expenditures, almost 75% have at least $500,000 in sales and government payments combined.[31] Furthermore, among farms that use fertilizer with at least $500,000 in sales, around 80% spend at least $50,000 on fertilizer.[32] This means there is likely substantial overlap between heavy fertilizer users and farms with high revenues. Since farmers with more sales receive disproportionate government support, heavy fertilizer users likely receive disproportionate government support.[33] Fertilizer use is also very concentrated: about a fifth of farms with fertilizer expenses spend at least $50,000 on fertilizer, accounting for around 80% of all fertilizer expenditures.[34] As the table below shows, larger farms use disproportionate shares of fertilizers and chemicals.

Fertilizer and chemical use by farm size in Illinois, 2017

	Farms		Acres treated with commercial fertilizer		Acres treated with insecticides		Acres treated with herbicides	
	Number	Share	Acres	Share	Acres	Share	Acres	Share
Moderate sales	8,222	35.2%	2,717,382	16.4%	1,122,225	14.0%	3,112,465	15.8%
Midsize	7,776	33.3%	6,004,177	36.3%	2,602,768	32.6%	7,013,922	35.6%
Large	3,164	13.5%	5,553,552	33.6%	3,002,920	37.6%	6,870,275	34.8%
Very large	121	0.5%	562,981	3.4%	340,721	4.3%	737,436	3.7%
Nonfamily	4,095	17.5%	1,684,079	10.2%	923,453	11.6%	1,989,087	10.1%

Source: 2017 Census of Agriculture, USDA, supra note 6, at tbl. 14.

31. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 10, at tbl. 73.
32. Calculated by the authors from *id.*
33. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14.
34. 2017 Census of Agriculture, USDA, *supra* note 10, at tbl. 4.

The story is similar for chemical expenditures. Among farms with at least $50,000 in chemical expenditures, about 60% have at least $500,000 in sales and government payments combined.[35] Among farms that use chemicals with at least $500,000 in sales and government payments, around 65% spend at least $50,000 on chemicals.[36] This means there is also likely substantial overlap between heavy chemical users and farms with high revenues. Chemical use is concentrated: a little less than a fifth of farms with chemical expenses spend at least $50,000 on chemicals and account for a little less than 70% of all chemical expenditures.[37]

USDA provides limited data on the practices of farmers by race and beginning status, so we cannot provide statistics on fertilizer and chemical use. However, the department does provide some data on organic practices, direct sales, no till, and use of cover crops. BIPOC farmers are slightly more likely than white farmers to farm organically, although these results should be taken with caution because the department's estimates of BIPOC farmers tend to have high statistical errors.[38] BIPOC farmers are more likely to sell direct to consumers than white farmers, likely because they tend to operate smaller farms than white farmers, and smaller farms are more likely to have direct to consumer sales.[39] BIPOC farmers practice no-till at about the same rate as white farmers, although Asian and Native American farmers practice it somewhat less.[40] All BIPOC farmers, except Black farmers, are more likely to use cover crops.[41]

Practices on farms with producers by reported race and ethnicity in Illinois, 2017

	Farm organically	Farm sells direct to consumers	Farm uses no till	Farm uses cover crops
Asian	1%	14%	25%	15%
Black	2%	16%	33%	5%
Native American	0%	11%	25%	12%
Hispanic or Latino	1%	9%	29%	10%
White	< 0.5%	4%	30%	8%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 38.

35. Calculated by the authors from using 2017 Census of Agriculture, USDA, *supra* note 10, at tbl. 73.
36. Calculated by the authors from to get the count for the $100,000 or less category using *id.*
37. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 10, at tbl. 4.
38. Nat'l Agric. Stat. Serv., USDA, Census of Agriculture, 2017 Race, Ethnicity and Gender Profiles – Illinois, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Race,_Ethnicity_and_Gender_Profiles/Illinois/ (last updated Mar. 8, 2019). USDA's figures are estimates subject to statistical error. To see that non-white farmers have higher error rates than white farmers, see Econ. Rsch. Serv., USDA, 2017 Census of Agriculture, Appendix A 19, tbl. A (last visited Nov. 10, 2023).
39. Nat'l Agric. Stat. Serv., USDA, *supra* note 38. Authors calculated BIPOC farmers operate smaller farms and smaller farms more likely to sell direct to consumers using 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14.
40. Nat'l Agric. Stat. Serv., USDA, *supra* note 38.
41. *Id.*

We have less data for beginning farmers, but we do find that 0.7% of beginning farmers operate organic farms as compared with 0.4% of more experienced farmers.[42] These estimates should also be taken with caution.

Since organic farms, organic production, and organic fertilizer use are all rare, at least as of the last census, and fertilizer and chemical use are so widespread, we must conclude Illinois farmers are using dangerous conventional methods on a widespread basis.[43] As discussed in the main report, overapplication of fertilizers and herbicides pollute waterways, harm animals, and pose a serious health risk to humans. Illinois hog producers, who farm the state's top animal product, are very concentrated.[44] Concentrated hog production is associated with greenhouse gas emissions, and water and air pollution.[45]

42. Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, Characteristics of All Farms and Farms with Organic Sales tbl. 14 (2019). We count any certified organic farm or non-certified farm with organic sales as organic.
43. Authors calculated few organic farms or production (sales) by comparing 2017 Census of Agriculture, USDA, *supra* note 10, at tbl. 51, tbl. 1. Authors calculated little organic fertilizer from *id.* at tbl. 46. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14 (the vast majority of farms with at least moderate sales use chemicals and fertilizers).
44. 2017 Census of Agriculture, USDA, *supra* note 6, at tbl. 14.
45. Peter H. Lehner & Nathan A. Rosenberg, Farming for our Future: The Science, Law, and Policy of Climate-Neutral Agriculture 42 (2022).

INDIANA

The Indiana farm economy had the ninth most receipts of any state in 2022. This made it roughly tied with North Carolina and Wisconsin.[46]

The state's farm economy is principally based on corn and soy, responsible for around 60% of receipts. The other principal products are chicken eggs (10%), hogs (9%), dairy products (6%), and turkeys (5%).[47] These products are all associated with conventional production and, the animal products, with CAFOs. The state had 697 certified organic farms out of around 55,000 farms in 2021.[48]

To analyze Indiana farms that operate as businesses, we need to exclude the large number of non-farm rural properties, hobby farms, and similar operations that USDA counts as farms.[49] We do this with two somewhat crude classifications: USDA's category of "farm business" and farms with at least $150,000 in gross cash farm income (GCFI). In Indiana, about 27,200 farms are farm businesses (49% of the total).[50] About 13,100 farms had at least $150,000 in GCFI (23% of the total) in the most recent census data.[51] Farm businesses received 94% of sales and farms with at least $150,000 in GCFI received 90% of sales.[52] Therefore, these classifications capture the vast majority of farm production.

Indiana farms that operate as businesses have a strong financial position. Moderate sales farms, with GCFI between $150,000 and $349,999, have a median household income of roughly $118,000. Midsize farms, with $350,000 to $999,999 in GCFI, have a median household income of roughly $183,000. These figures are much higher than the Indiana rural median of roughly $63,600 in 2018.[53] Farms with over $1 million in sales have even higher incomes.

46. Econ. Rsch. Serv., USDA, *supra* note 1.
47. Econ. Rsch. Serv., USDA, Cash Receipts by State, https://data.ers.usda.gov/reports.aspx?ID=17843#P8220968e88894c71b132341abe4da2ac_2_17iT0R0x14 (last updated Aug. 31, 2023).
48. Nat'l Agric. Stat. Serv., USDA, *supra* note 3, at tbl. 1; Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement, 2021 Indiana, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 12, 2023).
49. For more detail on this concept, see "Lifestyle and Retirement Farms" and "Low and no sales farms" in the main report.
50. Calculated by the authors from Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement, 2021 Indiana, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 12, 2023).
51. Calculated by the authors from the 2017 Census of Agriculture, USDA, Summary by Farm Typology Measured by Gross Cash Farm Income (GCFI) of Family Farm Producers and Non-Family Farms-Indiana 2017, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Typology/typology_in.pdf (last visited Nov. 13, 2023).
52. Authors calculated 94% by multiplying farms and the sum of average livestock income and crop sales, for all farms and for farm businesses from Econ. Rsch. Serv., USDA, supra note 50, then dividing the farm business sum by the all-farm sum. Authors calculated "[f]arms with at least $150,000 in GCFI receiving stated share of sales" using 2017 Census of Agriculture, *supra* note 51, at tbl. 15.
53. Ruggles et al., *supra* note 8.

Household incomes of selected farm businesses and rural households, Indiana

	Moderate sales farms			Midsize farms			All rural households
	Non-farm income	Farm income	Household income	Non-farm income	Farm income	Household income	Household income
Median	$58,807	$59,801	$117,507	$57,400	$113,789	$182,735	$63,600
Average	$66,477	$64,229	$130,706	$66,185	$144,309	$210,494	$76,115

Source: Econ. Rsch. Serv., USDA, ARMS, Tailored Reports, Operator Household Income, 2021 Indiana, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 12, 2023); Steven Ruggles et al., IPUMS ACS USA: Version 13.0, **https://doi.org/10.18128/D010.V13.0 (**2019) (for non-metro household income, excluding missing household income values for Indiana).

Indiana farms pair these high incomes with substantial wealth. Moderate sales farms have a median household net worth of $2.2 million. Midsize farms have a median net worth of $2.7 million. Of course, larger farms have even higher net worths. For all farm sizes, the vast majority of farm household net worth comes from the farm, although their non-farm wealth is significant. (Note that net wealth accounts for debts.) Indiana farm net worth tends to be much larger than the median rural household net wealth (across all states) of $146,400.[54]

Wealth statistics for selected farm businesses in Indiana, 2021

	Moderate sales farms			Midsize farms		
	Non-farm net wealth	Farm net wealth	Total net wealth	Non-farm net wealth	Farm net wealth	Total net wealth
Median	$383,750	$1,737,087	$2,230,034	$609,000	$2,056,604	$2,682,312
Average	$572,952	$2,018,919	$2,591,871	$762,260	$2,438,359	$3,200,619

Source: Econ. Rsch. Serv., USDA, ARMS, Tailored Reports, Operator Household Income, 2021 Indiana, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 12, 2023)

Indiana farmers are almost all white. Over 99% of principal producers have a reported race of "white alone," not in combination with other races, in the latest census results.[55] This figure is almost identical for all producers.[56] The most common non-white reported races among principal producers were Native American, Black or African American, and Asian, ranging from about 90 to 280.[57] Less than 1% of principal producers and of all producers were Hispanic.[58] There were about 620 Hispanic principal producers the same year.[59]

54. Aladangady et al., *supra* note 9, at 12 tbl. 2 (2023).
55. Calculated by the authors from 2017 Census of Agriculture, USDA, State Level Data: Indiana at tbl. 64. All race figures in this paragraph are for "alone or in combination with other races."
56. Calculated by the authors from using *id.* at tbl. 63.
57. *Id.* at tbl. 64.
58. Calculated by the authors from using *id.* at tbl. 60, 63, 64.
59. *Id.* at tbl. 60.

Reported race and ethnicity of farmers in Indiana, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Principal producers	91	165	277	618	74,297
All producers	127	186	325	753	93,702

Source: 2017 Census of Agriculture, supra note 55, at tbl. 60, 63, 64. Counts are for "alone or in combination with other races," except for white which is "white alone."

These counts are for every farmer on a farm enumerated by USDA, which includes rural properties and hobby farms. To get a more accurate picture of farmers who work on farms operated as businesses, we examine reported race and ethnicity by farm sales (see the table below). Over 80% of all non-white and of Hispanic farmers are on low sales farms, which we take as an approximation of farms that do not operate as businesses. If we consider what USDA calls commercial family farms, those with sales of at least $350,000, then we find 35 non-white commercial farmers, 125 Hispanic commercial farmers, and 18,542 white commercial farmers.[60]

Race and ethnicity of producers by farm sales category in Indiana, 2017

	Asian	African American	Native American	Multi-race	Hispanic or Latino	White
Low Sales	92.2%	91.8%	92.4%	89.3%	80.1%	74.7%
Moderate Sales	2.9%	2.5%	1.5%	2.3%	8.4%	8.1%
Midsize	2.9%	0.7%	0.0%	1.9%	5.8%	7.4%
Large	0.0%	1.5%	3.1%	1.5%	2.3%	4.0%
Very large	0.0%	0.0%	0.0%	1.1%	0.1%	0.2%
Nonfamily	2.0%	4.5%	3.1%	3.8%	3.3%	5.5%

Source: Calculated by the authors from 2017 Census of Agriculture, USDA, supra note 51, at tbl. 15.

Farms that operate as businesses in Indiana tend to bring in significant incomes. Moderate sales farms bring in about $89,000 in net income, while larger farms bring in much higher amounts. As mentioned earlier, farms with moderate sales or more are responsible for almost all sales in Indiana. Low sales farms, a large proportion of which are likely hobby farms or non-farm rural properties, bring in an average of just over $4,000 in net income. This is indicative of these farms' low production. (For more details on low sales farms, see "Low and no sales farms" in the main report.)

60. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 51, at tbl. 15. *See* Econ. Rsch. Serv., USDA, *supra* note 15 for a definition of commercial farms. Note that USDA includes nonfamily farms but we look only at commercial family farms here.

Net cash farm income by farm size in Indiana, 2017

Farm type	Net cash farm income		
	Total (in thousands)	Per farm	Share
Low sales	$187,104	$4,300	6.6%
Moderate sales	$417,233	$89,038	14.7%
Midsize	$790,782	$200,299	27.8%
Large	$913,218	$497,938	32.1%
Very large	$201,586	$2,167,519	7.1%
Nonfamily	$332,206	$129,112	11.7%
Total	$2,842,129	$50,171	100.0%

Source: 2017 Census of Agriculture, supra note 51, at tbl. 15.

Just under half (48%) of Indiana farmers receive support from government programs.[61] Among farms that received government payments, the average government payment was about $15,000 in 2021.[62] The average net cash farm income among participants was $84,500, as opposed to $21,600 for non-participants.[63] Farms with low sales actually receive a little less than 20% of all payments, the vast majority of which came from conservation programs in 2017.[64] Farms with at least moderate sales received about 82% of all payments that year.[65] Furthermore, these farms had over 90% of all acreage enrolled in crop insurance, almost all of which is subsidized by the federal government.[66] Larger farms also capture disproportionate shares of Commodity Credit Corporation (CCC) loans. CCC loans are subsidized loans that provide farmers with money in the period between harvest and sale, thereby helping them hold their products and wait for better prices.[67] For more details on other public benefits that farms receive, see the end of "Farmer Economic Conditions" in the main report.

61. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Farm Payment Status, Indiana 2021 https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 12, 2023).
62. *Id.*
63. *Id.*
64. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Total Government Payments by Type, Indiana with Typology: Low Sales Farms 2017, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 12, 2023).
65. 2017 Census of Agriculture, *supra* note 51, at tbl. 15.
66. Rosch, supra note 21, at 2. Note that 90% of corn and soy are insured through the federal crop insurance program.
67. *See* Farm Serv. Agency, USDA, *supra* note 22.

Selected government supports by farm size in Indiana, 2017

Farm type	Government payments				Land enrolled in crop insurance		Commodity Credit Corporation Loans	
	Total ($1,000)	Share farms with payments	Per farm with payments	Share of total	Total acres	Share of land in crop insurance	Total loans ($1,000)	Share of total
Low sales	$61,326	37.9%	$3,715	17.9%	711,344	7.2%	1,777	0.8%
Moderate sales	$38,850	79.6%	$10,418	11.3%	1,229,734	12.5%	8.505	3.7%
Midsize	$811,565	87.8%	$23,533	23.8%	2,842,581	28.9%	40,665	17.9%
Large	$115,785	92.1%	$68,512	33.8%	3,650,262	37.1%	114,279	50.2%
Very large	$7,265	61.3%	$127,456	2.1%	249,513	2.5%%	8,233	3.6%
Nonfamily	$38,124	66.4%	$22,321	11.1%	1,167,820	11.9%	54,214	23.8*
Total	**$342,915**	**47.9%**	**$12,628**	**100.0%**	**9,851,254**	**100.0%**	**227,673**	**100.0%**

Note: Government payments does not include crop insurance payments or CCC proceeds.

Source: 2017 Census of Agriculture, supra note 51, at tbl. 15.

BIPOC farmers do not share equally in farm income or government payments. Only Hispanic farmers have sales proportionate to their share of farms, while all other non-white farmers have less.[68] This is likely because BIPOC farmers tend to operate smaller farms than white farmers.[69] All BIPOC farmers also receive a lower share of government payments than their share of Indiana farms, except Hispanic farmers, who receive a proportionate amount.[70] This is likely due to BIPOC farmers tending to operate smaller farms, which receive proportionately lower government subsidies, and possibly because of discrimination by USDA officials.[71]

68. *Id.*
69. 2017 Census of Agriculture, *supra* note 51, at tbl. 15
70. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 55, at tbl. 62.
71. "Smaller farms" from 2017 Census of Agriculture, *supra* note 51, at tbl. 15. For a brief discussion of discrimination, see Casey, *supra* note 26, at 8.

Farm revenue statistics by reported race and ethnicity of principal operator in Indiana, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Farms	82	135	258	641	56,346
Share farms	0.1%	0.2%	0.5%	1.1%	99.5%
Sales ($1,000)	$2,748	$11,271	$19,554	$126,987	$11,043,039
Share sales	< 0.0%	0.1%	0.2%	1.1%	99.4%
Government payments ($1,000)	$114	$212	$1,018	$3,743	$342,133
Share payments	< 0.1%	< 0.1%	0.3%	1.1%	99.8%
CCC loans ($1,000)	$0	$0	Not reported	$2,708	$227,674
Share CCC loans	0.0%	0.0%	N/A	1.2%	100.0%

Note: The sum of shares in a row may not add to 100% because the reported races and ethnicities are not mutually exclusive. The same person can report multiple races and can report they are Hispanic or Latino. Reported race is for "alone or in combination with other races," except white, which is white alone.

Source: Farms and government payments from 2017 Census of Agriculture, supra note 55, at tbl. 1, 6, 59, 62.

Beginning farmers are more likely to operate lower GCFI farms than more experienced farmers (see the first table below).[72] This is probably because they are getting started in the industry and need time to acquire more re Sources. An analysis of government subsidies (in the second table below) shows beginning farmers receive lower shares of conservation payments, other federal payments, and CCC loans than their share of Indiana farmers.[73] This is likely because they tend to operate smaller farms.[74] Future researchers may want to investigate why beginning farmers operate nonfamily farms at such a high rate in Indiana.[75]

Comparison of beginning and non-beginning farmers by GCFI categories in Indiana, 2017

	Beginning farmers		Not beginning farmers	
	Count	Share	Count	Share
Moderate sales	1,268	32.9%	6,379	32.1%
Midsize	867	22.5%	6,079	30.6%
Large	429	11.1%	3,340	16.8%
Very large	34	0.9%	184	0.9%
Nonfamily	1,254	32.6%	3,899	19.6%

Source: 2017 Census of Agriculture, supra note 51, at tbl. 15.

72. 2017 Census of Agriculture, *supra* note 51, at tbl. 15.
73. 2017 Census of Agriculture, USDA, *supra* note 55 at tbl. 6, 69.
74. 2017 Census of Agriculture, *supra* note 51, at tbl. 15.
75. *Id.*

Selected government subsidies received by beginning farmers in Indiana, 2017

		Farms	Conservation payments	Other government payments	CCC loans
Beginning farmers	Amount ($1,000)	12,999	$5,246	$32,844	$32,634
	Share across all farms	22.9%	15.2%	10.7%	14.3%

Note: Beginning farmer statistics are for farms where "any principal producer is a new and beginning farmer."

Source: 2017 Census of Agriculture, supra note 55, at tbl. 6, 69.

The available data suggest that the largest farms tend to use the most fertilizers and chemicals (insecticides, herbicides, etc.). Among farms with at least $50,000 in fertilizer expenditures, almost 75% have at least $500,000 in sales and government payments combined.[76] Furthermore, among farms that use fertilizer with at least $500,000 in sales, around 75% spend at least $50,000 on fertilizer.[77] This means that almost all the heavy fertilizer users have very high revenues and almost all the farms with very high revenues are heavy fertilizer users.

Since farmers with more sales receive disproportionate government support, heavy fertilizer users likely receive disproportionate government support.[78] Fertilizer use is also very concentrated: about a seventh of farms with fertilizer expenses spend at least $50,000 on fertilizer, accounting for almost 80% of all fertilizer expenditures.[79] As the table below shows, larger farms use disproportionate shares of fertilizers and chemicals.

Fertilizer and chemical use by farm size in Indiana, 2017

	Farms		Acres treated with commercial fertilizer		Acres treated with insecticides		Acres treated with herbicides	
	Number	Share	Acres	Share	Acres	Share	Acres	Share
Moderate sales	4,686	35.7%	1,355,536	15.4%	439,387	11.3%	1,505,092	14.6%
Midsize	3,948	30.1%	2,825,957	32.1%	1,106,674	28.5%	3,210,727	31.1%
Large	1,834	14.0%	3,284,515	37.4%	1,669,786	43.0%	4,033,666	39.1%
Very large	93	0.7%	205,400	2.3%	162,743	4.2%	266,164	2.6%
Nonfamily	2,573	19.6%	1,119,230	12.7%	505,685	13.0%	1,292,448	12.5%

Source: 2017 Census of Agriculture, supra note 51, at tbl. 15.

76. Calculated by the authors from 2017 Census of Agriculture, *supra* note 55, at tbl. 73.
77. Calculated by the authors from *id.*
78. Calculated by the authors from 2017 Census of Agriculture, *supra* note 51, at tbl. 15.
79. Calculated by the authors from 2017 Census of Agriculture, *supra* note 55, at tbl. 4.

The story is similar for chemical expenditures. Among farms with at least $50,000 in chemical expenditures, about 85% have at least $500,000 in sales and government payments combined.[80] Furthermore, among farms that use chemicals with at least $500,000 in sales and government payments, about 60% spend at least $50,000 on chemicals.[81] Similar to heavy fertilizer users, there appears to be substantial overlap between farms with high revenues and heavy chemical users. Chemical use is concentrated: around a tenth of farms with chemical expenses spend at least $50,000 on chemicals and account for a little less than 70% of all chemical expenditures.[82]

USDA provides limited data on the practices of farmers by race and beginning status, so we cannot provide statistics on fertilizer and chemical use. However, the department does provide some data on organic practices, direct sales, no till, and use of cover crops. Asian farmers are more likely than white farmers to farm organically, although these results should be taken with caution because the department's estimates of BIPOC farmers tend to have high statistical errors.[83] Most groups of BIPOC farmers are more likely to sell direct to consumers than white farmers, likely because they tend to operate smaller farms than white farmers, and smaller farms are more likely to have direct to consumer sales.[84] Asian farmers are especially likely to have direct sales, with a fifth of these farmers having direct sales. Hispanic and white farmers practice no-till at about the same rate, with lower rates for other BIPOC groups.[85] White and BIPOC farmers use cover crops at about the same rate, though Black farmers have a lower rate.[86]

Practices on farms with producers by reported race and ethnicity in Indiana, 2017

	Farm organically	Farm sells direct to consumers	Farm uses no till	Farm uses cover crops
Asian	4%	20%	15%	13%
Black	0%	11%	17%	6%
Native American	0%	6%	16%	10%
Hispanic or Latino	1%	11%	27%	9%
White	1%	6%	28%	10%

Source: Nat'l Agric. Stat. Serv., supra note 83.

80. Calculated by the authors from *id.* at tbl. 73.
81. Calculated by the authors from *id.*
82. Calculated by the authors from *id.* tbl. 4.
83. Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, Race, Ethnicity, and Gender Profiles for Indiana, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Race,_Ethnicity_and_Gender_Profiles/Indiana/cpd18000.pdf (last visited Nov. 12, 2023). USDA's 2017 Census of Agriculture figures are estimates subject to statistical error. To see that non-white farmers have higher error rates than white farmers, see Econ. Rsch. Serv., USDA, 2017 Census of Agriculture, Appendix A 19, tbl. A.
84. Nat'l Agric. Stat. Serv., *supra* note 83. Operate smaller farms and smaller farms more likely to sell direct to consumers are both from Calculated by the authors from 2017 Census of Agriculture, *supra* note 51, at tbl. 15.
85. Nat'l Agric. Stat. Serv., *supra* note 83.
86. Nat'l Agric. Stat. Serv., *supra* note 83.

We have less data for beginning farmers, but we do find that 1.6% of beginning farmers operate organic farms as compared with 1.0% of more experienced farmers.87 These estimates are also likely subject to high errors, so should be taken with caution.

Since organic farms, organic production, and organic fertilizer use are all rare, at least as of the last census, and fertilizer and chemical use are so widespread, we must conclude Indiana farmers are using dangerous conventional methods on a widespread basis.[88] As discussed in the main report, overapplication of fertilizers and herbicides pollute waterways, harm animals, and pose a serious health risk to humans. Indiana egg and hog producers, who farm the state's top animal products, are very concentrated.[89] Concentrated hog production is associated with greenhouse gas emissions, and water and air pollution.[90]

87. Nat'l Agric. Stat. Serv., USDA, *supra* note 42, at tbl. 15. We count any certified organic farm or non-certified farm with organic sales as organic.
88. 2017 Census of Agriculture, *supra* note 55, at tbl. 51, 1, 46. Calculated by the authors from *id.* at tbl. 16 (the vast majority of farms with at least moderate sales use chemicals and fertilizers).
89. 2017 Census of Agriculture, *supra* note 51, at tbl. 15.
90. Lehner & Rosenberg, *supra* note 45, at 41-42.

