

# More Than CAFOs and Corn

**A Statistical Analysis of Agriculture  
in Six Midwestern States**



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FOOD LAW  
*and* POLICY CLINIC  
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## EXECUTIVE SUMMARY

This report provides a comprehensive, data-driven analysis of farm production, farmer race and ethnicity, and farm practices in the Midwest. This report has several features intended to assist policymakers and advocates. These features include a novel analysis of the development and current status of farm production in the Midwest; an assessment of the incomes and wealth of the region's farmers; the historical context and current economic status of Black, Indigenous, and People of Color (BIPOC) farmers; and an overview of

environmental problems caused by conventional farms. The work is meant to serve as a reference on these and other topics of interest to our intended audience, as well as to researchers with an interest in Midwest agriculture. The report relies on an extensive and original analysis of data from the United States Department of Agriculture (USDA), including data from special requests. The report also features a synthesis of USDA reports, academic work, and news articles, with a focus on broad trends.

## INTRODUCTION

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### Overview

This report provides an in-depth, data-driven analysis of farm production, farmer race and ethnicity, and farm practices in the Midwest. This report has several features intended to assist policymakers and advocates. These features include a novel analysis of the development and current status of farm production in the Midwest; an assessment of the incomes and wealth of the region's farmers; the historical context and current economic status of Black, Indigenous, and People of Color (BIPOC) farmers; and an overview of environmental problems caused by conventional farms. The work is meant to serve as a reference on these and other topics of interest to our intended audience, as well as to researchers with an interest in Midwest agriculture. This report is based on an extensive and original analysis of data from the United

States Department of Agriculture (USDA), including data from special requests.<sup>1</sup> Almost all of the calculations included in the report have not been previously published elsewhere. The report also features a synthesis of USDA reports, academic work, and news articles, with a focus on broad trends. The work is intended to be readable and accessible to motivated readers with an interest in the subject.

### Methodology

This report relies primarily on public data from USDA, supplemented by analysis from USDA reports, policy and academic research, and news articles. This report uses this information to analyze broad trends in Midwest agriculture, with a focus on production, economic inequality, racial

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1. Our research team requested records through the Freedom of Information Act (FOIA) for this report but USDA either denied these requests or provided unsatisfactory responses. USDA's responses are currently under appeal.

disparities, environmental problems, and alternative farm practices.

The bulk of this report relies on an original analysis of USDA data, primarily from the 2017 Census of Agriculture (COA) and the Agricultural Resource Management Survey (ARMS). The agricultural census provides an enormous amount of data on the production, economics, demographics, and various other characteristics of farms and farmers. The COA provides much of this data down to the county level. The 2017 COA also includes a “farm typology report” that presents farm and farmer statistics using a typology based on farm sales and other factors. We make extensive use of the typology report. We use data from the 2017 COA because it was the most recently published agricultural census when we produced this report. The ARMS survey is an annual survey that captures an array of information on farm production, practices, and finances, some of which is not reported in the census. We tend to use data from the 2021 ARMS, the latest year available when we produced the report. The COA and ARMS are our two most important sources for this study.

We also use a variety of other data sources. These include many other USDA data products and statistical reports, such as USDA’s Economic Research Service’s (ERS) “Annual cash receipts by commodity” reports, a 2017 COA report on American Indian Reservations, various Certified Organic Surveys, the 2014 Tenure, Ownership, and Transition of Agricultural Land (TOTAL) survey, and various other surveys and datasets. We also use data from special requests to USDA and information we have received from Freedom of Information Act (FOIA) requests. We submitted FOIA requests for this report that USDA did not

respond to. For statistics on rural residents, we often use the Integrated Public Use Microdata Series (IPUMS) USA online data analysis system, as well as the Federal Reserve’s Survey of Consumer Finances. For data on farmworkers, we use the National Center for Farmworker Health’s Farm Labor Data Dashboard, as well as the Department of Labor’s National Agricultural Workers Survey (NAWS), as well as the COA. We used data from the IPUMS National Historical Geographic Information System (NHGIS) to create maps. We also drew on other data sources not mentioned here.

While most of the study is based on our analysis of these and other data, we supplemented our research with findings from USDA reports, policy and academic research, and news articles. Although we use a number of USDA reports, our synthesis of these results is original. Our historical narrative and discussion of environmental problems are especially reliant on policy and academic studies. We use news articles to add descriptive detail, such as in the discussion of BIPOC farmers. We also use news reports to get a more accurate representation of aspects of the farm economy where the existing data are lacking, such as in our discussion of immigrant farmworkers. We include these sources to provide as accurate a view of the Midwest farm system as possible.

### **Caveats**

We should mention two important caveats to this report. First, although we use the term “Midwest,” this study covers only six states: Illinois, Indiana, Iowa, Minnesota, Ohio, and Wisconsin. The definition of “Midwest” is contested but it has historically included these states plus Michigan. For example, USDA’s Climate Hubs program refers



to the “Midwest” as our six states and Michigan.<sup>2</sup> A complete study of Midwest agriculture would include Michigan, but we did not have the resources to include it. Furthermore, portions of North and South Dakota, Nebraska, Kansas, and Missouri practice “Corn Belt” agriculture similar to that of much of the Midwest. These areas are adjacent to our states. A complete study of the Midwest would also include these areas. The second major caveat is that this report does not analyze gender. This is a complicated and important topic, made more complicated by certain issues in USDA’s data that would require substantial time and resources to fully analyze. Rather than provide a potentially misleading account of farmers by gender in the Midwest, we decided to forego such an analysis in this report. However, a comprehensive report would also analyze gender. With these caveats out of the way, we now proceed with our study.

### Summary of Argument

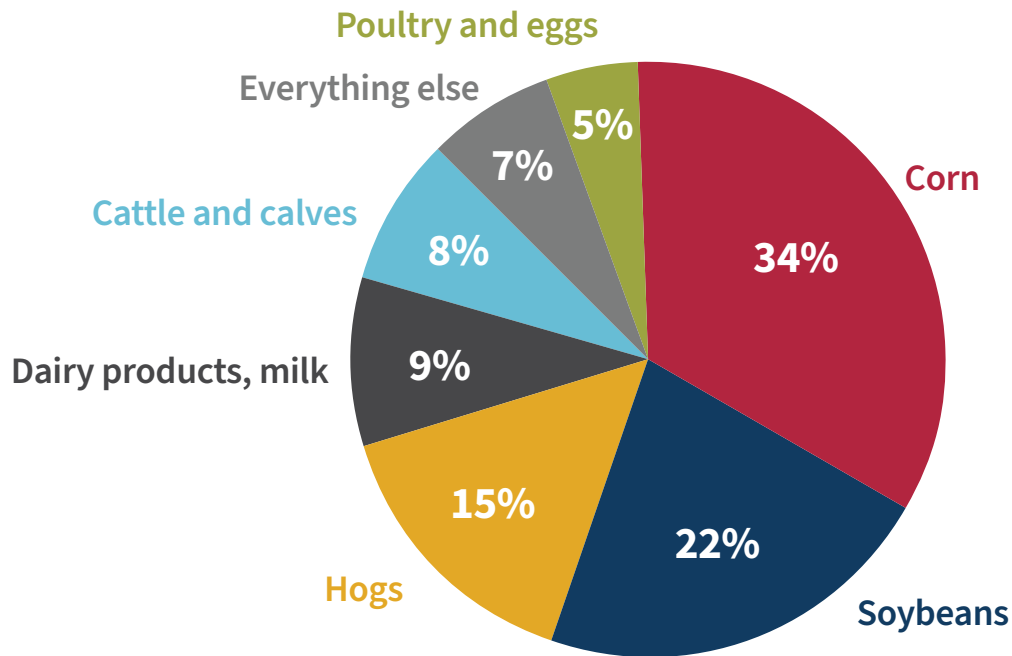
Midwest farms are central to the United States farm system. At the national level, corn, soybeans, hogs, milk from cows, cattle and calves, and poultry products including eggs, make up around 70% of farm sales, with total receipts of \$340 billion (in current dollars) in 2021.<sup>3</sup> In the Midwest, these

products made up over 90% of sales.<sup>4</sup> The states under study sold two-thirds of the nation’s hogs, half of all corn and soybeans, a quarter of all milk, and about an eighth of all cattle and calves.<sup>5</sup> These sales helped the Midwest capture 27% of total farm receipts in the United States in 2021.<sup>6</sup>

Midwest farms are highly specialized and capital-intensive. Around 90% of corn and soy sales come from farms that principally produce these products.<sup>7</sup> Corn and soy farmers use machines to plant and harvest; they apply large amounts of fertilizer, herbicides, and other chemicals; and they take out significant debts each year to finance their operations.<sup>8</sup> Many producers of hogs, milk, and beef cattle keep their animals in concentrated animal feeding operations (CAFOs), large facilities with specialized pens or cages for housing enormous numbers of animals in close proximity. These facilities often have many modern features. An egg CAFO in a promotional video from the Iowa Egg Council requires employees to shower upon entrance to maintain “biosecurity,” while another uses a computerized light, feed, water, and air quality control system to optimize egg production.<sup>9</sup> Between 500 and 1,000 dairy farms now use robots to milk their cows, robots that can cost over \$200,000 apiece.<sup>10</sup>

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2. CLIMATE HUBS, USDA, AGRICULTURE IN THE MIDWEST, <https://www.climatehubs.usda.gov/hubs/midwest/topic/agriculture-midwest> (last visited Oct. 31, 2023).
  3. Query from ECON. RSCH. SERV., USDA, CASH RECEIPTS BY COMMODITY STATE RANKING TOOL, <https://data.ers.usda.gov/reports.aspx?ID=17844> (last updated Aug. 31, 2023) for 2021, in real 2023 dollars.
  4. *Id.*
  5. *Id.*
  6. *Id.*
  7. Calculated by the authors using NAT’L AGRIC. STAT. SERV., USDA, 2017 CENSUS OF AGRICULTURE (2019) [hereinafter 2017 CENSUS OF AGRICULTURE], at STATE LEVEL DATA tbl. 75.
  8. See, e.g., ECON. RSCH. SERV., USDA, FARM SECTOR BALANCE SHEET AND SELECTED FINANCIAL RATIOS, (October 31, 2023), <https://data.ers.usda.gov/reports.aspx?ID=17835> (last updated Aug. 31, 2023) (showing aggregate debt/asset and debt/equity ratios for the farm sector).
  9. Iowa Egg Council, *Egg Production Video*, YOUTUBE (Dec. 15, 2017), [https://www.youtube.com/watch?v=g\\_DPxMYBfT4](https://www.youtube.com/watch?v=g_DPxMYBfT4).
  10. Ethan Humble, *For Years, Farmers Milked Cows by Hand. Today, Technology Is Doing More of the Work*, INVESTIGATE MIDWEST (Apr. 27, 2023), <https://investigatemidwest.org/2023/04/27/>

**Figure 1. Share of total receipts by commodity in the Midwest, 2021**



Source: Query from Econ. Rsch. Serv., USDA, Cash Receipts by Commodity State Ranking Tool, *supra* note 3.

The capital-intensive nature of much of the Midwest’s farm economy is a key contributor to concentration. Over 90% of all sales in the region are made by family farms with at least \$150,000 in gross cash farm income (GCFI) and nonfamily farms.<sup>11</sup> USDA provides a categorization of family farms based on GCFI. “Moderate sales farms,” with GCFI between \$150,000 and \$349,999, have a

11. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. Note that “family farms” are farms where the operator or their family own the majority of the farm. Nonfamily farms are farms where the operator or their family does not own the majority of the farm. A USDA typology we use extensively throughout this report classifies family farms by GCFI, while classifying all nonfamily farms in the same group, regardless of GCFI. USDA tends to treat all nonfamily farms as farms that operate as businesses. For example, the department includes nonfamily farms among so-called “commercial farms,” which includes family farms with at least \$350,000 in GCFI and nonfamily farms. ECON. RSCH. SERV., USDA, FARM HOUSEHOLD WELL-BEING: GLOSSARY (Aug. 31, 2023), <https://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/glossary/>. We follow this practice of treating nonfamily farms as farms that operate as businesses, no matter their levels of GCFI.

The reader should be aware of two issues related to language we use to discuss farms by typology categories. First, as a shorthand, we will sometimes refer to farms “with at least moderate sales” (or some other family farm sales category). We include all nonfamily farms in this grouping, no matter their level of GCFI. Second, USDA sometimes uses “GCFI” and “sales” interchangeably. (For example, USDA’s 2017 Typology report defines “low-sales farms” and “moderate-sales farms” on the basis of GCFI, rather than sales, suggesting USDA considers these terms at least somewhat interchangeable.) We sometimes follow this practice. The vast majority of GCFI appears to come from sales. The introduction to the 2017 Typology report states that GCFI includes sales, fees for delivering commodities under production contracts, government payments, and farm-related income. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY iii. If we consider sales, production contract receipts, federal payment receipts, and farm-related income, then 92% of this total came from sales in the Midwest in 2017. Note that the share of sales in GCFI is lower for low sales farms. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

median net cash farm income of at least \$67,000 and net household wealth over \$1.3 million in every state under study (note that these data are not available for Ohio).<sup>12</sup> These figures are much higher for farms with higher GCFIs.<sup>13</sup> Farms with this level of sales use massive amounts of capital. Moderate sales farms have median assets over \$1.5 million and annual liabilities between \$15,000 and \$43,000 in every Midwest state (note this information was also not available for Ohio).<sup>14</sup> These investments allow the largest farms to reduce their production costs, which increases their profits. Furthermore, the largest farms are also in the best position to adopt new technologies, a key pathway of farm consolidation, as we will discuss later. Federal policy also helps. Farms with at least moderate sales (family farms with a GCFI of at least \$150,000 and nonfamily farms) receive 70% of government payments, have over 90% of all land enrolled in crop insurance (almost all of that insurance federally subsidized), and get 98% of Commodity Credit Corporation loans by dollar amount.<sup>15</sup> As a result of these and other factors, large farms dominate Midwest agriculture, in major and minor industries.

The dominance of capital-intensive farming makes it difficult for new farmers to enter the industry. The required investment is so large that few except those who inherit farms or who are otherwise wealthy have a chance to farm on a large scale, where almost all Midwest production happens. Farmers tend to will their farms to their children, which keeps the volume of acreage for sale to potential competitors low and keeps the advantages of farm ownership in the family.<sup>16</sup> Farmland is also more expensive in the Midwest than almost any other part of the country, with prices in Iowa close to \$10,000 an acre, compared to \$3,000 in Mississippi or \$3,750 in Nebraska, in 2022.<sup>17</sup> Aspiring farmers from less advantaged backgrounds typically cite access to affordable land as the single biggest barrier they face.<sup>18</sup> These factors contribute to farming being a “club” that is generally only accessible to those with certain privileges.

While USDA has advised potential farmers who have fewer resources that they should compete in organic and direct sales markets, the department’s own data show that these markets are also dominated by large producers (see Table 1).<sup>19</sup> Farms with at least moderate sales captured almost 85%

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12. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, <https://my.data.ers.usda.gov/arms/data-analysis> (last updated Dec. 15, 2022). See the glossary in this report for definitions of the farm typology categories.

13. *Id.*

14. *Id.*

15. STEPHANIE ROSCH, CONG. RSCH. SERV., R46686, FEDERAL CROP INSURANCE: A PRIMER 2 (2021) (crop insurance federally subsidized); calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

16. See, e.g., Ashok K Mishra et al., *Succession Decisions in U.S. Family Farm Businesses*, 35 J. AGRIC. AND RES. ECON. 133, 133-34 (2010) (discussing how farm owners prioritize keeping farms in the family for importance of keeping farm in family); see Michele F. Mihaljevich, *Most Buyers of Farmland are Farmers vs. Investors*, HALDERMAN (July 1, 2022), <https://blog.halderman.com/most-buyers-of-farmland-are-farmers-vs.-investors> (discussing low volume).

17. NAT’L AGRIC. STAT. SERV., USDA, LAND VALUES: 2022 SUMMARY, at 5 (2022).

18. Martin Scotten, *‘They Just Need Land’: Young Farmers Struggle to Fund Affordable Acreage*, THE GUARDIAN (Apr. 23, 2023), <https://www.theguardian.com/environment/2023/apr/22/young-farmers-farm-land-cost>.

19. Nathan Rosenberg & Bryce Stucki, *How USDA Distorted Data to Conceal Decades of Discrimination Against Black Farmers*, THE COUNTER (June 26, 2019), <https://thecounter.org/usda-black-farmers-discrimination-tom-vilsack-reparations-civil-rights/>.



of organic sales and 52% of direct sales in 2017.<sup>20</sup> While low sales farms receive almost half of all direct sales, there are so many low sales farms that they receive only \$6,000 per operation.<sup>21</sup> For farms with at least moderate sales, the figure is \$50,000.<sup>22</sup>

(Note that in Table 1 we refer to “farm size” using a measure of GCFI, rather than acreage. Throughout this report, we tend to use sales instead of acres because animal farms, especially CAFOs, can generate high sales with relatively few acres. Even

among crop farms, variations in yields, market prices across crops, or of cropland values can make sales a better measure of economic size than acreage. With this said, we also often use other measures of farm size, including acreage. Note that we also sometimes use GCFI and “sales” interchangeably, since the vast majority of GCFI appears to come from sales in the Midwest. See footnote 11 for more details on this last point.)

**Table 1. Analysis of types of sales by selected farm size in the Midwest, 2017**

Type of sales	Farm size	Farms	Total sales (\$1,000)	Share of all sales	Amount per farm
All sales	Low sales	308,396	\$8,034,588	8.3%	\$26,053
	At least moderate sales	118,428	\$88,203,211	91.7%	\$744,783
Organic sales	Low sales	2,715	\$100,671	15.9%	\$37,080
	At least moderate sales	1,781	\$534,184	84.1%	\$299,935
Direct sales	Low sales	20,468	\$126,616	48.1%	\$6,186
	At least moderate sales	2,721	\$136,516	51.9%	\$50,171

Source: 2017 Census of Agriculture, *supra* note 7, at Typology.

Because families tend to transmit the advantages of wealth to their children, and farmers in particular make an effort to leave their farms to their children, the industry has a certain inertia of inherited advantage.<sup>23</sup> White families have made up the

vast majority of the region’s farmers for 200 years, and almost all farmers in these six states today are white—99.3% of all farmers and 99.6% of farmers on farms with at least moderate sales.<sup>24</sup> Starting in the colonial era, white settlers carried out violent

20. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

21. *Id.*

22. *Id.*

23. See, e.g., WILLIAM DARITY JR. ET AL., SAMUEL DUBOIS COOK CTR. ON SOC. EQUITY, WHAT WE GET WRONG ABOUT CLOSING THE RACIAL WEALTH GAP (2018) (describing the importance of familial wealth transfer in perpetuating wealth gaps).

24. R. DAVID EDMUNDS, ENDURING NATIONS: NATIVE AMERICANS IN THE MIDWEST 2-3 (U. Ill. Press 2008); calculated by the authors using 2017 CENSUS OF AGRICULTURE, USDA, *supra* note 7, at TYPOLOGY.

campaigns of dispossession and genocide against Native Americans, killing 12 million people in what is now the contiguous United States.<sup>25</sup> This included Native Americans who had farmed in the Midwest for hundreds of years.<sup>26</sup> Black, Japanese, and Hispanic farmers have all faced widespread discrimination and restrictions on their economic mobility.<sup>27</sup> Although employed as workers, sometimes when they are still children, throughout the farm and food systems, Hispanic people have very low farm ownership rates in the region.<sup>28</sup> The legacies of white dominance in agriculture, and BIPOC dispossession and exclusion, help explain the enormous racial gaps in the farm economy

The history of the region helps explain not just the racial composition of its farmers, but also its major industries. Indigenous peoples developed corn and grew it in the Midwest for hundreds of years before Europeans arrived.<sup>29</sup> The region's

indigenous people burned forest land to maintain ecosystems that supported the bison they hunted.<sup>30</sup> White settlers encountered the plains these people created when they moved west.<sup>31</sup> In the early 1800s, farmers from the Great Valley region, in what was then Virginia, brought a unique system of fattening cattle on corn, then letting hogs feed on the waste, to Ohio.<sup>32</sup> This early, then, a distinctive pattern of Midwest agriculture was present in the region. Over the 19th century, settlers expanded this system to northern Kentucky, and from central Tennessee to the outer edge of Iowa, up into southern Minnesota and Wisconsin, creating, more or less, the area known as the Corn Belt today.<sup>33</sup> This region led the country in hogs, corn, and cattle feedlots as early as the late 1800s.<sup>34</sup> Meanwhile, immigrants from New York and Scandinavia brought their dairy farming practices to the Upper Midwest.<sup>35</sup> Around the turn of the century, Minnesota and Wisconsin had become

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25. DAVID M. SMITH, COUNTING THE DEAD: ESTIMATING THE LOSS OF LIFE IN THE INDIGENOUS HOLOCAUST, 1492-PRESENT 12 (Se. Okla. State U. 2017).
  26. Illinois State Museum, *Illinois Agriculture Begins*, A History of Illinois Agriculture (Oct. 31, 2023), [https://www.museum.state.il.us/OHIA/htmls/people/native/peo\\_na.html](https://www.museum.state.il.us/OHIA/htmls/people/native/peo_na.html).
  27. Amy Mayer, *Why are there so Few Black Farmers in the Midwest?*, NEB. PUB. MEDIA (Oct. 19, 2020), <https://nebraskapublicmedia.org/en/news/news-articles/why-are-there-so-few-black-farmers-in-the-midwest/>; Dennis N. Valdés, *Settlers, Sojourners, and Proletarians: Social Formation in the Great Plains Sugar Beet Industry, 1890-1940*, 10 GREAT PLAINS Q. 110, (1990); Shedra A. Snipes, et al., “The Only Thing I Wish I could Change is that they Treat us like People and not like Animals”: *Injury and Discrimination among Latino Farmworkers*, 22 J. AGROMEDICINE 36 (2017). Note that even though the Snipes study was on workers in Texas, Texas is a traditional winter home to farmworkers who work in the Midwest. Cristina G. Magaña & Joseph D. Hovey, *Psychosocial Stressors Associated with Mexican Migrant Farmworkers in the Midwest United States*, 5 J. IMMIGRANT HEALTH 75, (2003).
  28. See Lauren K. Gurley, *Dozens of Youth Illegally Employed to Clean Meat Plants*, *Labor Dept. Says*, THE WASHINGTON POST (Nov. 11, 2022), <https://www.washingtonpost.com/business/2022/11/10/youth-workers-meat-packing/>, for a discussion on children working in the food system. Low ownership rates are Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7. For low pay in the farm and food industry, see MARIE T. MORA & ALBERTO DÁVILA, *ECON. POL'Y INST., THE HISPANIC-WHITE WAGE GAP HAS REMAINED WIDE AND RELATIVELY STEADY* (2018).
  29. JOHN HUDSON, *MAKING THE CORN BELT: A GEOGRAPHICAL HISTORY OF MIDDLE-WESTERN AGRICULTURE* 49-50 (Ind. U. Press 1994).
  30. *Id.* at 13.
  31. *Id.* at 22.
  32. *Id.* at 5-6.
  33. See *id.* at 11 fig. 4.
  34. *Id.* at 70, chapter 5: “The Feedlot” (for feedlots); *id.* at chapter 9: “Specialization and Westward Expansion” (for hogs); Daniel Hautzinger, *When Chicago was ‘Hog Butcher to the World*, WTTW (June 21, 2018), <https://interactive.wttw.com/playlist/2018/06/21/union-stock-yards> (for hogs); using 5 BUREAU OF THE CENSUS, U.S. DEP'T OF COM., 1890 CENSUS OF AGRICULTURE, at tbl. 9 (for cattle), 11 (for “swine”), 13 (for corn), <https://www.census.gov/library/publications/1895/dec/volume-5.html> (last visited Nov. 5, 2023).
  35. SUSAN GRANGER & SCOTT KELLY, MINN. DEPT. OF TRANSP., *DEVELOPMENTAL PERIODS IN THE HISTORIC CONTEXT “EURO-AMERICAN FARMS IN MINNESOTA, 1820-1960”* 30 (JUNE 2005); HUDSON, *supra* note 29, at 75.

leading dairy states: the Gopher State developing a specialization in butter and the Badger State in cheese.<sup>36</sup> Farmers came to grow soybeans later. A Midwest cornstarch manufacturer supported the development of numerous industrial uses for soybeans in the early 1900s.<sup>37</sup> Corn Belt farmers adopted the crop on a wide scale after World War II.