IOWA

The Iowa farm economy had the second most receipts of any state in 2022.[91]

The state's farm economy is principally based on corn and soy, responsible for 54% of receipts, and hogs, which comprise 24%. The other principal products are cattle and calves (12%), chicken eggs (4%), and dairy products (3%).[92] These products are all associated with conventional production and the state's beef feedlot industry with CAFOs. The state had 799 certified organic farms out of around 85,000 farms in 2021.[93]

To analyze Iowa farms that operate as businesses, we need to exclude the large number of non-farm rural properties, hobby farms, and similar operations that USDA counts as farms.[94] We do this with two somewhat crude classifications: USDA's category of "farm business" and farms with at least $150,000 in gross cash farm income (GCFI). In Iowa, about 41,500 farms are farm businesses (49% of the total).[95] About 32,500 farms had at least $150,000 in GCFI (38% of the total) in the most recent census data.[96] Farm businesses received 96% of sales and farms with at least $150,000 in GCFI received 94% of sales.[97] Therefore, these classifications capture the vast majority of farm production.

Iowa farms that operate as businesses have a strong financial position. Moderate sales farms, with GCFI between $150,000 and $349,999, have a median household income of roughly $149,000. Midsize farms, with $350,000 to $999,999 in GCFI, have a median household income of roughly $218,000. These figures are much higher than the Iowa rural median of roughly $68,000 in 2018.[98] Farms with over $1 million in sales have even higher incomes.

91. Econ. Rsch. Serv., USDA, Farm Sector Financial Indicators, State Rankings, https://data.ers.usda.gov/reports.aspx?ID=17839 (last updated Aug. 31, 2023).
92. Econ. Rsch. Serv., USDA, Cash Receipts by State, https://data.ers.usda.gov/reports.aspx?ID=17843#P8220968e88894c71b132341abe4da2ac_2_17iT0R0x14 (last updated Aug. 31, 2023).
93. Nat'l Agric. Stat. Serv., USDA, supra note 3, at tbl. 1. Number of farms are from Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Balance Sheet: Iowa 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).
94. For more detail on this concept, see "Lifestyle and Retirement Farms" and "Low and no sales farms" in the main report.
95. Calculated by the authors from Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement report: Iowa 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).
96. Calculated by the authors from the 2017 Census of Agriculture, USDA, Summary by Farm Typology Measured by Gross Cash Farm Income (GCFI) of Family Farm Producers and Non-Family Farms-Iowa 2017, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Typology/typology_ia.pdf (last visited Nov. 13, 2023).
97. Authors calculations from Econ. Rsch. Serv., USDA, *supra* note 95; 2017 Census of Agriculture, USDA, *supra* note 96.
98. Ruggles et al., *supra* note 8.

Household incomes of selected farm businesses and rural households, Iowa

	Moderate sales farms			Midsize farms			All rural households
	Non-farm income	Farm income	Household income	Non-farm income	Farm income	Household income	Household income
Median	$59,275	$83,312	$148,718	$148,501	$218,375	$68,000	$63,600
Average	$81,456	$87,410	$168,856	$158,335	$251,329	$81,871	$76,115

Source: Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Operator Household Income Report: 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023); Steven Ruggles et al., IPUMS ACS USA: Version 13.0, https://doi.org/10.18128/D010.V13.0 (2019) (for non-metro household income, excluding missing household income values in Iowa).

Iowa farms pair these high incomes with substantial wealth. Moderate sales farms have a median household net worth of $1.4 million. Midsize farms have a median net worth of $2.2 million. Of course, larger farms have even higher net worths. For all farm sizes, the vast majority of farm household net worth comes from the farm, although their non-farm wealth is significant. (Note that net wealth accounts for debts.) Iowa farm net worth tends to be much larger than the median rural household net wealth (across all states) of $146,400.[99]

Wealth statistics for selected farm businesses in Iowa, 2021

	Moderate sales farms			Midsize farms		
	Non-farm net wealth	Farm net wealth	Total net wealth	Non-farm net wealth	Farm net wealth	Total net wealth
Median	$499,102	$1,903,184	$2,235,671	$2,349,740	$3,092,325	$2,682,312
Average	$421,961	$2,093,613	$2,515,574	$3,351,365	$3,888,137	$3,200,619

Source: Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Operator Household Income Report: 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).

Iowa farmers are almost all white. Over 99% of principal producers have a reported race of "white alone," not in combination with other races, in the latest census results.[100] This figure is almost identical for all producers.[101] The most common non-white reported races among principal producers were Native American, Black or African American, and Asian, ranging from about 90 to 170.[102] Less than 1% of principal producers and of all producers were Hispanic.[103] There were about 570 Hispanic principal producers the same year.[104]

99. Aladangady et al., *supra* note 9, at 12 tbl. 2 (2023).
100. Calculated by the authors from 2017 Census of Agriculture, USDA, State Level Data: Iowa, tbl. 64, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Iowa/ (last updated July 17, 2018). All race figures in this paragraph are for "alone or in combination with other races."
101. Calculated by the authors from *id.* at tbl. 63.
102. *Id.* at tbl. 64.
103. Calculated by the authors from *id.* at tbl. 60, 63, 64.
104. *Id.* at tbl. 60.

Reported race and ethnicity of farmers in Iowa, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Principal producers	124	87	166	566	115,236
All producers	187	98	229	737	142,905

Source: 2017 Census of Agriculture, USDA, State Level Data: Iowa, tbl. 60, 63,64. Counts are for "alone or in combination with other races," except for white which is "white alone."

These counts are for every farmer on a farm enumerated by USDA, which includes rural properties and hobby farms. To get a more accurate picture of farmers who work on farms operated as businesses, we examine reported race and ethnicity by farm sales (see the table below). Over 65% of all non-white and of Hispanic farmers are on low sales farms, which we take as an approximation of farms that do not operate as businesses. If we consider what USDA calls commercial family farms, those with sales of at least $350,000, then we find 85 non-white commercial farmers, 211 Hispanic commercial farmers, and 47,433 white commercial farmers.[105]

Race and ethnicity of producers by farm sales category in Iowa, 2017

	Asian	African American	Native American	Multi-race	Hispanic or Latino	White
Low Sales	79.5%	87.5%	74.1%	77.9%	65.9%	60.8%
Moderate Sales	5.3%	0.0%	6.2%	10.1%	10.0%	13.2%
Midsize	6.0%	9.7%	4.9%	8.8%	13.3%	14.3%
Large	4.0%	0.0%	1.2%	1.4%	4.7%	5.2%
Very large	0.0%	0.0%	0.0%	0.5%	0.5%	0.6%
Nonfamily	5.3%	2.8%	13.6%	1.4%	5.4%	6.0%

Source: Calculated by the authors from 2017 Census of Agriculture, supra note 96, at tbl. 16.

Farms that operate as businesses in Iowa tend to bring in significant incomes. Moderate sales farms bring in about $89,000 in net income, while larger farms bring in much higher amounts. As mentioned earlier, farms with moderate sales or more are responsible for almost all sales in Iowa. Low sales farms, a large proportion of which are likely hobby farms or non-farm rural properties, bring in an average of just over $10,000 in net income. This is indicative of these farms' low production. (For more details on low sales farms, see "Low and no sales farms" in the main report.)

105. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16. See Econ. Rsch. Serv., USDA, Farm Household Well-Being: Glossary, https://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/glossary/ (last updated Aug. 31, 2023), for a definition of commercial farms. Note that USDA includes nonfamily farms, but we look only at commercial family farms here.

Net cash farm income by farm size in Iowa, 2017

Farm type	Net cash farm income		
	Total (in thousands)	Per farm	Share
Low sales	$575,276	$10,741	7.7%
Moderate sales	$1,045,230	$88,925	14.0%
Midsize	$2,317,066	$191,446	31.0%
Large	$2,067,415	$523,927	27.6%
Very large	$787,244	$2,162,758	10.5%
Nonfamily	$688,329	$157,225	9.2%
Total	$7,480,560	$86,878	100.0%

Source: 2017 Census of Agriculture, supra note 96, at tbl. 16.

Most Iowa farmers receive support from government programs.[106] Among farms that received government payments, the average government payment was close to $24,000 in 2021.[107] The average net cash farm income among participants was $146,100, as opposed to $68,000 for non-participants.[108] Farms with low sales receive around two-fifths of all payments, the vast majority of which came from conservation programs in 2017.[109] Farms with at least moderate sales received about 60% of all payments that year.[110] Furthermore, these farms had over 90% of all acreage enrolled in crop insurance, almost all of which is subsidized by the federal government.[111] Larger farms also capture disproportionate shares of Commodity Credit Corporation (CCC) loans. CCC loans are subsidized loans that provide farmers with money in the period between harvest and sale, thereby helping them hold their products and wait for better prices.[112] For more details on other public benefits that farms receive, see the end of "Farmer Economic Conditions" in the main report.

106. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Farm Payment Status: Iowa 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).
107. *Id.*
108. *Id.*
109. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Total Government Payments by Type: Iowa 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).
110. 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16.
111. Rosch, *supra* note 21, at 2. Note that 90% of corn and soy are insured through the federal crop insurance program.
112. *See* Farm Serv. Agency, USDA, *Commodity Loans*, https://www.fsa.usda.gov/programs-and-services/price-support/commodity-loans/index (last visited Nov. 10, 2023).

Selected government supports by farm size in Iowa, 2017

Farm type	Government payments				Land enrolled in crop insurance		Commodity Credit Corporation Loans	
	Total ($1,000)	Share farms with payments	Per farm with payments	Share of total	Total acres	Share of land in crop insurance	Total loans ($1,000)	Share of total
Low sales	$276,228	61.9%	$8,335	40.4%	1,884,442	8.5%	$9,069	2.8%
Moderate sales	$94,897	83.4%	$9,679	13.9%	3,526,336	15.8%	$40,136	12.4%
Midsize	$167,334	90.7%	$15,237	24.5%	8,908,663	40.0%	$127,414	39.5%
Large	$88,159	89.9%	$24,848	12.9%	5,651,465	25.3%	$111,923	34.7%
Very large	$5,845	63.7%	$25,194	0.9%	635,831	2.9%	$11,339	3.5%
Nonfamily	$50,532	81.5%	$14,155	7.4%	1,691,157	7.6%	$22,603	7.0%
Total	**$682,995**	**71.2%**	**$11,146**	**100.0%**	**22,297,894**	**100.0%**	**$322,484**	**100.0%**

Source: 2017 Census of Agriculture, supra note 96, at tbl. 16.
Note: Government payments does not include crop insurance payments or CCC proceeds.

BIPOC farmers do not share equally in farm income or government payments. Only Asian farmers and Hispanic farmers have sales proportionate to their share of farms, while all other non-white farmers have less.[113] This is likely because BIPOC farmers tend to operate smaller farms than white farmers.[114] BIPOC farmers also tend to receive a lower share of government payments than their share of Iowa farms, except Asian and Hispanic farmers.[115] This is likely due to BIPOC farmers tending to operate smaller farms, which receive proportionately lower government subsidies, and possibly because of discrimination by USDA officials.[116]

113. *Id.*
114. 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16.
115. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 100, at tbl. 62.
116. 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16. For a brief discussion of discrimination, see Casey, *supra* note 26, at 8.

Farm revenue statistics by reported race and ethnicity of principal operator in Iowa, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Farms	116	64	159	502	85,900
Share farms	0.1%	< 0.1%	0.2%	0.6%	99.8%
Sales ($1,000)	$22,181	$12,589	$19,691	$186,697	$28,929,182
Share sales	0.1%	< 0.1%	0.1%	0.6%	99.9%
Government payments ($1,000)	$696	$249	$995	$4,093	$681,940
Share payments	0.1%	< 0.1%	0.1%	0.6%	99.8%
CCC loans ($1,000)	$0	$0	Not reported	$1,074	$322,322
Share CCC loans	0.0%	0.0%	N/A	0.3%	99.9%

Note: The sum of shares in a row may not add to 100% because the reported races and ethnicities are not mutually exclusive. The same person can report multiple races and can report they are Hispanic or Latino. Reported race is for "alone or in combination with other races," except white, which is white alone.

Source: 2017 Census of Agriculture, USDA, supra note 100, at tbl. 1, 6, 59, 62.

Beginning farmers are more likely to operate lower GCFI farms than more experienced farmers (see the first table below).[117] This is probably because they are getting started in the industry and need time to acquire more re Sources. An analysis of government subsidies (in the second table below) shows beginning farmers receive lower shares of conservation payments, other federal payments, and CCC loans than their share of Iowa farmers.[118] This is likely because they tend to operate smaller farms.119 Future researchers may want to investigate why beginning farmers operate nonfamily farms at such a high rate in Iowa.120

Comparison of beginning and non-beginning farmers by GCFI categories in Iowa, 2017

	Beginning farmers		Not beginning farmers	
	Count	Share	Count	Share
Moderate sales	2,987	36.5%	15,849	33.0%
Midsize	2,372	29.0%	18,121	37.8%
Large	798	9.7%	6,599	13.8%
Very large	74	0.9%	719	1.5%
Nonfamily	1,957	23.9%	6,698	14.0%

Source: 2017 Census of Agriculture, supra note 96, at tbl. 16.