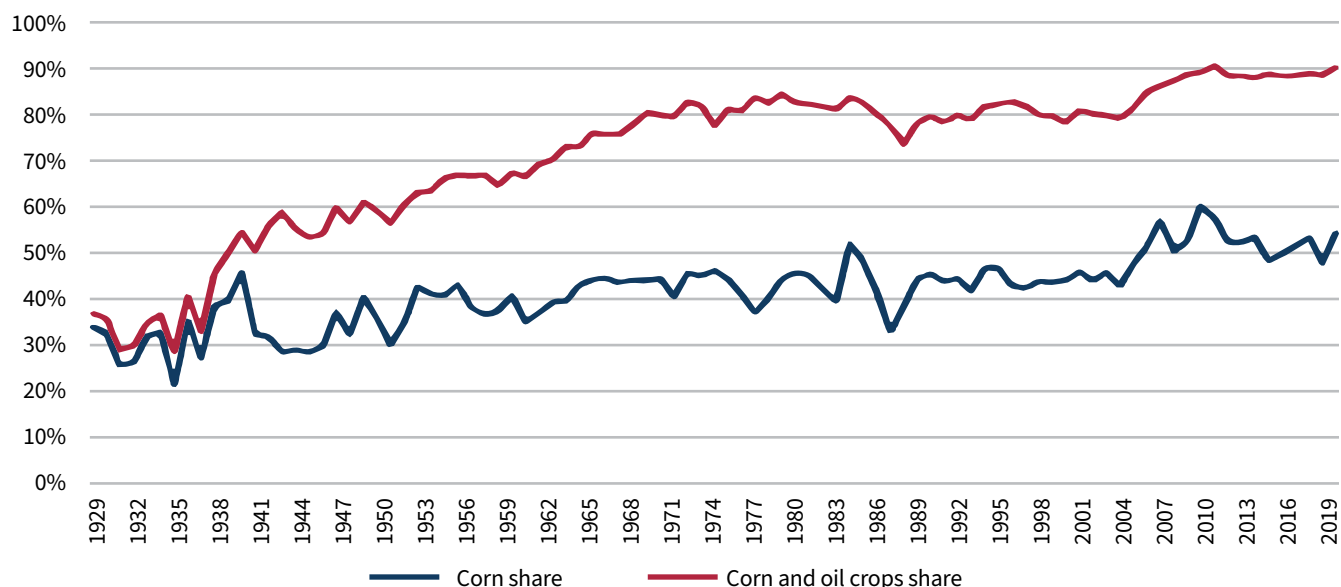
If Midwest farmers developed modes of agriculture shaped by their own and others' cultural practices, their production techniques were also shaped by the country's capitalist economic system, influenced, on the one side, by the development of productive forces on the farm, and, on the other, by the expansion of markets, or purchasers, for their products. Over the course of the 20th century, private investors put up the capital to develop soybean oil, soymeal, corn starch, corn syrup, corn ethanol, and other corn and soy products.<sup>38</sup> These developments tended to increase demand for corn

and soy. Midwest farmers, who could rotate these crops, met rising demand with increased production: corn and oil crop sales rose from around 30% of all crop sales in the early 1930s to around 90% of all crop sales today (see Figure 2).<sup>39</sup> Meanwhile, machine manufacturers, who wanted to tap into farmer income, developed the tractor and then the combine.<sup>40</sup> Farmers who could afford these machines could reduce costs and increase profits, giving them advantages over their less profitable competitors. Among these advantages was extra money to invest in more new technologies. From 1900 to 1987, corn farmers reduced person-hours per acre by 92%.<sup>41</sup> Meanwhile, the number of Midwest farms fell by 60%.<sup>42</sup> The remaining farms now employ enormous amounts of capital: a farmer looking to raise the midpoint acreage of corn and soybeans needed \$8 million in "land, equipment, and structures" in 2012.<sup>43</sup>

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36. GRANGER & KELLY, *supra* note 35, at 33-34; Wisconsin Historical Society, *Cheesemaking in Wisconsin*, <https://www.wisconsinhistory.org/Records/Article/CS1896>.
  37. HUDSON, *supra* note 29, at 160-161.
  38. WILLIAM SHURTLEFF & AKIKO AOYAGI, HISTORY OF A.E. STALEY MANUFACTURING CO. WORK WITH Soy 59, 161, 191, 235 (Soyinfo Ctr. ed., 2018) (discussing how Staley helped develop soybean oil, soymeal, corn starch and corn syrup); Anna Casey, *How did the Soybean Become such a Common Crop in the U.S.*, INVESTIGATE MIDWEST (Dec. 22, 2017), <https://investigatamidwest.org/2017/12/22/how-did-the-soybean-become-such-a-common-crop-in-the-u-s/> (protein for animal feed).
  39. Query from ECON. RSCH. SERV., USDA, ANNUAL CASH RECEIPTS BY COMMODITY, <https://data.ers.usda.gov/reports.aspx?ID=17832> (last updated Aug. 31, 2023).
  40. DOUGLAS R. HURT, AGRICULTURE TECHNOLOGY IN THE TWENTIETH CENTURY 16, 59 (Sunflower U. Press, 1991).
  41. Calculated by the authors from *Id.* at 100.
  42. Calculated by the authors using 5 BUREAU OF THE CENSUS, U.S. DEP'T OF COM., 1900 CENSUS OF AGRICULTURE, at tbl. 1, <https://www.census.gov/library/publications/1902/dec/vol-05-agriculture.html> (last visited Nov. 5, 2023); 1 BUREAU OF THE CENSUS, U.S. DEP'T OF COM., 1987 CENSUS OF AGRICULTURE, tbl. 1, [https://agcensus.library.cornell.edu/census\\_year/1987-census/STATE\\_DATA](https://agcensus.library.cornell.edu/census_year/1987-census/STATE_DATA) (last visited Nov. 5, 2023).
  43. JAMES M. MACDONALD ET AL., ECON. RSCH. SERV., USDA, FARM SIZE AND THE ORGANIZATION OF U.S. CROP FARMING 49 (2013). Note that "midpoint acreage" refers to the acreage amount where half of all acreage is greater than the midpoint. Contrast this with median acres, where half of all farms have greater acreage. See explanation at *Id.* ii.



**Figure 2. Corn and oil crop share of total receipts in the Midwest, 1929-2021**



Source: Calculated by the authors from Econ. Rsch. Serv., USDA, Annual Cash Receipts by Commodity, <https://data.ers.usda.gov/reports.aspx?ID=17832> (last updated Aug. 31, 2023).

The intensive mode of farming that dominates the Midwest produces large amounts of greenhouse gas emissions and pollutes the environment. This region has some of the highest agricultural emissions in the country and Iowa has by far the most of any state.<sup>44</sup> These emissions come principally from soil management—fertilizer use and the breakdown of organic matter—enteric fermentation from cattle, and manure management, especially from large dairy farms, hog CAFOs, and

cattle feedlots.<sup>45</sup> Since large farms tend to farm most of the cropland and run the CAFOs, they are responsible for a disproportionate share of emissions.<sup>46</sup> Midwest farmers also apply excessive amounts of fertilizers that pollute rivers and they use dangerous herbicides that harm humans and damage ecosystems.<sup>47</sup> CAFO operations generate noxious gasses that harm farmers, workers, and nearby communities.<sup>48</sup> (Note that the Environmental Protection Agency has a specific

44. See PETER H. LEHNER & NATHAN A. ROSENBERG, *FARMING FOR OUR FUTURE: THE SCIENCE, LAW, AND POLICY OF CLIMATE-NEUTRAL AGRICULTURE*, 47 fig. 8 (2022).

45. *Id.* at 41-42.

46. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. Farms with at least midsize sales operate the vast majority of crop land, are responsible for the vast majority of fertilizer expenses, manage most of the cattle, and have almost all of the hog inventories and sales of cattle fed for slaughter in the Midwest. We treat these as proxies for emissions. For a fuller discussion, see *infra* “Problems of conventional agriculture.”

47. Sarah Porter, *Manure Overload: Manure Plus Fertilizer Overwhelms Minnesota’s Land and Water*, ENV’T WORKING GROUP (May 28, 2020), <https://www.ewg.org/interactive-maps/2020-manure-overload/>; MAE WU ET AL., THE NAT. RES. DEF. COUNCIL, *STILL POISONING THE WELL* (2010).

48. Christina Cooke, *Iowa Residents to Sue the State over Air Emissions from Industrial Hog Farms*, CIVIL EATS (May 16, 2018) <https://civileats.com/2018/05/16/iowa-residents-to-sue-state-over-air-emissions-from-industrial-hog-farms/>; Ted Genoways, *Hog Wild: Factory Farms are Poisoning Iowa’s Drinking Water*, MOTHER JONES (Mar. 21, 2014), <https://www.motherjones.com/>

definition of a CAFO. This definition considers an operation's practices; the type, number, and size of animals on the operation; and pollution from the operation.<sup>49</sup> We tend to use inventories or sales to identify large animal operations in this report.)

There have been groups that challenged the dominant trends in Midwest agriculture. Midwest farmers participated in various reformist and radical movements from the late 1800s to the 1940s: these included the Grange and Farmers' Alliance, farmer-labor parties, the Farmers National Committee for Action, and the Communist Party USA.<sup>50</sup> Many Midwest farmers took part in left-leaning movements up to the early 1930s, but after New Deal legislation helped stabilize the crisis-rocked farm industry, and more modest farmers were increasingly forced out of production, the remaining operators tended to take a conservative turn.<sup>51</sup> Farmers are predominantly conservatives

today.<sup>52</sup> Against this tendency, there are farmers and advocates who argue for the rights of BIPOC farmers and for alternative agricultural systems that use sustainable methods. There are farmers and farm groups throughout the Midwest that advocate for African American, Hispanic, Native American, and Asian farmers.<sup>53</sup> Groups like the Savanna Institute operate demonstration farms where they implement alternative practices and offer technical assistance.<sup>54</sup>

The Midwest has long been at the center of the United States agricultural system. The region produces huge amounts of the country's most economically important farm products, raised in capital-intensive operations that contribute to rural inequalities and pollute the environment. The farm operators are almost all white, while the workers they bring on or who process the food for market are disproportionately Hispanic.<sup>55</sup> The

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environment/2014/03/hog-wild-factory-farms-are-poisoning-iowas-drinking-water/.