117. 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16.
118. 2017 Census of Agriculture, USDA, *supra* note 100, at tbl. 6, 69.
119. 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16.
120. *Id.*

Selected government subsidies received by beginning farmers in Iowa, 2017

		Farms	Conservation payments	Other government payments	CCC loans
Beginning farmers	Amount ($1,000)	17,645	$47,531	$41,693	$28,574
	Share across all farms	20.5%	14.7%	11.6%	8.9%

Note: Beginning farmer statistics are for farms where "any principal producer is a new and beginning farmer."

Source: 2017 Census of Agriculture, USDA, supra note 100, at tbl. 69, for amounts for beginning farmers (any principal producer is a beginning farmer). Denominators for shares are across all farms, taken from id. at tbl. 6.

The available data suggest that the largest farms tend to use the most fertilizers, while the story is somewhat more complicated for chemicals (insecticides, herbicides, etc.). Among farms with at least $50,000 in fertilizer expenditures, almost 75% have at least $500,000 in sales and government payments combined.[121] Furthermore, among farms that use fertilizer with at least $500,000 in sales, around 60% spend at least $50,000 on fertilizer.[122] This means there is likely substantial overlap between farmers with high fertilizer use and farmers with high revenues. Since farmers with more sales receive disproportionate government support, heavy fertilizer users likely receive disproportionate government support.[123] Fertilizer use is also very concentrated: about a fifth of farms with fertilizer expenses spend at least $50,000 on fertilizer, accounting for around 70% of all fertilizer expenditures.[124] As the table below shows, larger farms use disproportionate shares of fertilizers and chemicals.

Fertilizer and chemical use by farm size in Iowa, 2017

	Farms		Acres treated with commercial fertilizer		Acres treated with insecticides		Acres treated with herbicides	
	Number	Share	Acres	Share	Acres	Share	Acres	Share
Moderate sales	11,754	36.1%	3,087,629	17.7%	1,226,659	15.2%	3,576,246	17.4%
Midsize	12,103	37.2%	7,616,572	43.7%	3,192,823	39.7%	8,832,126	42.9%
Large	3,946	12.1%	4,686,696	26.9%	2,523,280	31.3%	5,766,034	28.0%
Very large	364	1.1%	582,792	3.3%	398,927	5.0%	692,931	3.4%
Nonfamily	4,378	13.5%	1,443,585	8.3%	708,394	8.8%	1,720,992	8.4%

Source: 2017 Census of Agriculture, supra note 96, at tbl. 16.

121. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 100, at tbl. 73.
122. Calculated by the authors from *id.*
123. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16.
124. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 100, at tbl. 4.

There is somewhat less overlap between farms that expend heavily on chemicals and farms that receive the highest combined sales and government payments. Among farms with at least $50,000 in chemical expenditures, about 80% have at least $500,000 in sales and government payments combined.[125] However, not all farms that use chemicals and receive high revenues make heavy expenditures on chemicals. Among farms that use chemicals with at least $500,000 in sales and government payments, only around 40% spend at least $50,000 on chemicals.[126] Still, chemical use is fairly concentrated: a tenth of farms with chemical expenses spend at least $50,000 on chemicals and account for around 50% of all chemical expenditures.[127]

USDA provides limited data on the practices of farmers by race and beginning status, so we cannot provide statistics on fertilizer and chemical use. However, the department does provide some data on organic practices, direct sales, no till, and use of cover crops. Native American and Asian farmers are more likely than white farmers to farm organically, although these results should be taken with caution because the department's estimates of BIPOC farmers tend to have high statistical errors.128 A quarter of Asian farmers and a third of Black farmers have direct sales, which are very high rates and may warrant more investigation.[129] BIPOC farmers tend to practice no-till at lower rates than white farmers, although Hispanic farmers have a slightly higher rate.[130] BIPOC and white farmers use cover crops at about the same rates.[131]

Practices on farms with producers by reported race and ethnicity in Iowa, 2017

	Farm organically	Farm sells direct to consumers	Farm uses no till	Farm uses cover crops
Asian	4%	24%	20%	12%
Black	1%	33%	13%	10%
Native American	2%	6%	26%	12%
Hispanic or Latino	1%	5%	31%	12%
White	1%	3%	28%	10%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 128.

125. Calculated by the authors from *id.*
126. Calculated by the authors from *id.* tbl. 73.
127. Calculated by the authors from *id.* tbl. 4.
128.Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, Race, Ethnicity, and Gender Profiles: Iowa, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Reources/Race,_Ethnicity_and_Gender_Profiles/Iowa/cpd19000.pdf (last visited Nov. 13, 2023). USDA's 2017 COA figures are estimates subject to statistical error. To see that non-white farmers have higher error rates than white farmers, see Econ. Rsch. Serv., USDA, 2017 Census of Agriculture, Appendix A, 19, tbl. A, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usappxa.pdf (last visited Nov. 13, 2023).
129. Nat'l Agric. Stat. Serv., USDA, *supra* note 128. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16.
130. Nat'l Agric. Stat. Serv., USDA, *supra* note 128.
131. *Id.*

We have less data for beginning farmers, but we do find that 1.5% of beginning farmers operate organic farms as compared with 0.8% of more experienced farmers.[132] These estimates are also likely subject to high errors, so should be taken with caution.

Since organic farms, organic production, and organic fertilizer use are all rare, at least as of the last census, and fertilizer and chemical use are so widespread, we must conclude Iowa farmers are using dangerous conventional methods on a widespread basis.[133] As discussed in the main report, overapplication of fertilizers and herbicides pollute waterways, harm animals, and pose a serious health risk to humans. Iowa hog producers, who farm the state's top animal product, are very concentrated.[134] Concentrated hog production is associated with greenhouse gas emissions, and water and air pollution.[135]

132. Nat'l Agric. Stat. Serv., USDA, *supra* note 42, at tbl. 16. We count any certified organic farm or non-certified farm with organic sales as organic.
133. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 100, at tbl. 1, 46, 51. Calculated by the authors from 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16 (the vast majority of farms with at least moderate sales use chemicals and fertilizers).
134. 2017 Census of Agriculture, USDA, *supra* note 96, at tbl. 16.
135. Lehner & Rosenberg, *supra* note 45, at 41-42.

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The Minnesota farm economy had the sixth most receipts of any state in 2022. This made it roughly tied with Illinois and Nebraska.[136]

The state's farm economy is principally based on corn and soy, responsible for 51% of receipts. The other principal products are hogs (14%), dairy products (10%), cattle and calves (8%) and turkeys (4%).[137] These products are all associated with conventional production and hog production with CAFOs. The state had 650 certified organic farms out of around 67,000 farms in 2021.[138]

To analyze Minnesota farms that operate as businesses, we need to exclude the large number of non-farm rural properties, hobby farms, and similar operations that USDA counts as farms.[139] We do this with two somewhat crude classifications: USDA's category of "farm business" and farms with at least $150,000 in gross cash farm income (GCFI). In Minnesota, about 34,600 farms are farm businesses (51% of the total).[140] About 21,300 farms had at least $150,000 in GCFI (31% of the total) in the most recent census data.[141] Farm businesses received 95% of sales and farms with at least $150,000 in GCFI received 92% of sales.[142] Therefore, these classifications capture the vast majority of farm production.

Minnesota farms that operate as businesses have a strong financial position. Moderate sales farms, with GCFI between $150,000 and $349,999, have a median household income of roughly $109,000. Midsize farms, with $350,000 to $999,999 in GCFI, have a median household income of roughly $209,000. These figures are much higher than the Minnesota rural median of roughly $70,900 in 2018.[143] Farms with over $1 million in sales have even higher incomes.

136. Econ. Rsch. Serv., USDA, Farm Sector Financial Indicators: State Rankings, https://data.ers.usda.gov/reports.aspx?ID=17839 (last updated Aug. 31, 2023).
137. Econ. Rsch. Serv., USDA, Cash Receipts by State, https://data.ers.usda.gov/reports.aspx?ID=17843#P8220968e88894c71b132341abe4da2ac_2_17iT0R0x14 (last updated Aug. 31, 2023).
138. Certified organic farms from Nat'l Agric. Stat. Serv., USDA, *supra* note 3, at tbl. 1. Number of farms from Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement: Minnesota 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).
139. For more detail on this concept, see "Lifestyle and Retirement Farms" and "Low and no sales farms" in the main report.
140. Calculated by the authors from Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement: Minnesota 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).
141. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, Summary by Farm Typology Measured by Gross Cash Farm Income (GCFI) of Family Farm Producers and Non-Family Farms: Minnesota 2017, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Typology/typology_mn.pdf (last visited Nov. 13, 2023).
142. Farm businesses receive 94% of sales is from Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement: Minnesota 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023), calculated by multiplying farms and the sum of average livestock income and crop sales, for all farms and for farm businesses, then dividing the farm business sum by the all farm sum. Farms with at least $150,000 in GCFI receiving 90% of sales is calculated from Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24.
143. Ruggles et al., *supra* note 8.

Household incomes of selected farm businesses and rural households, Minnesota

	Moderate sales farms			Midsize farms			All rural households
	Non-farm income	Farm income	Household income	Non-farm income	Farm income	Household income	Household income
Median	$58,572	$54,290	$$108,687	$137,788	$208,849	$70,900	$63,600
Average	$60,616	$40,861	$101,477	$132,855	$225,473	$85,082	$76,115

Source: Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Operator Household Income Report: Minnesota 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023); Steven Ruggles et al., IPUMS ACS USA: Version 13.0, **https://doi.org/10.18128/D010.V13.0 (**2019) (for non-metro household income, excluding missing household income values in Minnesota).

Minnesota farms pair these high incomes with substantial wealth. Moderate sales farms have a median household net worth of $2.4 million. Midsize farms have a median net worth of $2.8 million. Of course, larger farms have even higher net worths. For all farm sizes, the vast majority of farm household net worth comes from the farm, although their non-farm wealth is significant. (Note that net wealth accounts for debts.) Minnesota farm net worth tends to be much larger than the median rural household net wealth (across all states) of $146,400.[144]

Wealth statistics for selected farm businesses in Minnesota, 2021

	Moderate sales farms			Midsize farms		
	Non-farm net wealth	Farm net wealth	Total net wealth	Non-farm net wealth	Farm net wealth	Total net wealth
Median	$499,102	$1,941,425	$2,379,612	$2,080,836	$2,820,826	$2,682,312
Average	$473,892	$2,363,175	$2,837,067	$2,644,660	$3,318,314	$3,200,619

Source: Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Operator Household Balance Sheet: Minnesota 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).

Minnesota farmers are almost all white. Over 99% of principal producers have a reported race of "white alone," not in combination with other races, in the latest census results.[145] This figure is very similar for all producers.[146] The most common non-white reported races among principal producers were Native American, Black or African American, and Asian, ranging from about 50 to 320.[147] Less than 1% of principal producers and of all producers were Hispanic.[148] There were about 530 Hispanic principal producers the same year.[149]

144. Aladangady et al., *supra* note 9, at 12 tbl. 2 (2023).
145. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, State Level Data: Minnesota tbl. 64, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Minnesota/ (last visited Nov. 13, 2023). All race figures in this paragraph are for "alone or in combination with other races."
146. Calculated by the authors from *id.* at tbl. 63.
147. *Id.* at tbl. 64.
148. Calculated by the authors from *id.* at tbl. 60, 63, 64.
149. *Id.* at tbl. 60.

Reported race and ethnicity of farmers in Minnesota, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Principal producers	318	49	313	527	88,679
All producers	433	60	408	651	110,117

Source: Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, State Level Data: Minnesota tbl. 60, 63, 64, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Minnesota/ (last visited Nov. 13, 2023). Counts are for "alone or in combination with other races," except for white which is "white alone."

These counts are for every farmer on a farm enumerated by USDA, which includes rural properties and hobby farms. To get a more accurate picture of farmers who work on farms operated as businesses, we examine reported race and ethnicity by farm sales (see the table below). Over 60% of all non-white and of Hispanic farmers are on low sales farms, which we take as an approximation of farms that do not operate as businesses. If we consider what USDA calls commercial family farms, those with sales of at least $350,000, then we find 95 non-white commercial farmers, 222 Hispanic commercial farmers, and 31,572 white commercial farmers.[150]

Race and ethnicity of producers by farm sales category in Minnesota, 2017

	Asian	African American	Native American	Multi-race	Hispanic or Latino	White
Low Sales	83.0%	87.2%	73.3%	84.8%	63.1%	66.7%
Moderate Sales	4.5%	5.1%	6.7%	2.7%	11.5%	11.1%
Midsize	4.5%	0.0%	1.7%	5.1%	15.7%	11.2%
Large	1.5%	0.0%	1.1%	2.4%	6.5%	5.7%
Very large	0.8%	2.6%	0.0%	0.0%	0.5%	0.5%
Nonfamily	5.8%	5.1%	17.2%	5.1%	2.8%	4.8%

Source: Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, supra note 141, at tbl. 24.