49. U.S. EPA, National Pollutant Discharge Elimination System (NPDES): Animal Feeding Operations (AFOs), <https://www.epa.gov/npdes/animal-feeding-operations-afos> (last updated Aug. 3, 2020).
50. DANIEL NELSON, *FARM AND FACTORY: WORKERS IN THE MIDWEST 1880-1990*, 20-21 (discussing the Grange and Alliances), 69, 136 (discussing farm-labor parties, although see 137 on the difficulties these parties had in keeping farmers and workers in a coalition) (Ind. U. Press 1995); John L. Shover, *The Communist Party and the Midwest Farm Crisis of 1933*, 51 J. AM. HIST. 248 (1964) (discussing the Farmers National Committee for Action and Communist Party USA).
51. NELSON, *supra* note 50, at 117-118; Maywa M. de Wit et al., *Agrarian Origins of Authoritarian Populism in the United States: What can we Learn from 20th-Century Struggles in California and the Midwest?* 82 J. RURAL STUD. 518, (2021) (outlining conservatism in the 1950s-70s).
52. Richard Mertens, *Midwest Farmers are Sticking with Trump*, THE CHRISTIAN SCI. MONITOR (Oct. 30, 2020), <https://www.csmonitor.com/Business/2020/1030/Why-Midwest-farmers-are-sticking-with-Trump> (discussing Midwest farmer conservatism today); Nathan Rosenberg & Bryce Stucki, *Don't Trust the Antitrust Narrative on Farms*, JACOBIN (June 6, 2021), <https://jacobin.com/2021/06/antitrust-farmers-farmworkers-exploitation-agribusiness-low-pay-dangerous-working-conditions> (note discussion on farmer conservatism, including their strong approval of Donald Trump).
53. See Kynala Phillips, *Wisconsin's Black Farming Tradition*, THE BELT MAG. (Aug. 20, 2021), <https://beltmag.com/wisconsin-black-farming-tradition/>; Erin Jordan, *Black Farmers in Iowa Plowing Different Path*, THE GAZETTE (Feb. 21, 2022), <https://www.thegazette.com/agriculture/black-farmers-in-iowa-plowing-different-path/>; RAICES LATINAS, *Who We Are*, <https://www.raiceslatinasmc.org/who-we-are>; Susan Cosier, *For Thousands of Years, Indigenous Tribes have been Planting for the Future*, NAT. RES. DEF. COUNCIL (Nov. 30, 2021), <https://www.nrdc.org/stories/thousands-years-indigenous-tribes-have-been-planting-future>; HMONG AM. FARMERS ASSOC., <https://www.hmongfarmers.com/#> (last visited Oct. 29, 2023).
54. SAVANNA INST., *Our Work* (Oct. 31, 2023), <https://www.savannainstitute.org/our-work/>.
55. See *infra* "BIPOC Farmers"; Mary Wisniewski & Christine Stebbins, *Midwest Farm Town, Transformed by Immigration, Thrives*, REUTERS (June 20, 2021), <https://www.reuters.com/article/usa-immigration-meatpacking/feature-midwest-farm-town-transformed-by-immigration-thrives-idINL1E8HFHT820120620> (discussing food system workers in an Illinois town); Angela Stuesse & Nathan Dollar, *Who are America's Meat and Poultry Workers?*, WORKING ECON. BLOG (Sept. 24, 2020, 10:00 AM), <https://www.epi.org/blog/meat-and-poultry-worker-demographics/> (discussing meatpacking and poultry processing industries).

few BIPOC farmers are often at the edges of the system. People who do not inherit a farm or who lack substantial wealth have little realistic hope of breaking in. Federal policies helped create this mode of agriculture and can undo it. The workers, prospective farmers, and farmers outside the mainstream will be at the forefront to change the system.

The remainder of the report expands on the themes in this section. We first provide a brief history of Midwest farming. We then review the region's major and minor farm industries, with a

focus on production practices, with some attention to markets. We then provide an overview of economic inequalities in the farm system, with commentary on new and beginning farmers. We then look at BIPOC farmers, followed by a discussion of farmworkers. Next, we review greenhouse gas emissions and other environmental damage caused by current practices. We also review alternative farm systems in the region. We close with a summary of our argument. We also provide various detailed tables on topics covered in this report in the appendix.



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# HISTORICAL OVERVIEW

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This section provides a brief history of Midwest agriculture. This history emphasizes the long development and persistence of certain distinctive aspects of the region's farm system, which were present in an early form on the farms of early white settlers. In this section, we place an emphasis on the development of production and of markets. Later in the report, we discuss more of the history of the region's BIPOC farmers.

The Midwest region was inhabited and cultivated by Native Americans for hundreds of years before the first European settlers arrived. Native Americans raised corn and burned forest land in order to maintain ecosystems that supported the bison that they hunted. When white settlers reached the Midwest's flat, fertile plains, they were encountering the product of conscious cultivation by Native Americans.<sup>56</sup> Through a series of wars and dispossessions, white settlers stole this land from the Native Americans, driving many of those who survived onto reservations or out of the region.<sup>57</sup>

The white settlers who most influenced the region's agricultural development came to Ohio's Scioto River Valley by way of Virginia. These settlers had developed a system of fattening cattle on

corn, then having hogs feed on the waste.<sup>58</sup> They desired tracts of land where they could situate their country houses and implement their new form of agriculture.<sup>59</sup> These farmers ran operations that were the product of many different cultures. Their corn had been bred by Indigenous people in Mexico, then brought to the north by native peoples.<sup>60</sup> Their cattle came from England and their hogs had escaped from Spanish colonists, only to be found by British settlers.<sup>61</sup> They would keep this system's profits for themselves.

From the early 1800s to the early 1900s, farmers spread the corn-cattle-hog system from western Ohio, northern Kentucky, and central Tennessee west to the outer edge of Iowa, and up into southern Minnesota and Wisconsin, covering, more or less, the modern day Corn Belt.<sup>62</sup> In the 1800s, cattle ranchers from Kansas to Texas would take advantage of cheap land to raise large herds of cattle, which they would send to the Midwest for finishing.<sup>63</sup> During the second half of the 1800s, domestic consumers showed a demand for pork and goods derived from pig products, like soap, candles, cosmetics, and oil made from lard or lard constituents.<sup>64</sup> Chicago's industrial pork industry, processing roughly half of all pork chops in the nation by 1890, was sustained by this demand.<sup>65</sup> By

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56. Hudson, *supra* note 29, 23-24, 28, 33 (discussion of burning), 47 (discussion of corn).

57. See *Indians at the Time of Contact, 1600-1850*, LIBR. CONG., <https://www.loc.gov/collections/pioneering-the-upper-midwest/articles-and-essays/history-of-the-upper-midwest-overview/indians-at-the-time-of-contact/> (last visited Oct. 31, 2023), for a brief summary.

58. Hudson, *supra* note 29, at 6-7.

59. *Id.* at 73.

60. Hudson, *supra* note 29, at chapter 4: "Zea Mays."

61. *Id.* at 6, 69.

62. See *id.* at 11 fig. 4.

63. *Id.* at 70, 72.

64. *Id.* at 85.

65. Hudson, *supra* note 29, at 132.

the late 1800s, Iowa had become the nation's leading hog producer.<sup>66</sup> After World War I, consumers shifted their preferences toward leaner meat and vegetable oils, and the price of hogs fell.<sup>67</sup> Farmers also faced a fall in corn prices.<sup>68</sup> Desperate for new sources of income amid the farm crisis of the early 1930s, some farmers began to grow soybeans.<sup>69</sup> Investors put up the capital for industries centered on the legume, such as vegetable oil, margarine, and soy meal production, which helped create demand for soy.<sup>70</sup> By the mid-1960s, three-quarters of the region's crop receipts came from corn and oil crops (soy is an oil crop).<sup>71</sup> Midwestern feedlot operators also saw changes in their industry. Cattle feedlot operators moved their businesses west, to be closer to ranchers who raised cattle.<sup>72</sup> Hog farmers started to run CAFOs in the late 20th century.

Many farmers ran diversified systems in these years. It was typical for farmers to keep horses, chickens, and sometimes sheep.<sup>73</sup> Crop farmers rotated wheat and oats with corn.<sup>74</sup> In the Upper Midwest, early settlers from Pennsylvania ran diversified farms that produced wheat, cattle,

corn, and hogs. Under pressure from more profitable corn-cattle-hog farms, these families or their children, tended to switch to the Corn Belt system.<sup>75</sup> Investors set up "bonanza" wheat farms, sometimes encompassing thousands of acres, in Minnesota in the late 1800s. On the largest farms, absentee landlords employed hundreds of farmworkers, who used modern machinery to complete the harvest. Many of these operations, after taking on too much debt, went under in the crash of 1893.<sup>76</sup> Farmers from New York and immigrants from Scandinavian countries brought dairy farm practices to Wisconsin and Minnesota.<sup>77</sup> Around the turn of the century, these two states were already leaders in dairy production, with Wisconsin developing a specialization in cheese and Minnesota in butter.<sup>78</sup>

Since World War I, the major farm industries of the Midwest, and many of the minor ones, have seen enormous increases in productivity. These changes are the result of efforts by large numbers of workers, scientists, engineers, marketers, and farmers. From 1919 to 1997, corn bushels per harvested acre more than tripled in Iowa.<sup>79</sup> In this

66. Mark Honeyman et al., *Iowa's Changing Swine Industry* (Aug. 7, 2006), <https://www.thepigsite.com/articles/iowas-changing-swine-industry>.

67. *Id.* at 158-159.

68. *Id.*

69. *Id.*

70. *Id.* at 158-60.

71. Calculated by the authors using ECON. RSCH. SERV., *supra* note 39.

72. JOHN C. HUDSON & CHRISTOPHER R. LAINGEN, *AMERICAN FARMS, AMERICAN FOOD: A GEOGRAPHY OF AGRICULTURE AND FOOD PRODUCTION IN THE UNITED STATES* 73 (2016).

73. HUDSON, *supra* note 29, at 177.

74. *Id.* at 75.

75. *Id.* at 102-3.