Farms that operate as businesses in Minnesota tend to bring in significant incomes. Moderate sales farms bring in about $76,000 in net income, while larger farms bring in much higher amounts. As mentioned earlier, farms with moderate sales or more are responsible for almost all sales in Minnesota. Low sales farms, a large proportion of which are likely hobby farms or non-farm rural properties, bring in an average of just under $7,000 in net income. This is indicative of these farms' low production. (For more details on low sales farms, see "Low and no sales farms" in the main report.)

150. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24. See Econ. Rsch. Serv., USDA, Farm Household Well-Being: Glossary, https://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/glossary/ (last updated Aug. 31, 2023), for a definition of commercial farms. Note that USDA includes nonfamily farms, but we look only at commercial family farms here.

Net cash farm income by farm size in Minnesota, 2017

	Net cash farm income		
Farm type	Total (in thousands)	Per farm	Share
Low sales	$322,207	$6,773	7.1%
Moderate sales	$596,928	$76,236	13.2%
Midsize	$1,253,369	$168,192	27.7%
Large	$1,460,310	$455,777	32.3%
Very large	$540,875	$2,235,021	12.0%
Nonfamily	$351,587	$139,353	7.8%
Total	$4,525,276	$65,753	100.0%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 141, at tbl. 24.

Most Minnesota farmers receive support from government programs.[151] Among farms that received government payments, the average government payment was about $24,700 in 2021.[152] The average net cash farm income among participants was $120,500, as opposed to $36,800 for non-participants.[153] Farms with low sales receive around 30% of all payments, the vast majority of which came from conservation programs in 2017.[154] Farms with at least moderate sales received about 70% of all payments that year.[155] Furthermore, these farms had over 90% of all acreage enrolled in crop insurance, almost all of which is subsidized by the federal government.[156] Larger farms also capture disproportionate shares of Commodity Credit Corporation (CCC) loans. CCC loans are subsidized loans that provide farmers with money in the period between harvest and sale, thereby helping them hold their products and wait for better prices.[157] For more details on other public benefits that farms receive, see the end of "Farmer Economic Conditions" in the main report.

151. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Farm Payment Status: Minnesota 2021, https://my.data.ers.usda.gov/arms/tailored-reports (last visited Nov. 13, 2023).
152. *Id.*
153. *Id.*
154. Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24.
155. *Id.*
156. Aladangady et al., *supra* note 9, at 12 tbl. 2 (2023). Note that 90% of corn and soy are insured through the federal crop insurance program.
157. *See* Farm Serv. Agency, USDA, *Commodity Loans*, https://www.fsa.usda.gov/programs-and-services/price-support/commodity-loans/index (last visited Nov. 10, 2023).

Selected government supports by farm size in Minnesota, 2017

Farm type	Government payments				Land enrolled in crop insurance		Commodity Credit Corporation Loans	
	Total ($1,000)	Share farms with payments	Per farm with payments	Share of total	Total acres	Share of land in crop insurance	Total loans ($1,000)	Share of total
Low sales	$119,740	49.0%	$5,140	30.4%	1,557,487	8.8%	$8,344	2.0%
Moderate sales	$52,357	82.6%	$8,097	13.3%	2,533,944	14.3%	$31,902	7.7%
Midsize	$104,394	89.5%	$15,651	26.5%	6,007,238	34.0%	$140,314	33.8%
Large	$86,101	88.9%	$30,243	21.8%	5,754,957	32.5%	$180,124	43.4%
Very large	$5,683	62.8%	$37,388	1.4%	594,901	3.4%	$20,475	4.9%
Nonfamily	$26,217	71.3%	$14,565	6.6%	1,236,437	7.0%	$33,420	8.1%
Total	**$394,492**	**59.9%**	**$9,568**	**100.0%**	**17,684,964**	**100.0%**	**$414,579**	**100.0%**

Source: Nat'l Agric. Stat. Serv., USDA, supra note 145, at tbl.16.
Note: Government payments does not include crop insurance payments or CCC proceeds.

BIPOC farmers do not share equally in farm income or government payments. Only Hispanic farmers have sales proportionate or in excess to their share of farms, while all other BIPOC farmers have less.[158] This is likely because BIPOC farmers tend to operate smaller farms than white farmers, although, notably, this is not the case for Hispanic farmers in Minnesota.[159] All BIPOC farmers also receive a lower share of government payments than their share of Minnesota farms, except Hispanic and Black farmers, who receive a proportionate amount.[160] This is likely due to BIPOC farmers tending to operate smaller farms, which receive proportionately lower government subsidies, and possibly because of discrimination by USDA officials.[161]

158. *Id.*
159. Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24.
160. Nat'l Agric. Stat. Serv., USDA, *supra* note 145, at tbl. 62.
161. Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24. For a brief discussion of discrimination, see Casey, *supra* note 26, at 8.

Farm revenue statistics by reported race and ethnicity of principal operator in Minnesota, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Farms	281	48	302	483	68,516
Share farms	0.4%	0.1%	0.4%	0.7%	99.6%
Sales ($1,000)	$48,948	$1,152	$28,323	$169,861	$18,381,032
Share sales	0.3%	< 0.1%	0.2%	0.9%	99.9%
Government payments ($1,000)	$328	$239	$1,171	$2,801	$393,938
Share payments	0.1%	0.1%	0.3%	0.7%	99.9%
CCC loans ($1,000)	$0	$0	$217	$8,269	$414,580
Share CCC loans	0.0%	0.0%	0.1%	2.0%	100.0%

Note: The sum of shares in a row may not add to 100% because the reported races and ethnicities are not mutually exclusive. The same person can report multiple races and can report they are Hispanic or Latino. Reported race is for "alone or in combination with other races," except white, which is white alone.

Source: Farms and government payments from Nat'l Agric. Stat. Serv., USDA, supra note 145, at tbl. 59, 62. Share denominators for farms, government payments, and CCC loans from Id. at tbl. 1, 6.

Beginning farmers are more likely to operate lower GCFI farms than more experienced farmers (see the first table below).[162] This is probably because they are getting started in the industry and need time to acquire more re Sources. An analysis of government subsidies (in the second table below) shows beginning farmers receive lower shares of conservation payments, other federal payments, and CCC loans than their share of Minnesota farmers.[163] This is likely because they tend to operate smaller farms.164 Future researchers may want to investigate why beginning farmers operate nonfamily farms at such a high rate in Minnesota.[165]

Comparison of beginning and non-beginning farmers by GCFI categories in Minnesota, 2017

	Beginning farmers		Not beginning farmers	
	Count	Share	Count	Share
Moderate sales	1,858	34.3%	10,539	33.3%
Midsize	1,577	29.1%	10,864	34.4%
Large	767	14.1%	5,531	17.5%
Very large	64	1.2%	469	1.5%
Nonfamily	1,156	21.3%	4,222	13.4%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 141, at tbl. 24.

162. Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24.
163. Nat'l Agric. Stat. Serv., USDA, *supra* note 145, at tbl. 69 for amounts for beginning farmers. Denominators for shares are across all farms, taken from *id.* at tbl. 6.
164. Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24.
165. *Id.*

Selected government subsidies received by beginning farmers in Minnesota, 2017

		Farms	Conservation payments	Other government payments	CCC loans
Beginning farmers	Amount ($1,000)	13,501	$13,390	$33,557	$41,064
	Share across all farms	19.6%	12.5%	11.7%	9.9%

Note: Beginning farmer statistics are for farms where "any principal producer is a new and beginning farmer."

Source: Nat'l Agric. Stat. Serv., USDA, supra note 145, at tbl. 69 for amounts for beginning farmers. Denominators for shares are across all farms, taken from id. at tbl. 6.

The available data suggest that the largest farms tend to use the most fertilizers, while the story is somewhat more complicated for chemicals (insecticides, herbicides, etc.). Among farms with at least $50,000 in fertilizer expenditures, almost 75% have at least $500,000 in sales and government payments combined.[166] Furthermore, among farms that use fertilizer with at least $500,000 in sales, a little less than 70% spend at least $50,000 on fertilizer.[167] This means that there is substantial overlap between heavy fertilizer users and farmers with very high revenues. Since farmers with more sales receive disproportionate government support, heavy fertilizer users likely receive disproportionate government support.[168] Fertilizer use is also very concentrated: about a fifth of farms with fertilizer expenses spend at least $50,000 on fertilizer, accounting for almost 75% of all fertilizer expenditures.[169] As the table below shows, larger farms use disproportionate shares of fertilizers and chemicals.

Fertilizer and chemical use by farm size in Minnesota, 2017

	Farms		Acres treated with commercial fertilizer		Acres treated with insecticides		Acres treated with herbicides	
	Number	Share	Acres	Share	Acres	Share	Acres	Share
Moderate sales	7,830	36.8%	2,140,540	16.5%	980,274	13.5%	2,514,733	15.4%
Midsize	7,452	35.1%	4,876,701	37.5%	2,636,649	36.2%	5,985,749	36.6%
Large	3,204	15.1%	4,476,295	34.4%	2,809,206	38.6%	5,924,357	36.3%
Very large	242	1.1%	475,025	3.7%	270,033	3.7%	642,618	3.9%
Nonfamily	2,523	11.9%	1,033,520	7.9%	587,776	8.1%	1,265,926	7.8%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 141, at tbl. 24.

166. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 145, at tbl. 73.
167. *Id.* at tbl. 73.
168. Calculated by the authors from using Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24.
169. Calculated by the authors from using Nat'l Agric. Stat. Serv., USDA, *supra* note 145, at tbl. 4.

There is somewhat less overlap between farms that expend heavily on chemicals and farms that receive the highest combined sales and government payments. Among farms with at least $50,000 in chemical expenditures, almost 90% have at least $500,000 in sales and government payments combined.[170] However, not all farms that use chemicals and receive high revenues make heavy expenditures on chemicals. Among farms that use chemicals with at least $500,000 in sales and government payments, a little over 40% spend at least $50,000 on chemicals.[171] Chemical use is concentrated: a little less than a tenth of farms with chemical expenses spend at least $50,000 on chemicals and account for a little less than 60% of all chemical expenditures.[172]

USDA provides limited data on the practices of farmers by race and beginning status, so we cannot provide statistics on fertilizer and chemical use. However, the department does provide some data on organic practices, direct sales, no till, and use of cover crops. All BIPOC farmer groups are more likely than white farmers to farm organically, with an especially high rate for Black farmers at 11%. These results should be taken with caution because the department's estimates of BIPOC farmers tend to have high statistical errors.[173] BIPOC farmers are more likely to sell direct to consumers than white farmers, likely because they tend to operate smaller farms than white farmers, and smaller farms are more likely to have direct to consumer sales.[174] Asian farmers have an especially high rate of direct sales, at almost 50%, likely driven by Hmong farmers, a group we discuss in more detail in the main report. BIPOC farmers tend to practice no-till at roughly the same, if not slightly higher, rates as white farmers, although Asian and Black farmers have higher rates.[175] BIPOC farmers tend to use more cover crops at higher rates than white farmers, except Asian farmers, who use them at the same rate.[176]

170. Calculated by the authors from using *id.* at tbl. 73.
171. Calculated by the authors from using *id.*
172. Calculated by the authors from using Nat'l Agric. Stat. Serv., USDA, *supra* note 145, at tbl 4.
173. Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, Race, Ethnicity, and Gender Profile: Minnesota, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Race,_Ethnicity_and_Gender_Profiles/Minnesota/cpd27000.pdf (last visited Nov. 13, 2023). USDA's 2017 Census of Agriculture figures are estimates subject to statistical error. To see that non-white farmers have higher error rates than white farmers, see Econ. Rsch. Serv., USDA, 2017 Census of Agriculture, Appendix A 19, tbl. A, (last visited Nov. 10, 2023).
174. Nat'l Agric. Stat. Serv., USDA, *supra* note 173. Operate smaller farms and smaller farms more likely to sell direct to consumers are both from Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24.
175. Nat'l Agric. Stat. Serv., USDA, *supra* note 173.
176. *Id.*

Practices on farms with producers by reported race and ethnicity in Minnesota, 2017

	Farm organically	Farm sells direct to consumers	Farm uses no till	Farm uses cover crops
Asian	3%	46%	13%	8%
Black	11%	15%	16%	16%
Native American	4%	17%	9%	15%
Hispanic or Latino	2%	9%	10%	11%
White	1%	5%	8%	8%

Source: Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, Race, Ethnicity, and Gender Profile: Minnesota, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Race,_Ethnicity_and_Gender_Profiles/Minnesota/cpd27000.pdf (last visited Nov. 13, 2023).

We have less data for beginning farmers, but we do find that 1.5% of beginning farmers operate organic farms as compared with 1.0% of more experienced farmers.[177] These estimates are also likely subject to high errors, so should be taken with caution.