76. Harold E. Briggs, *Early Bonanza Farming in the Red River Valley of the North*, 6 *AGRIC. HIST.* 26, 36 (1932).

77. GRANGER & KELLY, *supra* note 35; Wisconsin Historical Society, *supra* note 36.

78. *Id.*

79. Calculated by the authors using BUREAU OF THE CENSUS, U.S. DEP'T OF COM., 1900 CENSUS, VOL. 6 *AGRICULTURE*, <https://www.census.gov/library/publications/1922/dec/vol-06-agriculture.html> (Oct. 8, 2021), at tbl.32 for Iowa; BUREAU OF THE CENSUS, U.S. DEP'T OF COM., 1997 CENSUS OF AGRICULTURE, [https://agcensus.library.cornell.edu/census\\_year/1997-census/](https://agcensus.library.cornell.edu/census_year/1997-census/) (2019), at tbl. 42 for Iowa. We calculated bushels of corn per harvested acre of corn in 1919 and 1997, then found the ratio.



period, farmers adopted numerous new technologies they used to produce these increases. Agricultural researchers at colleges, research institutions, and seed companies developed hybrid corn with yields much higher than existing seed in the 1920s and 1930s.<sup>80</sup> Ford developed an affordable, mass-produced tractor in the 1910s and 1920s.<sup>81</sup> Engineers at various manufacturers improved on the tractor to make autos that were compatible with add-ons like cultivators, plows, and corn pickers.<sup>82</sup> Farmers used these machines to reduce their work time per acre, which allowed them to plant more acres.<sup>83</sup>

German scientists developed commercial-scale production of ammonia in the early 1900s, which Americans adapted to support the munitions industry in World War II. Some of these companies repurposed their factories to produce nitrogen fertilizer after the war.<sup>84</sup> Corn farmers applied the nitrogen in large amounts, allowing them to plant more corn per acre. Meanwhile, seed producers developed large stocks of highly productive hybrid corn seeds from the 1960s to the 1980s, seeds that allowed farmers to further increase their yields.<sup>85</sup> Those who had the money could now purchase large mechanical combines that could thresh and

clean the kernels all at once.<sup>86</sup> Farmers who could afford these machines were able to reduce their on-farm labor needs by huge amounts: whereas corn farmers had needed 38 person-hours per acre in 1900, the figure was down to 3 person-hours by 1987.<sup>87</sup> All this while corn farmers produced much more product per acre. Corn farmers saw increased demand for corn grains in the 1970s, as President Richard Nixon's administration made trade with the Soviet Union easier and international demand for animals that could be fed on corn grew.<sup>88</sup> Farmers in Illinois, Iowa, Minnesota, and Wisconsin brought about 15.7 million acres into corn and soy production from 1969 to 1978.<sup>89</sup> Meanwhile, the president of Archer-Daniels-Midland (ADM), an agribusiness firm, convinced national politicians to subsidize ethanol—a product of ADM's "wet mill" process that also produced high fructose corn syrup—as a fuel source.<sup>90</sup> Today, as much corn goes to ethanol as to feed.<sup>91</sup>

Other farm industries in the Midwest have also seen major increases in productivity. Engineers at Deere & Company developed a combine attachment that could harvest soybeans in the 1970s, replacing a battery of other machines.<sup>92</sup>

80. Hudson, *supra* note 29, at 163-168.

81. HURT, *supra* note 40, at 16.

82. *Id.* at 20-23

83. *Id.* at 24-25.

84. Anton Bekkerman et al., *The History, Consolidation, and Future of the U.S. Nitrogen Fertilizer Production Industry*, CHOICES (2020), <https://www.choicesmagazine.org/choices-magazine/submitted-articles/the-history-consolidation-and-future-of-the-us-nitrogen-fertilizer-production-industry>.

85. Hudson, *supra* note 29, at 197-198.

86. HURT, *supra* note 40, at 59 (person-hours for corn).

87. *Id.* at 100 (person-hours for corn).

88. Hudson, *supra* note 29, at 199-200.

89. *Id.* at 188.

90. Dennis Keeney, *Ethanol USA*, 43 ENVTL. SCI. TECH. 8, 9 (2009).

91. Dennis Keeney, *An Ethanol Timeline*, JOHNS HOPKINS CTR. FOR A LIVABLE FUTURE (Sept. 16, 2011), <https://clf.jhsph.edu/viewpoints/ethanol-timeline-how-we-got-here>; ECON. RSCH. SERV., USDA, FEED GRAINS SECTOR AT A GLANCE, <https://www.ers.usda.gov/topics/crops/corn-and-other-feed-grains/feed-grains-sector-at-a-glance/> (last updated Sept. 28, 2023).

92. HURT, *supra* note 40, at 57-58.

The industrialist A.E. Staley, who owned a corn-starch manufacturing company, supported the development of industrial processes to produce soybean meal to feed to animals and soybean oil used in margarine and cooking oil.<sup>93</sup> These and other developments helped create more domestic demand for soy.

Less common, but still important, crop specializations also saw increased use of machines and productivity gains. A Prussian chemist proved beets contained sugar in the mid-1700s, and another Prussian chemist opened the first factory to produce sugar from beets in 1802.<sup>94</sup> German immigrants brought the sugar beet to the United States<sup>95</sup> and made up a substantial portion of farmers and laborers in the early sugar beet industry.<sup>96</sup> Sugar beet farmers came to rely on Mexican and Japanese laborers to produce this very labor-intensive crop.<sup>97</sup> Sugar beets required 85 person-hours per acre in 1922, even after seeding and digging the plant had been mechanized.<sup>98</sup> By the mid-1960s, scientists and engineers with USDA and various private companies had created harvesters that dug and prepared the beets for

transport in one go, reducing person-hours by 75%.<sup>99</sup>

Farmers involved in animal production also implemented technologies that radically altered their industries. The early hog farmers in the Midwest bred together hogs of mixed European and Asian origin to develop animals that fattened well and could walk for long distances—this was at a time when many farmers still walked their hogs to market.<sup>100</sup> As railroad companies spread further into the Midwest, and introduced refrigerated train cars, packers moved their facilities closer to farmers, which allowed them to more easily get their hogs to buyers.<sup>101</sup> In the 1960s, a hog farmer in North Carolina pioneered the modern factory hog system. He built a grain elevator on his property and constructed sheltered hog pens on an operation that raised more than twenty times as many animals as was typical at the time.<sup>102</sup> Scientists and farmers developed hog breeds that put on weight faster and with less food, and farmers delivered food mixes in such a way that a hog of the same size required less feed.<sup>103</sup> Geneticists and breeders have also developed dairy cows, over the past two decades, that produce more milk with fewer

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93. Anna Casey, *How Did Soybean Become Such a Common Crop in the U.S.?*, INVESTIGATE MIDWEST (Dec. 22, 2017), <https://investigatamidwest.org/2017/12/22/how-did-the-soybean-become-such-a-common-crop-in-the-u-s/>.

94. Esther S. Anderson, CONSERVATION AND SURVEY DIVISION, U. NEB., *THE SUGAR BEET INDUSTRY OF NEBRASKA* 15 (1935).

95. Jim Norris, *Bargaining for Beets: Migrants and Growers in the Red River Valley*, MINN. HIST. SOC'Y 196, 198 (Winter 2002-2003), <https://web.archive.org/web/20151128181937/https://collections.mnhs.org/MNHHistoryMagazine/articles/58/v58i04p196-209.pdf>.

96. Valdés, *supra* note 27, at 110-13.

97. *Id.*

98. HURT, *supra* note 40, at 78.

99. *Id.* at 78-83.

100. HUDSON, *supra* note 29, at 83-84.

101. *Id.* at 133-134.

102. HUDSON & LAINGEN, *supra* note 72, at 85.

103. CHRISTOPHER G. DAVIS ET AL., USDA, U.S. HOG PRODUCTION: RISING OUTPUT AND CHANGING TRENDS IN PRODUCTIVITY GROWTH, 1, 15, 20-21 (2022).

inputs.<sup>104</sup> Some dairy farms are even using AI systems and robots to manage and milk their cows.<sup>105</sup>

Almost all farmers in the Midwest in the early 1900s raised flocks of chickens whose eggs they sold to cities, transported by rail.<sup>106</sup> By the 1920s, eggs commanded the sixth most receipts of any agricultural product, and Iowa was the leader in “shell eggs” marketed to cities.<sup>107</sup> Over the next few decades, USDA employees, agricultural college professors, and businesses developed chicken housing facilities; mechanized incubators and egg cleaners; and invented new feed mixtures and practices to increase egg output per hen while reducing labor hours.<sup>108</sup> Along the way, the egg laying industry became distinct from the broiler (meat chicken) industry.<sup>109</sup> Private companies and university researchers have also developed robots that can clean and pick up eggs from the floor in cage-free chicken enclosures.<sup>110</sup>

Farmers’ adoption of privately-owned, capital-intensive production has given Midwest agriculture certain defining features. First, farmers in the major industries produce enormous and increasing amounts of product. Farmers have been able to reach higher levels of production in part through

higher yields, per acre and per animal (measured in weight or “output,” like milk). Second, farmers have replaced labor with machines, reducing labor costs and time. In fact, one-third of corn farmers on farm businesses in Illinois and Iowa say they average less than 40 hours a week on the farm.<sup>111</sup> Third, farms are concentrated. As an example, dairy farms are undergoing a period of concentration that has been painful for many smaller producers. Larger farms have implemented improved breeding techniques, computerized management systems, and robots to increase productivity.<sup>112</sup> This has reduced their costs and increased their profits.<sup>113</sup> As discussed later, this pattern has played out, in one way or another, in all the major Midwest farm industries (with ranching as an exception). Even with this concentration, for reasons that we discuss later, the farm industry still contains far more farms than the typical concentrated industry contains companies. USDA’s farm statistics, due to the department’s expansive definition of the term “farm,” also include a huge number of “farms in name only” that produce little or no agricultural products. USDA’s inclusion of these farms in its statistics has misled many analysts into concluding that agriculture is far less concentrated than it

104. ERIC NJUKI, ECON. RSCH. SERV., USDA, SOURCES, TRENDS, AND DRIVERS OF U.S. DAIRY PRODUCTIVITY AND EFFICIENT 16 (Christine Williams et al. eds., 2022).

105. Treena Hein, *Dairy Farming and Partnering with AI Systems*, DAIRY GLOBAL (Jan. 14, 2021), <https://www.dairyglobal.net/industry-and-markets/smart-farming/dairy-farming-and-partnering-with-ai-systems/>; Marcia Endres & Jim Salfer, *Milking Dairy Cows with Robots*, U. MINN. EXTENSION (2020), <https://extension.umn.edu/precision-dairy/milking-dairy-cows-robots>.

106. M.T. Kidd & K.E. Anderson, *Laying Hens in the U.S. Market: An Appraisal of Trends from the Beginning of the 20th Century to Present*, 28 J. APPLIED POULTRY RES. 771, 772-83 (2019).

107. *Id.*

108. *Id.*

109. *Id.*

110. Lilong Chai, *Robots for Precision Poultry and Egg Production*, U. GA (Aug. 24, 2022), <https://site.caes.uga.edu/precisionpoultry/2022/08/robots-for-precision-poultry-and-egg-production/#:~:text=There%20are%20two%20primary%20robotic,been%20tested%20in%20different%20countries>.

111. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.

112. JAMES M. MACDONALD ET AL., ECON. RES. SERV., USDA, CONSOLIDATION IN U.S. DAIRY 13, 24-25 (2020); see also Marcia Endres & Jim Salfer, *supra* note 105, (discussing the role of robots in increasing productivity).

113. MACDONALD ET AL., *supra* note 112, at 7, 24-25.

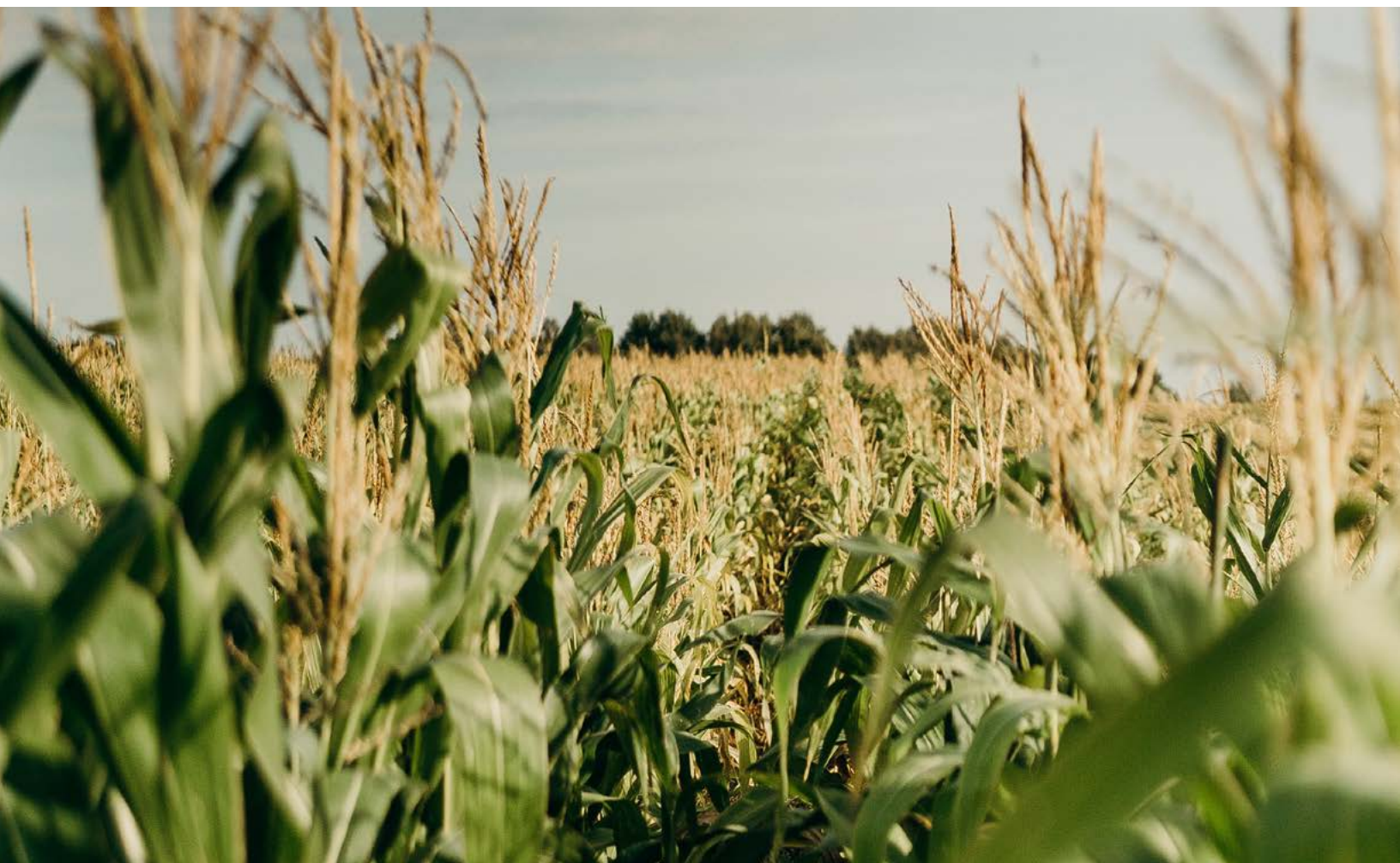


really is. By focusing on farms above certain sales and income thresholds, we attempt to account for this problem throughout the report.

That Midwest agriculture has evolved in this way has created enormous environmental and social problems. Conventional crop and animal farms are responsible for large amounts of greenhouse gas emissions. Conventional crop farms pollute their environments with fertilizer runoff and chemicals. Many CAFOs produce dangerous amounts of waste that can poison drinking supplies and emit odors that degrade the quality of life for people nearby. Farm ownership is the province of the rich,

out of reach for those who lack access to capital. A farmer looking to raise the midpoint acreage of corn and soybeans in the Midwest needed \$8 million in “farm, land, and structures” in 2012.<sup>114</sup> Since families try to keep land within the family, outsiders have fewer chances to purchase land—plus farmers rarely sell.<sup>115</sup> BIPOC people have made up a very small percentage of the rural population for most of the Midwest’s history<sup>116</sup> and have faced pervasive discrimination. We will expand on these issues later in the report. Now, we present an analysis of the region’s major and minor farm industries.

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114. MACDONALD ET AL., *supra* note 43, at 49. Note that “midpoint acreage” refers to the acreage amount where half of all acreage is greater than the midpoint. Contrast this with median acres, where half of all farms have greater acreage. See explanation at ii.
115. See Mishra et al., *supra* note 16 (discussing the importance of keeping farm in family); Mihaljevich, *supra* note 16 (discussing low volume).
116. Steven Ruggles et al., IPUMS ACS USA: Version 13.0, 2019, <https://doi.org/10.18128/D010.V13.0>. We analyzed reported race in the Midwest in non-metro areas.





# FARM INDUSTRIES

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The vast majority of Midwest farm income comes from a small number of major commodities: corn, soybeans, hogs, milk from cows, and cattle. The farms that produce these products are highly specialized, capital-intensive, and tend to be concentrated. An exception is ranchers raising cattle before sending them to a feedlot. This part of the beef production chain has yet to consolidate, while feedlots, which receive most of the cattle income in the Midwest, are highly concentrated. The Midwest also has a variety of minor industries, some of them national leaders. These include

vegetables like green peas, dry beans, and carrots, as well as animals such as turkeys and ducks. Large producers also dominate these minor industries. A handful of minor products, like hay and oats, are relatively less concentrated. We analyze these products as well. We also examine, in this section, USDA's counts of "farms" that produce little to no farm products. This section's focus is on production, with some attention to markets. In the next section, we look at farmer economic conditions across farm specializations.

## MAJOR INDUSTRIES

The Midwest is a major producer of the products that bring in the largest revenues in United States agriculture. Midwest farm production is largely devoted to a small number of products: corn, soybeans, hogs, milk from cows, cattle, and poultry products including eggs.<sup>117</sup> These products have massive markets. Total U.S. sales of these products reached \$340 billion (in real 2023 dollars) in 2021, accounting for around 70% of all agricultural sales in the country. In the Midwest, these products made up over 90% of sales.<sup>118</sup> The states under

study sold around two-thirds of the nation's hogs, half of all corn and soybeans, a quarter of all milk, and about an eighth of all cattle and calves, by value.<sup>119</sup> Midwest farmers sell a significant amount of these products to foreign consumers. The nation's biggest agricultural exports are soybeans, corn, pork, feed, and soybean meal.<sup>120</sup> The Midwest produces around half or more of each of these exports (including almost two-thirds of pork exports) by value.<sup>121</sup>

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117. Query from ECON. RSCH. SERV. CASH RECEIPTS BY COMMODITY STATE RANKING Tool, *supra* note 3.

118. *Id.*

119. *Id.*

120. ECON. RSCH. SERV., USDA, *Annual State Agricultural Exports Interactive Chart*, <https://www.ers.usda.gov/data-products/state-agricultural-trade-data/annual-state-agricultural-exports/> (last updated Oct. 31, 2023); ECON. RSCH. SERV., USDA, *STATE AGRICULTURAL TRADE DATA*, <https://ers.usda.gov/data-products/state-agricultural-trade-data/> (last updated Nov. 2, 2023).

121. ECON. RSCH. SERV., USDA, *U.S. Agricultural Exports, Commodity Detail by State: Calendar Years 2000-2021*. <https://ers.usda.gov/data-products/state-agricultural-trade-data/> (last updated Nov. 2, 2023).

**Table 2. Receipts (\$1,000, in real 2023 dollars) from selected and all commodities in the Midwest and U.S., 2021**

State	Corn	Soybeans	Hogs	Dairy products, milk	Cattle and calves	Poultry and eggs	All commodities
Illinois	11,741,943	7,758,173	2,112,802	354,186	768,882	155,877	24,012,784
Indiana	5,564,653	4,421,042	1,639,488	922,882	444,953	1,598,356	15,701,152
Iowa	13,174,208	7,338,474	10,395,197	1,147,922	4,532,006	1,492,419	38,590,169
Minnesota	7,733,167	4,745,811	3,639,755	2,194,353	1,810,653	1,307,328	24,088,415
Ohio	3,188,940	3,387,122	1,050,185	1,179,263	631,153	1,257,571	12,230,135
Wisconsin	2,277,023	1,249,178	207,471	6,542,883	1,858,889	333,105	14,245,398
<b>Midwest</b>	<b>43,679,934</b>	<b>28,958,580</b>	<b>19,044,898</b>	<b>12,341,489</b>	<b>10,046,536</b>	<b>6,144,656</b>	<b>128,868,053</b>
<b>U.S.</b>	<b>79,504,078</b>	<b>54,304,585</b>	<b>31,098,544</b>	<b>46,206,685</b>	<b>80,412,887</b>	<b>51,048,081</b>	<b>482,965,911</b>

Source: Query from Econ. Rsch. Serv., USDA, Cash Receipts by Commodity State Ranking Tool, *supra* note 3.

Midwest farms bring in huge amounts of revenues from these products. The region brought in about a quarter of total commodity receipts in 2021. Iowa made \$39 billion (in real 2023 dollars), second-most in the country (see Table 2).<sup>122</sup> Minnesota and Illinois brought in about \$24 billion each. Indiana, Wisconsin, and Ohio made between \$12 billion and \$16 billion each.<sup>123</sup> All six states ranked in the top ten in farm receipts, except Ohio at 13th.<sup>124</sup> Every state also got at least 85% of its receipts from corn, soy, hogs, milk, cattle and calves, and poultry and eggs.<sup>125</sup>

Since almost all of these products are produced on larger, highly specialized farms, total sales are also concentrated among these farms. Roughly 10% of farms account for 75% of sales in every Midwest state (see Table 3).<sup>126</sup> Commercial farms made almost 80% of all sales in 2017.<sup>127</sup> Farms that produce corn and soy, hogs, milk, and cattle—as well as farms that produce many minor commodities—are, with some small caveats, highly specialized and concentrated.

122. *Id.*

123. *Id.*

124. *Id.*

125. *Id.*

126. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, STATE LEVEL DATA at tbl. 41.

127. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. Note that commercial farms are family farms with at least \$350,000 in GCFI and nonfamily farms. ECON. RSCH. SERV., USDA, FARM HOUSEHOLD WELL-BEING: GLOSSARY (Aug. 31, 2023), <https://www.ers.usda.gov/topics/farm-economy/farm-household-well-being/glossary/>.

**Table 3. Minimum number of farms (share of all farms) to account for 50% of sales and 75% of sales in the Midwest, 2017**

State	50% of sales	75% of sales
Illinois	3,681 (5.1%)	9,508 (13.1%)
Indiana	1,809 (3.2%)	5,070 (8.9%)
Iowa	3,730 (4.3%)	11,530 (13.4%)
Ohio	1,984 (2.5%)	6,047 (7.8%)
Minnesota	2,900 (4.2%)	8,175 (11.9%)
Wisconsin	1,663 (2.6%)	5,900 (9.1%)

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, State Level Data at tbl. 41.

## Corn and Soy

Corn and soy are the stereotypical industrial crops. In the Midwest, these products account for around 90% of crop sales and half of all agricultural sales of any kind.<sup>128</sup> They were also planted on almost 90% of all harvested cropland acres as of the last census (see Figure 3 for a map that displays the production of corn and soy bushels by county).<sup>129</sup> Over 85% of all harvested cropland was in farms with at least moderate sales.<sup>130</sup> Corn and soy farms require large investments: the median Illinois farm business specializing in corn spent \$43,000 on seed expenses and \$75,000 on fertilizer and

chemical expenses (insecticides, herbicides, fungicides, etc.), and owned \$280,000 of farm equipment (measured in market value, as assessed by the farmer) in 2021.<sup>131</sup> Farms with a soybean specialization spent less on seeds and fertilizer, with \$19,000 on seed expenses and \$38,000 on fertilizer and chemical expenses, because soybean seed tends to be cheaper and soybeans do not require nitrogen fertilizer because they “fix” their own nitrogen.<sup>132</sup> (Note that here and elsewhere in the report, when we refer to, as an example, “corn farms” or “farms with a corn specialization,” this means the farm’s main product by value was corn, not that it exclusively produced or produces corn. Midwest farms often rotate corn and soy, so a “corn farm” in one year can be a “soy farm” the next year, and may produce both products, or other products, in the same year.) At the same time, corn and soy yields and prices differ such that net returns are close. The exact ratio of corn and soy that farmers choose to plant depends on numerous factors, like projected input prices, yields, and sale prices.<sup>133</sup> Some modern corn and soy farmers seek to protect their income through participation in financial markets: 12% of corn and soy farmers use futures contracts, options, or marketing contracts to protect themselves against uncertain market conditions.<sup>134</sup>

128. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 2.