Since organic farms, organic production, and organic fertilizer use are all rare, at least as of the last census, and fertilizer and chemical use are so widespread, we must conclude Minnesota farmers are using dangerous conventional methods on a widespread basis.[178] As discussed in the main report, overapplication of fertilizers and herbicides pollute waterways, harm animals, and pose a serious health risk to humans. Minnesota hog producers, who farm the state's top animal product, are very concentrated.[179] Concentrated hog production is associated with greenhouse gas emissions, and water and air pollution.[180]

177. Nat'l Agric. Stat. Serv., USDA, supra note 141, at tbl. 24. We count any certified organic farm or non-certified farm with organic sales as organic
178. Nat'l Agric. Stat. Serv., USDA, *supra* note 145, at tbl. 1, 46, 51. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24 (the vast majority of farms with at least moderate sales use chemicals and fertilizers).
179. Nat'l Agric. Stat. Serv., USDA, *supra* note 141, at tbl. 24.
180. Lehner& Rosenberg, *supra* note 45, at 41-42.

OHIO

Note: USDA does not provide data from the ARMS survey for Ohio like it does for the other Midwest states. Therefore, the state analysis of Ohio lacks some details in the other summaries.

The Ohio farm economy had the fourteenth most receipts of any state in 2022. This made it roughly tied with North Dakota and Missouri.[181]

The state's farm economy is principally based on corn and soy, responsible for 51% of receipts. The other principal products are chicken eggs (13%), dairy products (9%), hogs (7%), and cattle and calves (6%).[182] These products are all associated with conventional production and chicken eggs with CAFOs. The state had 800 certified organic farms out of a likely 76,500 farms in 2021.[183]

To analyze Ohio farms that operate as businesses, we need to exclude the large number of non-farm rural properties, hobby farms, and similar operations that USDA counts as farms.[184] We do this by analyzing farms with at least $150,000 in gross cash farm income (GCFI). About 13,300 farms had at least $150,000 in GCFI (17% of the total) in the most recent census data.[185] Farms with at least $150,000 in GCFI received 85% of sales.[186] Therefore, these classifications capture the vast majority of farm production.

Ohio farmers are almost all white. Over 99% of principal producers have a reported race of "white alone," not in combination with other races, in the latest census results.[187] This figure is almost identical for all producers.[188] The most common non-white reported races among principal producers were Native American, Black or African American, and Asian, ranging from about 190 to 440.[189] Less than 1% of principal producers and of all producers were Hispanic.[190] There were about 730 Hispanic principal producers the same year.[191]

181. Econ. Rsch. Serv., USDA, Farm Sector Financial Indicators: State Rankings, https://data.ers.usda.gov/reports.aspx?ID=17839 (last updated Aug. 31, 2023).
182. Econ. Rsch. Serv., USDA, Cash Receipts by State, https://data.ers.usda.gov/reports.aspx?ID=17843#P8220968e88894c71b132341abe4da2ac_2_17iT0R0x14 (last updated Aug. 31, 2023).
183. Nat'l Agric. Stat. Serv., USDA, *supra* note 3, at tbl. 1. Number of farms are from Nat'l Agric. Stat. Serv., USDA, 2022 State Agriculture Overview: Ohio (2023), https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=OHIO. Since this is for 2022, we say "likely" in the text because there were likely about the same number of farms in 2021.
184. For more detail on this concept, see "Lifestyle and Retirement Farms" and "Low and no sales farms" in the main report.
185. Calculated by the authors from the Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, Summary by Farm Typology Measured by Gross Cash Farm Income (GCFI) of Family Farm Producers and Non-Family Farms: Ohio 2017, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Typology/typology_oh.pdf (last visited Nov. 14, 2023).
186. Farm businesses receive 94% of sales is calculated by multiplying farms and the sum of average livestock income and crop sales, for all farms and for farm businesses, then dividing the farm business sum by the all farm sum using Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement: 2021 Ohio, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Typology/typology_oh.pdf (Dec. 15, 2022). Farms with at least $150,000 in GCFI receiving 90% of sales is calculated from Nat'l Agric. Stat. Serv., USDA, supra note 185, at tbl. 36.
187. Nat'l Agric. Stat. Serv., USDA, 2017 Census Volume 1, Chapter 1: State Level Data: Ohio tbl. 64. All race figures in this paragraph are for "alone or in combination with other races."
188. Calculated by the authors from *id.* at 63.
189. *Id.* at tbl. 64.
190. Calculated by the authors from *id.* at tbl. 60, 63, 64.
191. *Id.* at tbl. 60.

Reported race and ethnicity of farmers in Ohio, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Principal producers	192	271	437	729	101,809
All producers	250	344	530	954	127,576

Source: Nat'l Agric. Stat. Serv., USDA, 2017 Census Volume 1, Chapter 1: State Level Data: Ohio tbl. 60, 63, 64, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Ohio/ (last visited Nov. 14, 2023). Counts are for "alone or in combination with other races," except for white which is "white alone."

These counts are for every farmer on a farm enumerated by USDA, which includes rural properties and hobby farms. To get a more accurate picture of farmers who work on farms operated as businesses, we examine reported race and ethnicity by farm sales (see the table below). Over 88% of all non-white and of Hispanic farmers are on low sales farms, which we take as an approximation of farms that do not operate as businesses. If we consider what USDA calls commercial family farms, those with sales of at least $350,000, then we find 42 non-white commercial farmers, 70 Hispanic commercial farmers, and 18,021 white commercial farmers.[192]

Race and ethnicity of producers by farm sales category in Ohio, 2017

	Asian	African American	Native American	Multi-race	Hispanic or Latino	White
Low Sales	95.7%	94.8%	97.1%	91.2%	88.6%	81.1%
Moderate Sales	1.1%	1.0%	0.0%	3.7%	2.8%	6.9%
Midsize	0.0%	0.5%	1.7%	1.7%	2.4%	5.1%
Large	0.5%	0.5%	0.6%	0.0%	1.8%	1.9%
Very large	1.1%	0.0%	0.0%	0.0%	0.3%	0.2%
Nonfamily	1.6%	3.1%	0.6%	3.4%	4.1%	4.7%

Source: Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, supra note 185, at tbl. 36.

Farms that operate as businesses in Ohio tend to bring in significant incomes. Moderate sales farms bring in about $92,000 in net income, while larger farms bring in much higher amounts. As mentioned earlier, farms with moderate sales or more are responsible for almost all sales in Ohio. Low sales farms, a large proportion of which are likely hobby farms or non-farm rural properties, bring in an average of just under $1,000 in net income. This is indicative of these farms' low production. (For more details on low sales farms, see "Low and no sales farms" in the main report.)

192. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36. See Econ. Rsch. Serv., USDA, Farm Household Well-Being: Glossary, https://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/glossary/ (last updated Aug. 31, 2023), for a definition of commercial farms. Note that USDA includes nonfamily farms but we look only at commercial family farms here.

Net cash farm income by farm size in Ohio, 2017

Farm type	Net cash farm income		
	Total (in thousands)	Per farm	Share
Low sales	$62,258	$965	2.7%
Moderate sales	$499,897	$92,317	21.7%
Midsize	$718,876	$195,135	31.1%
Large	$582,425	$513,602	25.2%
Very large	$174,196	$2,002,253	7.5%
Nonfamily	$271,108	$90,490	11.7%
Total	$2,308,760	$29,674	100.0%

Source Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, supra note 185, at tbl. 36.

Larger farms tend to capture more government payments than smaller farms in Ohio. Farms with low sales receive around 20% of all payments, the vast majority of which came from conservation programs in 2017.[193] Farms with at least moderate sales received nearly 80% of all payments that year.[194] Furthermore, these farms had nearly 90% of all acreage enrolled in crop insurance, almost all of which is subsidized by the federal government.[195] Larger farms also capture disproportionate shares of Commodity Credit Corporation (CCC) loans. CCC loans are subsidized loans that provide farmers with money in the period between harvest and sale, thereby helping them hold their products and wait for better prices.[196] For more details on other public benefits that farms receive, see the end of "Farmer Economic Conditions" in the main report.

Selected government supports by farm size in Ohio, 2017

Farm type	Government payments				Land enrolled in crop insurance		Commodity Credit Corporation Loans	
	Total ($1,000)	Share farms with payments	Per farm with payments	Share of total	Total acres	Share of land in crop insurance	Total loans ($1,000)	Share of total
Low sales	$74,260	29.0%	$3,972	21.1%	885,971	12.4%	$1,627	1.4%
Moderate sales	$51,052	75.1%	$12,559	14.5%	1,282,764	18.0%	$5,110	4.2%
Midsize	$92,369	85.1%	$29,473	26.3%	2,366,066	33.2%	$28,200	23.5%
Large	$90,854	88.0%	$91,036	25.9%	1,725,238	24.2%	$61,242	50.9%
Very large	$6,916	58.6%	$135,608	2.0%	133,588	1.9%	$17,167	14.3%
Nonfamily	$35,674	53.4%	$22,296	10.2%	723,8096	10.2%	$6,890	5.7%
Total	**$351,125**	**36.7%**	**$12,301**	**100.0%**	**7,117,433**	**100.0%**	**$120,236**	**100.0%**

Note: Government payments does not include crop insurance payments or CCC proceeds.

Source: Nat'l Agric. Stat. Serv., USDA, supra note 185, at tbl. 36.

193. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Total Government Payments By Type: Ohio, https://my.data.ers.usda.gov/arms/tailored-reports (Dec. 15, 2022).
194. Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36.
195. Rosch, *supra* note 21, at 2. Note that 90% of corn and soy are insured through the federal crop insurance program.
196. *See* Farm Serv. Agency, USDA, *Commodity Loans*, https://www.fsa.usda.gov/programs-and-services/price-support/commodity-loans/index (last visited Nov. 10, 2023).

BIPOC farmers do not share equally in farm income or government payments. Only Asian farmers have sales proportionate to their share of farms, while all other BIPOC farmers have less.[197] This is likely because these farmers tend to operate smaller farms than white farmers.[198] All BIPOC farmers also receive a lower share of government payments than their share of Ohio farms.[199] This is likely due to BIPOC farmers tending to operate smaller farms, which receive proportionately lower government subsidies, and possibly because of discrimination by USDA officials.[200]

Farm revenue statistics by reported race and ethnicity of principal operator in Ohio, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Farms	165	257	419	669	77,271
Share farms	0.2%	0.3%	0.5%	0.9%	99.3%
Sales ($1,000)	$23,853	$11,685	$11,794	$50,944	$9,334,879
Share sales	0.3%	0.1%	0.1%	0.5%	99.9%
Government payments ($1,000)	$267	$486	$439	$2,314	$350,407
Share payments	0.1%	0.1%	0.1%	0.7%	99.8%
CCC loans ($1,000)	$0	$0	$0	Not reported	$120,236
Share CCC loans	0.0%	0.0%	0.0%	N/A	100.0%

Note: The sum of shares in a row may not add to 100% because the reported races and ethnicities are not mutually exclusive. The same person can report multiple races and can report they are Hispanic or Latino. Reported race is for "alone or in combination with other races," except white, which is white alone.

Source: Farms and government payments from Nat'l Agric. Stat. Serv., USDA, supra note 187, at tbl. 59, 62. Share denominators for farms, government payments, CCC loans from id. at tbl. 1, 6.

Beginning farmers are more likely to operate lower GCFI farms than more experienced farmers (see the first table below).[201] This is probably because they are getting started in the industry and need time to acquire more resources. An analysis of government subsidies (in the second table below) shows beginning farmers receive lower shares of conservation payments, other federal payments, and CCC loans than their share of Ohio farmers.[202] This is likely because they tend to operate smaller farms.[203] Future researchers may want to investigate why beginning farmers operate nonfamily farms at such a high rate in Ohio.[204]

197. *Id.*
198. Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36.
199. Nat'l Agric. Stat. Serv., USDA, *supra* note 187, at tbl. 62.
200. "Smaller farms" from Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36. For a brief discussion of discrimination, see Casey, *supra* note 26, at 8.
201. Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36.
202. Nat'l Agric. Stat. Serv., USDA, *supra* note 187, at tbl. 6, 69.
203. Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36.
204. *Id.*

Comparison of beginning and non-beginning farmers by GCFI categories in Ohio, 2017

	Beginning farmers		Not beginning farmers	
	Count	Share	Count	Share
Moderate sales	1,498	34.3%	7,379	37.3%
Midsize	898	20.6%	5,665	28.7%
Large	341	7.8%	2,066	10.4%
Very large	25	0.6%	192	1.0%
Nonfamily	1,603	36.7%	4,469	22.6%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 185, at tbl. 36.

Selected government subsidies received by beginning farmers in Ohio, 2017

		Farms	Conservation payments	Other government payments	CCC loans
Beginning farmers	Amount ($1,000)	19,213	$5,939	$31,675	$10,892
	Share across all farms	24.7%	15.3%	10.1%	9.1%

Note: Beginning farmer statistics are for farms where "any principal producer is a new and beginning farmer."

Source: Nat'l Agric. Stat. Serv., USDA, supra note 187, at tbl. 69 (amounts for beginning farmers including principal producers), tbl. 6 (denominators for shares are across all farms).