129. *Id.* at STATE LEVEL DATA tbl. 1.

130. *Id.* at TYPOLOGY.

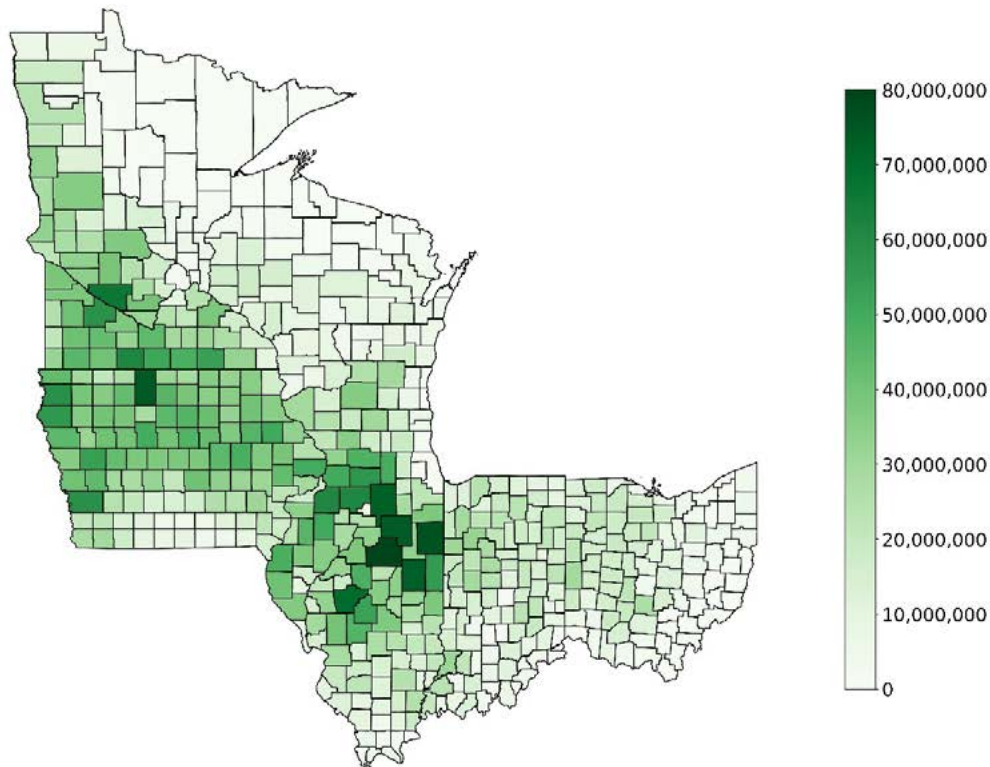
131. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12; 2017 CENSUS OF AGRICULTURE, *supra* note 7, at APPENDIX B 49 (USDA asks farmers to assess their farm equipment’s market value).

132. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12; Matthew Meisner, *What can you Expect to Pay for Corn and Soybean Seed Traits*, FARMER’S BUS. NETWORK (Apr. 21, 2020), <https://www.fbn.com/community/blog/corn-soybean-trait-costs; Examine Seed Costs for Corn and Soybeans>, FARM PROGRESS (Dec. 6, 2015), <https://www.farmprogress.com/corn/examine-seed-costs-for-corn-and-soybeans> (Cheaper seeds); Gary Schnitkey et al., *Weekly Farm Economics: 2022 Planting Decisions, Nitrogen Fertilizer Prices, and Corn and Soybean Prices*, 11 FARMDOC DAILY 1, 1-5 (2021); Kim Chipman et al., *Soy Usurps King Corn as U.S. Farmers Dodge Pricey Fertilizer*, BLOOMBERG (Mar. 31, 2022), <https://www.bloomberg.com/news/articles/2022-03-31/farmers-to-slash-corn-plantings-amid-record-fertilizer-prices?leadSource=uverify%20wall> (nitrogen fix).

133. Elaine Kub, *Soybeans Not ‘Bidding’ for Acres Because They Don’t Have To*, PROGRESSIVE FARMER (Feb. 22, 2023), <https://www.dtnpf.com/agriculture/web/ag/news/article/2023/02/22/soybeans-bidding-acres>.

134. JAMES M. MACDONALD, ECON. RES. SERV., USDA, CORN AND SOYBEAN FARMERS COMBINE FUTURES, OPTIONS, AND MARKETING CONTRACTS TO MANAGE FINANCIAL RISKS (Nov. 2, 2020), <https://www.ers.usda.gov/amber-waves/2020/november/corn-and-soybean->

**Figure 3. Number of corn and soybean bushels by county in the Midwest, 2017**



Source: 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 2; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

Corn and soy farms are highly mechanized. Farmers use machines to plant and to spread fertilizers and herbicides. At harvest time, the operator drives a combine through their field, where the machine knocks over corn stalks, conveys the ears into a chamber where a rotor knocks loose the kernels, then transports the kernels into a filter system that separates the kernels from any

remaining chaff.<sup>135</sup> The combine expels the corn waste products onto the harvested field to decompose, while it deposits the grains into a holding bin or into a grain cart attached to an automobile that another operator drives alongside the combine.<sup>136</sup> Operators can also augment or adjust combines to harvest soybeans.<sup>137</sup> About 70% of farms (regardless of specialization) with 1,000 to 1,999 acres

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farmers-combine-futures-options-and-marketing-contracts-to-manage-financial-risks/.

135. Note that the description in the paragraph is for a particular design of a combine. The general idea is that the machine harvests the ears, separates the kernels, removes any remaining chaff, deposits the kernels into a bin, and expels the chaff onto the field. See Griggs Farms LLC, *How a Combine Works: A View Inside the Combine*, YouTube (Jan. 12, 2020), <https://www.youtube.com/watch?v=ZMDw9mUoG2M> (demonstrating how a combine works); Bigtractorpower, *John Deere 4640 Tractor on Corn Harvest Grain Cart Duty*, YouTube (Nov. 26, 2019), <https://www.youtube.com/watch?v=WevxOLkaHpk> (showing a combine that deposits into a grain cart).

136. *Id.*

137. See The Farmer's Life, *Switching Combine Heads for Different Crops*, THE FARMER'S LIFE (November 10, 2013), <https://thefarmerslife.com/switch-combine-heads-different-crops/> (discussing changing the "head" on a combine so it can harvest corn or soy).



have hired labor expenses and about 86% of farms with at least 2,000 acres have labor expenses.<sup>138</sup> Some hired workers operate machines and others may perform maintenance or other tasks around the farm.<sup>139</sup> Farmers also hire workers for so-called “hand-requiring” jobs, like hoeing weeds, “de-tasseling” corn for corn seed, and packing produce.<sup>140</sup> What USDA terms “oilseed and grain” farms, which are mostly corn and soy farms, despite their mechanization, still spend the most on labor of any farm specialization in the Midwest.<sup>141</sup>

Corn and soy farmers have seen their yields rise in a linear fashion in recent decades.<sup>142</sup> A recent USDA report identifies two recent drivers of productivity increases as farmers’ use of genetically engineered (GE) seeds and implementation of so-called “precision technologies.”<sup>143</sup> Corn and soy farmers have adopted GE corn and soybean seeds at a near-universal scale.<sup>144</sup> The most common GE corn produces insecticidal substances (often

called “Bt corn,” after the insecticidal bacteria Bt) and is resistant to herbicides. The most common GE soy has herbicide resistance.<sup>145</sup> Many GE seeds also have drought-resistance, which has helped farmers cut down on irrigation costs.<sup>146</sup> Academic research has attributed a recent decline in corn pests to farmers’ adoption of GE corn.<sup>147</sup> As a consequence, farmers have reduced their insecticide applications. Farmers only applied insecticides (insect killers) to 14% of their corn acreage in 2021.<sup>148</sup> However, farmers have increased their application of herbicides (weed killers) so much that total chemical applications (insecticides and herbicides combined) have increased.<sup>149</sup> Farmers who use GE corn and GE soy with herbicide resistance spray weeds with the herbicide their crops resist. This practice has led to herbicide-resistant weeds.<sup>150</sup> Farmers have responded by increasing their spraying and by switching between crops with resistance to different types of herbicides,

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138. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 71. Note that since almost all cropland is in corn and soy farms, it seems likely that a high share of corn and soy farms with at least 1,000 hire labor.
  139. See MACDONALD ET AL., *supra* note 43, 20 tbl. 8 (2013); William Edwards & Alejandro Plastina, *Grain Harvesting Equipment and Labor in Iowa*, AG DECISION MAKER (Iowa S. 2016) (demonstrating that some hired workers operate machines).
  140. José G. Villagrán, *Revisiting the ‘Midwest Stream’: An Ethnographic Account of Farmworkers on the Texas-Michigan Circuit*, 2, 130 (May 2019) (Ph.D dissertation, U. Tex.).
  141. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.
  142. MONICA SAAVOSS ET AL., ECON. RSCH. SERV., USDA, TRENDS IN PRODUCTION PRACTICES AND COSTS OF THE U.S. CORN SECTOR 6 fig. 4 (2021); Gary Schnitkey et al., *Weekly Farm Economics: Perspectives on National U.S. Corn Yields for Productivity and Down-Side Yield Risk*, 12 FARMDOC DAILY 1, (2022); NAT’L AGRIC. STAT. SERV., USDA, SOYBEANS: YIELD BY YEAR, US (Oct. 12, 2023), [https://www.nass.usda.gov/Charts\\_and\\_Maps/Field\\_Crops/soyylid.php](https://www.nass.usda.gov/Charts_and_Maps/Field_Crops/soyylid.php).
  143. SAAVOSS, *supra* note 142, at 33 (corn); KATE VAIKNORAS & TODD HUBBS, CHARACTERISTICS AND TRENDS OF U.S. SOYBEAN PRODUCTION PRACTICES, COSTS, AND RETURNS SINCE 2002 i. (2023).
  144. ANNE EFFLAND ET AL., ECON. RES. SERV., USDA, INNOVATIONS IN SEED AND FARMING TECHNOLOGIES DRIVE PRODUCTIVITY GAINS AND COSTS ON CORN FARMERS (Apr. 4, 2022), <https://www.ers.usda.gov/amber-waves/2022/april/innovations-in-seed-and-farming-technologies-drive-productivity-gains-and-costs-on-corn-farms/>.
  145. ECON. RSCH. SERV., USDA, RECENT TRENDS IN GE ADOPTION, <https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-u-s/recent-trends-in-ge-adoption/> (last updated Oct. 4, 2023).
  146. EFFLAND, *supra* note 144.
  147. Charles M. Benbrook, *Impacts of Genetically Engineered Crops on Pesticide use in the U.S.: The First Sixteen Years*, 24 ENV’T SCI. EUROPE 24, (2012).
  148. NAT’L AGRIC. STAT. SERV., USDA, 2021 AGRICULTURAL CHEMICAL USE SURVEY: corn Fig. 2 (May 2022), [https://www.nass.usda.gov/Surveys/Guide\\_to\\_NASS\\_Surveys/Chemical\\_Use/2021\\_Field\\_Crops/chemhighlights-corn.pdf](https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Chemical_Use/2021_Field_Crops/chemhighlights-corn.pdf).
  149. JORGE FERNANDEZ-CORNEJO ET AL., ECON. RSCH. SERV., USDA, GENETICALLY ENGINEERED CROPS IN THE UNITED STATES 24 (2014); BENBROOK, *supra* note 147.
  150. FERNANDEZ-CORNEJO ET AL., *supra* note 149, at i.

so they can spray with different herbicides over time.<sup>151</sup> Corn and soy farmers have continued to use heavy applications of fertilizer, with recent increases in nitrogen applications.<sup>152</sup> The various chemicals and fertilizers farmers use have serious consequences for human health and for ecosystems, a point we will return to later.