The available data suggest that the largest farms tend to use the most fertilizers, while the story is somewhat more complicated for chemicals (insecticides, herbicides, etc.). Among farms with at least $50,000 in fertilizer expenditures, almost 70% have at least $500,000 in sales and government payments combined.[205] Furthermore, among farms that use fertilizer with at least $500,000 in sales, around 60% spend at least $50,000 on fertilizer.[206] This suggests substantial overlap between heavy fertilizer users and fertilizer-using farms with very high revenues. Since farmers with more sales receive disproportionate government support, heavy fertilizer users likely receive disproportionate government support.[207] Fertilizer use is concentrated: a little less than a tenth of farms with fertilizer expenses spend at least $50,000 on fertilizer, accounting for around 60% of all fertilizer expenditures.[208] As the table below shows, larger farms use disproportionate shares of fertilizers and chemicals.

205. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 187, at tbl. 73.
206. Calculated by the authors from *id.*
207. Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36.
208. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 187, at tbl. 4.

Fertilizer and chemical use by farm size in Ohio, 2017

	Farms		Acres treated with commercial fertilizer		Acres treated with insecticides		Acres treated with herbicides	
	Number	Share	Acres	Share	Acres	Share	Acres	Share
Moderate sales	5,415	40.7%	1,407,060	23.5%	402,621	16.8%	1,623,500	22.3%
Midsize	3,684	27.7%	2,252,262	37.6%	812,529	34.0%	2,689,257	36.9%
Large	1,134	8.5%	1,469,590	24.5%	799,200	33.4%	1,944,308	26.6%
Very large	87	0.7%	145,895	2.4%	84,908	3.5%	178,441	2.4%
Nonfamily	2,996	22.5%	714,494	11.9%	292,731	12.2%	860,836	11.8%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 185, at tbl. 36.

There is somewhat less overlap between farms that expend heavily on chemicals and farms that receive the highest combined sales and government payments. Among farms with at least $50,000 in chemical expenditures, about 80% have at least $500,000 in sales and government payments combined.[209] However, not all farms that use chemicals and receive high revenues make heavy expenditures on chemicals. Among farms that use chemicals with at least $500,000 in sales and government payments, around 40% spend at least $50,000 on chemicals.[210] Chemical use is concentrated: a about a twentieth of farms with chemical expenses spend at least $50,000 on chemicals and account for about 50% of all chemical expenditures.[211]

USDA provides limited data on the practices of farmers by race and beginning status, so we cannot provide statistics on fertilizer and chemical use. However, the department does provide some data on organic practices, direct sales, no till, and use of cover crops. Asian and Black farmers are slightly more likely than white farmers to farm organically, although these results should be taken with caution because the department's estimates of BIPOC farmers tend to have high statistical errors.[212] BIPOC farmers are slightly more likely to sell direct to consumers than white farmers, likely because they tend to operate smaller farms than white farmers, and smaller farms are more likely to have direct to consumer sales.[213] BIPOC farmers practice no-till at slightly lower rates than white farmers.[214] BIPOC farmers tend to use cover crops at about the same rate as white farmers.[215]

209. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 187, at tbl. 73.
210. Calculated by the authors from *id.*
211. Calculated by the authors from *id.* at tbl. 4.
212. Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, Race, Ethnicity, and Gender Profile: Ohio, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Race,_Ethnicity_and_Gender_Profiles/Ohio/cpd39000.pdf (last visited Nov. 14, 2023). USDA's 2017 Census of Agriculture figures are estimates subject to statistical error. To see that non-white farmers have higher error rates than white farmers, see Econ. Rsch. Serv., USDA, 2017 Census of Agriculture, Appendix A 19, tbl. A (last visited Nov. 10, 2023).
213. Nat'l Agric. Stat. Serv., USDA, *supra* note 212. Operate smaller farms and smaller farms more likely to sell direct to consumers are from Calculated by the authors from using Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36.
214. Nat'l Agric. Stat. Serv., USDA, *supra* note 212.
215. *Id.*

Practices on farms with producers by reported race and ethnicity in Ohio, 2017

	Farm organically	Farm sells direct to consumers	Farm uses no till	Farm uses cover crops
Asian	2%	9%	19%	11%
Black	2%	11%	18%	8%
Native American	0%	12%	15%	8%
Hispanic or Latino	1%	12%	23%	11%
White	1%	8%	26%	11%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 212.

We have less data for beginning farmers, but we do find that 1.8% of beginning farmers operate organic farms as compared with 0.9% of more experienced farmers.[216] These estimates are also likely subject to high errors, so should be taken with caution.

Since organic farms, organic production, and organic fertilizer use are all rare, at least as of the last census, and fertilizer and chemical use are so widespread, we must conclude Ohio farmers are using dangerous conventional methods on a widespread basis.[217] As discussed in the main report, overapplication of fertilizers and herbicides pollute waterways, harm animals, and pose a serious health risk to humans.

216. Nat'l Agric. Stat. Serv., USDA, *supra* note 42, at 246-52 tbl. 36. We count any certified organic farm or non-certified farm with organic sales as organic.

217. Few organic farms or production (sales) from Nat'l Agric. Stat. Serv., USDA, *supra* note 187, at tbl. 51, compared with overall farms and sales from *id.* at tbl. 1. Little organic fertilizer from *id.* at tbl. 46. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 185, at tbl. 36 (the vast majority of farms with at least moderate sales use chemicals and fertilizers).

WISCONSIN

The Wisconsin farm economy had the tenth most receipts of any state in 2022. This made it roughly tied with Indiana and North Carolina.[218]

The state's farm economy is principally based on dairy products, responsible for 46% of receipts. The other principal products are corn and soybeans (collectively 25%) and cattle and calves (13%).[219] These products are all associated with conventional production and dairy production, increasingly, with CAFOs. The state had 1,455 certified organic farms out of around 64,000 farms in 2021.[220]

To analyze Wisconsin farms that operate as businesses, we need to exclude the large number of non-farm rural properties, hobby farms, and similar operations that USDA counts as farms.[221] We do this with two somewhat crude classifications: USDA's category of "farm business" and farms with at least $150,000 in gross cash farm income (GCFI). In Wisconsin, about 33,200 farms are farm businesses (52% of the total).[222] About 14,800 farms had at least $150,000 in GCFI (23% of the total) in the most recent census data.[223] Farm businesses received 96% of sales and farms with at least $150,000 in GCFI received 90% of sales.[224] Therefore, these classifications capture the vast majority of farm production.

Wisconsin farms that operate as businesses have a strong financial position. Moderate sales farms, with GCFI between $150,000 and $349,999, have a median household income of roughly $120,000. Midsize farms, with $350,000 to $999,999 in GCFI, have a median household income of roughly $157,000. These figures are much higher than the Wisconsin rural median of roughly $70,000.[225] Farms with over $1 million in sales have even higher incomes.

218. Econ. Rsch. Serv., USDA, Farm Sector Financial Indicators, State Rankings, https://data.ers.usda.gov/reports.aspx?ID=17839 (last updated Aug. 31, 2023).
219. Econ. Rsch. Serv., USDA, Cash Receipts by State, https://data.ers.usda.gov/reports.aspx?ID=17843#P8220968e88894c71b132341abe4da2ac_2_17iT0R0x14 (last updated Aug. 31, 2023).
220. Nat'l Agric. Stat. Serv., USDA, *supra* note 3, at tbl. 1. Number of farms from Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement: 2021 Wisconsin, https://my.data.ers.usda.gov/arms/tailored-reports (Dec. 15, 2022).
221. For more detail on this concept, see "Lifestyle and Retirement Farms" and "Low and no sales farms" in the main report.
222. Calculated by the authors from Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement: 2021 Wisconsin, https://my.data.ers.usda.gov/arms/tailored-reports (Dec. 15, 2022).
223. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, Summary by Farm Typology Measured by Gross Cash Farm Income (GCFI) of Family Farm Producers and Non-Family Farms: Wisconsin 2017, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Typology/typology_wi.pdf (last visited Nov. 14, 2023).
224. Farm businesses receive 94% of sales is calculated by multiplying farms and the sum of average livestock income and crop sales, for all farms and for farm businesses, then dividing the farm business sum by the all farm sum. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Farm Business Income Statement: 2021 Wisconsin, https://my.data.ers.usda.gov/arms/tailored-reports (Dec. 15, 2022). Farms with at least $150,000 in GCFI receiving 90% of sales is calculated from Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50.
225. Ruggles et al., *supra* note 8.

Household incomes of selected farm businesses and rural households, Wisconsin

	Moderate sales farms			Midsize farms			All rural households
	Non-farm income	Farm income	Household income	Non-farm income	Farm income	Household income	Household income
Median	$44,736	$58,610	$120,141	$33,675	$100,974	$156,900	$70,000
Average	$51,625	$60,690	$112,316	$48,486	$120,509	$168,994	$84,225

Source: Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Operator Household Income, https://my.data.ers.usda.gov/arms/tailored-reports (Dec. 15, 2022); Steven Ruggles et al., IPUMS ACS USA: Version 13.0, https://doi.org/10.18128/D010.V13.0 (2019) (for non-metro household income, excluding missing household income values in Wisconsin).

Wisconsin farms pair these high incomes with substantial wealth. Moderate sales farms have a median household net worth of $1.4 million. Midsize farms have a median net worth of $1.9 million. Of course, larger farms have even higher net worths. For all farm sizes, the vast majority of farm household net worth comes from the farm, although their non-farm wealth is significant. (Note that net wealth accounts for debts.) Wisconsin farm net worth tends to be much larger than the median rural household net wealth (across all states) of $146,400.[226]

Wealth statistics for selected farm businesses in Wisconsin, 2021

	Moderate sales farms			Midsize farms		
	Non-farm net wealth	Farm net wealth	Total net wealth	Non-farm net wealth	Farm net wealth	Total net wealth
Median	$322,500	$1,359,533	$1,850,022	$276,800	$1,853,679	$2,162,063
Average	$395,368	$1,568,125	$1,963,492	$347,633	$2,164,170	$2,511,802

Source: Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Operator Household Income: Wisconsin 2021, https://my.data.ers.usda.gov/arms/tailored-reports (Dec. 15, 2022).

Wisconsin farmers are almost all white. Over 99% of principal producers have a reported race of "white alone," not in combination with other races, in the latest census results.[227] This figure is almost identical for all producers.[228] The most common non-white reported races among principal producers were Native American, Black or African American, and Asian, ranging from about 70 to 390.[229] Less than 1% of principal producers and of all producers were Hispanic.[230] There were about 470 Hispanic principal producers the same year.[231]

226. Aladangady et al., *supra* note 9, at 12 tbl. 2 (2023).
227. Nat'l Agric. Stat. Serv., USDA, 2017 Census Volume 1, Chapter 1: State Level Data: Wisconsin tbl. 64, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Wisconsin/ (last visited Nov. 14, 2023). All race figures in this paragraph are for "alone or in combination with other races."
228. Calculated by the authors from *id.* at tbl. 63.
229. *Id.* at tbl. 64.
230. Calculated by the authors from *id.* at tbl. 60, 63, 64.
231. *Id.* at tbl. 60.

Reported race and ethnicity of farmers in Wisconsin, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Principal producers	389	69	222	472	87,325
All producers	544	96	293	649	109,561

Source: Nat'l Agric. Stat. Serv., USDA, 2017 Census Volume 1, Chapter 1: State Level Data: Wisconsin tbl. 60, 63, 64, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Wisconsin/ (last visited Nov. 14, 2023). Counts are for "alone or in combination with other races," except for white which is "white alone."

These counts are for every farmer on a farm enumerated by USDA, which includes rural properties and hobby farms. To get a more accurate picture of farmers who work on farms operated as businesses, we examine reported race and ethnicity by farm sales (see the table below). Over 67% of all non-white and of Hispanic farmers are on low sales farms, which we take as an approximation of farms that do not operate as businesses. If we consider what USDA calls commercial family farms, those with sales of at least $350,000, then we find 103 non-white commercial farmers, 104 Hispanic commercial farmers, and 23,517 white commercial farmers.[232]

Race and ethnicity of producers by farm sales category in Wisconsin, 2017

	Asian	African American	Native American	Multi-race	Hispanic or Latino	White
Low Sales	89.6%	68.5%	67.4%	86.6%	76.9%	73.7%
Moderate Sales	7.2%	28.8%	4.5%	5.6%	6.8%	9.9%
Midsize	0.2%	1.4%	7.3%	2.8%	5.5%	7.7%
Large	0.6%	0.0%	0.0%	2.2%	3.1%	3.4%
Very large	0.0%	0.0%	0.0%	0.0%	0.6%	0.4%
Nonfamily	2.3%	1.4%	20.8%	2.8%	7.1%	4.8%

Source: Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, supra note 223, at tbl. 50.

232. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50. See Econ. Rsch. Serv., USDA, Farm Household Well-being Glossary, https://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/glossary/ (last updated Aug. 31, 2023), for a definition of commercial farms. Note that USDA includes nonfamily farms, but we look only at commercial family farms here.

Farms that operate as businesses in Wisconsin tend to bring in significant incomes. Moderate sales farms bring in about $66,000 in net income, while larger farms bring in much higher amounts. As mentioned earlier, farms with moderate sales or more are responsible for virtually all sales in Wisconsin. Low sales farms, a large proportion of which are likely hobby farms or non-farm rural properties, bring in an average of just over $100 in net income. This is indicative of these farms' low production. (For more details on low sales farms, see "Low and no sales farms" in the main report.)

Net cash farm income by farm size in Wisconsin, 2017

Farm type	Net cash farm income		
	Total (in thousands)	Per farm	Share
Low sales	$7,062	$141	0.3%
Moderate sales	$406,293	$65,584	17.0%
Midsize	$659,721	$155,815	27.6%
Large	$735,646	$442,095	30.8%
Very large	$322,662	$1,792,567	13.5%
Nonfamily	$255,707	$101,030	10.7%
Total	**$2,387,091**	**$36,842**	**100.0%**

Source: Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, supra note 223, at tbl. 50.

About 47% of Wisconsin farmers receive support from government programs.[233] Among farms that received government payments, the average government payment was $24,600 in 2021.[234] The average net cash farm income among participants was $67,500, as opposed to $26,100 for non-participants.[235] Farms with low sales receive around 35% of all payments, the vast majority of which came from conservation programs in 2017.[236] Farms with at least moderate sales received about 65% of all payments that year.[237] Furthermore, these farms had over 85% of all acreage enrolled in crop insurance, almost all of which is subsidized by the federal government.[238] Larger farms also capture disproportionate shares of Commodity Credit Corporation (CCC) loans. CCC loans are subsidized loans that provide farmers with money in the period between harvest and sale, thereby helping them hold their products and wait for better prices.[239] For more details on other public benefits that farms receive, see the end of "Farmer Economic Conditions" in the main report.

233. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Farm Payment Status: Wisconsin 2021, https://my.data.ers.usda.gov/arms/tailored-reports (Dec. 15, 2022).
234. *Id.*
235. *Id.*
236. Econ. Rsch. Serv., USDA, ARMS Tailored Reports, Government Payments, Total Government Payments By Type: Wisconsin, https://my.data.ers.usda.gov/arms/tailored-reports (Dec. 15, 2022).
237. Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50.
238. Rosch, *supra* note 21, at 2. Note that 90% of corn and soy are insured through the federal crop insurance program.
239. *See* Farm Serv. Agency, USDA, *Commodity Loans*, https://www.fsa.usda.gov/programs-and-services/price-support/commodity-loans/index (last visited Nov. 14, 2023).

Selected government supports by farm size in Wisconsin, 2017

	Government payments				Land enrolled in crop insurance		Commodity Credit Corporation Loans	
Farm type	Total ($1,000)	Share farms with payments	Per farm with payments	Share of total	Total acres	Share of land in crop insurance	Total loans ($1,000)	Share of total
Low sales	$45,492	34.0%	$2,677	35.9%	804,872	14.4%	$1,847	3.1%
Moderate sales	$17,743	68.8%	$4,165	14.0%	955,296	17.1%	$6,665	11.2%
Midsize	$25,529	77.8%	$7,745	20.2%	1,472,250	26.3%	$16,320	27.5%
Large	$22,369	83.2%	$16,151	17.7%	1,468,841	26.3%	$28,895	48.7%
Very large	$4,744	78.3%	$33,645	3.7%	333,105	6.0%	$2,207	3.7%
Nonfamily	$10,707	54.8%	$7,720	8.5%	553,892	9.9%	$3,373	5.7%
Total	**$126,584**	**42.4%**	**$4,609**	**100.0%**	**5,588,256**	**100.0%**	**$59,307**	**100.0%**

Note: Government payments does not include crop insurance payments or CCC proceeds.

Source: Nat'l Agric. Stat. Serv., USDA, supra note 223, at tbl. 50.

BIPOC farmers do not share equally in farm income or government payments. All groups of BIPOC farmers have disproportionately low shares of sales.[240] This is likely because these farmers tend to operate smaller farms than white farmers.[241] All BIPOC farmers also receive a lower share of government payments than their share of Wisconsin farms, except for Black farmers, who receive a proportionate share.[242] This is likely due to BIPOC farmers tending to operate smaller farms, which receive proportionately lower government subsidies, and possibly because of discrimination by USDA officials.[243]

240. *Id.*
241. Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50.
242. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 227, at tbl. 62.
243. Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50. For a brief discussion of discrimination, see Casey, *supra* note 26, at 8.

Farm revenue statistics by reported race and ethnicity of principal operator in Wisconsin, 2017

	Asian	African American	Native American	Hispanic or Latino	White
Farms	311	58	198	446	64,373
Share farms	0.5%	0.1%	0.3%	0.7%	99.4%
Sales ($1,000)	10,508	2,716	16,229	58,111	11,412,473
Share sales	0.1%	< 0.1%	0.1%	0.5%	99.9%
Government payments ($1,000)	$285	$102	$157	$646	$126,240
Share payments	0.2%	0.1%	0.1%	0.5%	99.7%
CCC loans ($1,000)	$273	$0	$0	582	59,307
Share CCC loans	0.5%	0.0%	0.0%	1.0%	100.0%

Note: The sum of shares in a row may not add to 100% because the reported races and ethnicities are not mutually exclusive. The same person can report multiple races and can report they are Hispanic or Latino. Reported race is for "alone or in combination with other races," except white, which is white alone.

Source: Farms and government payments from Nat'l Agric. Stat. Serv., USDA, supra note 227, at tbl. 59, 62. Share denominators for farms, government payments, CCC loans from id. at tbl. 1, 6.

Beginning farmers are more likely to operate lower GCFI farms than more experienced farmers (see the first table below).[244] This is probably because they are getting started in the industry and need time to acquire more re Sources. An analysis of government subsidies (in the second table below) shows beginning farmers receive lower shares of conservation payments, other federal payments, and CCC loans than their share of Wisconsin farmers.[245] This is likely because they tend to operate smaller farms.[246]

Comparison of beginning and non-beginning farmers by GCFI categories in Wisconsin, 2017

	Beginning farmers		Not beginning farmers	
	Count	Share	Count	Share
Moderate sales	1,838	38.0%	9,060	37.5%
Midsize	1,266	26.2%	7,208	29.8%
Large	516	10.7%	3,247	13.4%
Very large	74	1.5%	412	1.7%
Nonfamily	1,137	23.5%	4,223	17.5%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 223, at tbl. 50.

244. Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50.
245. Nat'l Agric. Stat. Serv., USDA, *supra* note 227, at tbl. 69 (amounts for beginning farmers); tbl. 6 (denominators for shares are across all farms).
246. Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50.

Selected government subsidies received by beginning farmers in Wisconsin, 2017

		Farms	Conservation payments	Other government payments	CCC loans
Beginning farmers	Amount ($1,000)	13,190	3,153	11,546	5,608
	Share across all farms	20.4%	11.4%	11.7%	9.5%

Note: Beginning farmer statistics are for farms where "any principal producer is a new and beginning farmer."

Source: Nat'l Agric. Stat. Serv., USDA, supra note 227, at tbl. 69 (amounts for beginning farmers); tbl. 6 (denominators for shares are across all farms).

The available data suggest that the largest farms tend to use the most fertilizers and chemicals (insecticides, herbicides, etc.). Among farms with at least $50,000 in fertilizer expenditures, almost 70% have at least $500,000 in sales and government payments combined.[247] Among farms that use fertilizer with at least $500,000 in sales, around 50% spend at least $50,000 on fertilizer.[248] This means there is likely some overlap between heavy fertilizer users and fertilizer users with high revenues. Since farmers with more sales receive disproportionate government support, heavy fertilizer users likely receive disproportionate government support.[249] Fertilizer use is concentrated: about a tenth of farms with fertilizer expenses spend at least $50,000 on fertilizer, accounting for around 60% of all fertilizer expenditures.[250] As the table below shows, larger farms use disproportionate shares of fertilizers and chemicals.

Fertilizer and chemical use by farm size in Wisconsin, 2017

	Farms		Acres treated with commercial fertilizer		Acres treated with insecticides		Acres treated with herbicides	
	Number	Share	Acres	Share	Acres	Share	Acres	Share
Moderate sales	6,195	41.8%	1,256,493	22.2%	264,257	15.8%	1,172,535	20.8%
Midsize	4,234	28.6%	1,738,090	30.7%	442,510	26.5%	1,728,281	30.7%
Large	1,664	11.2%	1,606,065	28.4%	529,974	31.7%	1,685,925	29.9%
Very large	180	1.2%	364,578	6.4%	194,873	11.7%	368,587	6.5%
Nonfamily	2,531	17.1%	691,184	12.2%	239,309	14.3%	679,021	12.1%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 223, at tbl. 50.

247. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 227, at tbl. 73.
248. Calculated by the authors from *id.*
249. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50.
250. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 227, at tbl. 4.

There is somewhat less overlap between farms that expend heavily on chemicals and farms that receive the highest combined sales and government payments. Among farms with at least $50,000 in chemical expenditures, about 80% have at least $500,000 in sales and government payments combined.[251] Among farms that use chemicals with at least $500,000 in sales and government payments, only 25% spend at least $50,000 on chemicals.[252] Among those who use chemicals, use is concentrated: about a twentieth of farms with chemical expenses spend at least $50,000 on chemicals and account for about 50% of all chemical expenditures.[253]

USDA provides limited data on the practices of farmers by race and beginning status, so we cannot provide statistics on fertilizer and chemical use. However, the department does provide some data on organic practices, direct sales, no till, and use of cover crops. BIPOC farmers are slightly more likely than white farmers to farm organically, although these results should be taken with caution because the department's estimates of BIPOC farmers tend to have high statistical errors.[254] Black farmers have an especially high rate at 13%. BIPOC farmers are much more likely to sell direct to consumers than white farmers, likely because they tend to operate smaller farms than white farmers, and smaller farms are more likely to have direct to consumer sales.[255] Asian farmers have especially high rates, at almost 40%, likely driven by Hmong farmers, as discussed in the main report. BIPOC farmers practice no-till at about the same rate as white farmers.[256] BIPOC farmers use cover crops at about the same rate as white farmers.[257]

Practices on farms with producers by reported race and ethnicity in Wisconsin, 2017

	Farm organically	Farm sells direct to consumers	Farm uses no till	Farm uses cover crops
Asian	4%	38%	15%	11%
Black	13%	21%	20%	13%
Native American	5%	17%	19%	16%
Hispanic or Latino	3%	15%	20%	12%
White	2%	8%	23%	12%

Source: Nat'l Agric. Stat. Serv., USDA, supra note 254.

251. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 227, at tbl. 73.
252. Calculated by the authors from *id.*
253. Calculated by the authors from *id.* at tbl. 4.
254. Nat'l Agric. Stat. Serv., USDA, 2017 Census of Agriculture, Race, Ethnicity, and Gender Profile: Wisconsin, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/Race,_Ethnicity_and_Gender_Profiles/Wisconsin/cpd55000.pdf (last visited Nov. 14, 2023). USDA's 2017 Census of Agriculture figures are estimates subject to statistical error. To see that non-white farmers have higher error rates than white farmers, see Econ. Rsch. Serv., USDA, 2017 Census of Agriculture, Appendix A 19, tbl. A (last visited Nov. 10, 2023).
255. Nat'l Agric. Stat. Serv., USDA, *supra* note 254.
256. *Id.*
257. *Id.*

We have less data for beginning farmers, but we do find that 4.0% of beginning farmers operate organic farms as compared with 2.3% of more experienced farmers.[258] These estimates are also likely subject to high errors, so should be taken with caution.

Since organic farms, organic production, and organic fertilizer use are all rare, at least as of the last census, and fertilizer and chemical use are so widespread, we must conclude Wisconsin farmers are using dangerous conventional methods on a widespread basis.[259] As discussed in the main report, overapplication of fertilizers and herbicides pollute waterways, harm animals, and pose a serious health risk to humans. Wisconsin dairy producers, who farm the state's top animal product, tend to have large operations.[260] Dairy production is associated with greenhouse gas emissions from enteric fermentation and manure waste.[261]

258. Nat'l Agric. Stat. Serv., USDA, *supra* note 42, at 344-50 tbl. 50. We count any certified organic farm or non-certified farm with organic sales as organic.
259. Few organic farms or production (sales) from Nat'l Agric. Stat. Serv., USDA, *supra* note 227, at tbl. 51, compared with overall farms and sales from *id.* at tbl. 1. Little organic fertilizer from *id.* at tbl. 46. Calculated by the authors from Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50 (the vast majority of farms with at least moderate sales use chemicals and fertilizers).
260. Nat'l Agric. Stat. Serv., USDA, *supra* note 223, at tbl. 50.
261. Lehner, *supra* note 45, at 41-42.

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FRONT COVER PHOTO CREDIT Carol Highsmith, “Joe Sigg & Sons' dairy farm near Hollandale in Iowa County, Wisconsin”