Another source of recent productivity gains on corn and soy farms are so-called “precision technologies.” A common precision technology system includes a yield monitor and yield map. An operator installs a yield monitor on their combine, in conjunction with a GPS system, and the monitor informs them of the yields in different parts of their land. Farmers can convert these data into a map that helps them visualize yields in different parts of their fields. They can use this information to identify problems and address them with adjustments to inputs on different parts of their farm.<sup>153</sup> More cutting-edge technologies, like drones or robots that use AI to identify and remove weeds, have much lower adoption rates.<sup>154</sup> A USDA

study found that corn farmers with average-size operations who adopted precision technologies increased their net returns by a few percent.<sup>155</sup> The study found larger farms were more likely to adopt these technologies.<sup>156</sup>

The government also helps larger farms. USDA’s census of agriculture does not provide the relevant statistics for corn and soy farms alone but does provide statistics for “oilseed and grain specialization” farms. This category approximates corn and soy farms in the Midwest.<sup>157</sup> These farms have over 85% of their acreage enrolled in crop insurance.<sup>158</sup> While the census does not provide these data for corn and soy farms by size, the COA typology report shows that farms in the Midwest with at least moderate sales operate over 90% of all land enrolled in crop insurance.<sup>159</sup> The federal government heavily subsidizes crop insurance premiums.<sup>160</sup> Farmers can also receive loans from the government-owned Commodity Credit Corporation (CCC) between harvest and sale.<sup>161</sup> Corn and soy farmers receive about 90% of CCC

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151. FERNANDEZ-CORNEJO ET AL., *supra* note 149, at iv; Lauren Quinn, UNIVERSITY OF ILLINOIS-URBANA CHAMPAIGN, *Tank-mixing herbicides may not be enough to avoid herbicide resistance*, ACES NEWS (May 2023), <https://aces.illinois.edu/news/tank-mixing-herbicides-may-not-be-enough-avoid-herbicide-resistance>.

152. EFFLAND, *supra* note 144.

153. SAAVOSS, *supra* note 142; William Casady et al., *Precision Agriculture: Yield Monitors*, U. Mo. (Nov. 1998), <https://extension.missouri.edu/media/wysiwyg/Extensiondata/Pub/pdf/envqual/wq0451.pdf>.

154. SAAVOSS, *supra* note 142; Zach Winn, *Titanic Robots Make Farming More Sustainable*, MIT NEWS (Mar. 9, 2023), <https://news.mit.edu/2023/titanic-robots-farming-more-sustainable-0309>.

155. DAVID SCHIMMELPFENNIG, ECON. RSCH. SERV., USDA, *FARM PROFITS AND ADOPTION OF PRECISION AGRICULTURE IV.* (2016).

156. *Id.*, at 29.

157. Almost all sales in this category come from corn or soy, and almost all sales of corn and soy come from farms in this specialization. In the Midwest, over 90% of sales in the category come from corn and soy; furthermore, around 90% of all corn sales and all soy sales come from this category. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

158. *Id.*

159. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

160. Vincent H. Smith et al., *Time to Reform the US Federal Agricultural Insurance Program*, AMERICAN ENTERPRISE INSTITUTE 10 (Oct. 2017), <https://www.aei.org/wp-content/uploads/2017/10/Time-to-Reform-the-US-Federal-Agricultural-Insurance-Program.pdf>

161. See FARM SERV. AGENCY, USDA, *Non-Resource Marketing Assistance Loans*, <https://www.fsa.usda.gov/programs-and-services/price-support/commodity-loans/>.

loans.<sup>162</sup> Farms with at least moderate sales receive almost 100% of these loans by amount.<sup>163</sup> Farmers also receive various other government payments, like conservation payments, price support payments, and disaster relief payments. Corn and soy farmers receive about two-thirds of government payments.<sup>164</sup> Again, larger farms (with any kind of production) receive more than their share: 70% of the total.<sup>165</sup> Scholars have argued that government subsidies, especially crop insurance, contribute to consolidation by favoring large farms.<sup>166</sup>

Corn and soybean farmers also need markets for the products they produce. The federal government essentially created the market for ethanol—initially at the insistence of the president of Archer-Daniels-Midland, an agribusiness firm—through various subsidies and regulations, starting in the late 1970s.<sup>167</sup> About two decades ago, an analyst estimated annual subsidies to ethanol at \$5.1-\$6.8 billion a year (\$7.9-\$10.5 billion in today's dollars).<sup>168</sup>

The ethanol market now absorbs about as much corn as the animal feed market.<sup>169</sup> Many experts have argued ethanol subsidies are wasteful and environmentally destructive.<sup>170</sup>

Most soybeans become animal feed. Manufacturers also make cooking oils from soybeans and as a substitute for petrochemicals in processes to create rubber, plastics, adhesives, and other consumer products.<sup>171</sup> California's efficient fuel standards have driven demand for renewable diesels that use soy oil as an input.<sup>172</sup> Renewable fuel production capacity doubled from May 2021 to May 2022.<sup>173</sup> Analysts anticipate demand for soybean bushels will increase by over 500 million bushels to meet biofuel purchasers in the coming years.<sup>174</sup>

Farmers also sell to foreign markets. Corn exports now represent 15% of production volume.<sup>175</sup> Soybean exports are almost half of production volume.<sup>176</sup>

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162. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

163. *Id.* at TYPOLOGY.

164. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

165. *Id.* at TYPOLOGY.

166. Taylor Kaus et al., *Farm Consolidation and Crop Insurance Premium Subsidies*, CTR. FOR AGRIC. PROFITABILITY (Jan. 14, 2022), <https://cap.unl.edu/crops/farm-consolidation-and-crop-insurance-premium-subsidies>; UNION OF CONCERNED SCIENTISTS, *SUBSIDIZING WASTE: HOW INEFFICIENT U.S. FARM POLICY COSTS TAXPAYERS, BUSINESSES, AND FARMERS BILLIONS 1-2* (2016); Traci Bruckner, *Agricultural Subsidies and Farm Consolidation*, 75 AM. J. OF ECON. AND SOC. 623, (2016).

167. Keeney, *supra* note 90.

168. DOUGH KOPLOW, *THE GLOBAL SUBSIDIES INITIATIVE, BIOFUELS—AT WHAT COST? GOVERNMENT SUPPORT FOR ETHANOL AND BIODIESEL IN THE UNITED STATES* 56 (2006), 50; *CPI Inflation Calculator*, BUREAU OF LABOR STATISTICS, [https://www.bls.gov/data/inflation\\_calculator.htm](https://www.bls.gov/data/inflation_calculator.htm).

169. USDA, *Corn: Food, Fuel, and Now ... Fiber Too?* (May 1, 2023) <https://tellus.ars.usda.gov/stories/articles/corn-food-fuel-and-now-fiber-too#:~:text=What%20not%20everyone%20realizes%20about,for%20the%20past%2040%20years>

170. C. Ford Runge, *The Case Against More Ethanol: It's Simply Bad for the Environment*, YALE ENVIRONMENT 360 (May 25, 2016), [https://e360.yale.edu/features/the\\_case\\_against\\_ethanol\\_bad\\_for\\_environment](https://e360.yale.edu/features/the_case_against_ethanol_bad_for_environment).

171. USDA, *USDA COEXISTENCE FACT SHEETS: SOYBEANS* (Feb. 2015), <https://www.usda.gov/sites/default/files/documents/coexistence-soybeans-factsheet.pdf> (uses of soybeans); UNITED SOYBEAN BOARD, *NONFOOD USES*, <https://www.unitedsoybean.org/issue-briefs/nonfood-uses/#:~:text=Over%20the%20past%20two%20decades,use%20soy%20as%20an%20ingredient>.

172. Matthew Wilde, *Soaring Soy Oil Demand*, PROGRESSIVE FARMER (Nov. 30, 2022), <https://www.dtnpf.com/agriculture/web/ag/news/article/2022/12/01/big-crush>.

173. *Id.*

174. *Id.*

175. ECON. RSCH. SERV., *USDA, FEED GRAINS SECTOR AT A GLANCE*, *supra* note 91.

176. ECON. RSCH. SERV., *USDA, OIL CROPS SECTOR AT A GLANCE*, <https://www.ers.usda.gov/topics/crops/soybeans-and-oil-crops/oil-crops-sector-at-a-glance/#:~:text=In%202021%2C%20the%20United%20States,increasing%20competition%20from%20>

Corn and soy farmers bring in healthy incomes and hold substantial wealth. While news reports often assert that farmers are struggling, the dominant crop system in the Midwest is doing well. The median net cash farm income—cash income from farm and farm-related activities after expenses—for corn farm businesses in what USDA calls the “Heartland” region is \$151,000 and the median farm equity is \$2.2 million.<sup>177</sup> The figures for farms whose main product was soy are \$61,000 and \$1.1 million.<sup>178</sup> The largest corn and soy farms capture much higher incomes and have even higher wealth. In Illinois, operators on large farms have almost twice the household income and one-and-a-half times the wealth as operators on midsize farms.<sup>179</sup> Larger farms also tend to be more profitable. We present data on corn farms in Illinois as an example. We focus on moderate (GCFI between

\$150,000-\$349,999), midsize (\$350,000-\$999,999), and large farms (\$1 million-\$4.999 million). These farms generated 70% of crop sales among corn farms in 2021.<sup>180</sup> Table 4 shows that large farms bring in a median net cash farm income about 2.6 times that of midsize farms, which, in turn, bring in a median net cash farm income 3.0 times that of moderate sales farms. Large farms have an average return on assets 1.9 times that of midsize farms, which, in turn, have an average return on assets 1.6 times that of moderate sales farms. The three categories of farms have median household incomes ranging from \$154,000 to \$609,000 and median net household wealth from \$1.5 million to \$4.5 million, far above the national rural median family income of \$57,100 and wealth of \$146,400.<sup>181</sup>

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South%20America. (last updated Oct. 23, 2023)

177. The “Heartland” region mostly lies in what we refer to as the Midwest but includes parts of Kentucky, most of Missouri, and small parts of Nebraska and South Dakota. ECON. RSCH. SERV., USDA, ECONOMIC RESEARCH SERVICE GROUPS ITS NINE FARM RESOURCE REGIONS ACCORDING TO GEOGRAPHICAL COMMODITY SPECIALIZATION, <https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=103601> (last updated Apr. 4, 2022); Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.
178. *Id.*
179. *Id.*
180. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12. This data source provides total farms and average crop sales. For moderate, midsize, large, and all corn specialization farms, we multiplied total farms by average crop sales to get total crop sales for each specialization. We divided total crop sales for moderate, midsize, and large corn farms by total crop sales for all corn farms to find that 70% of crop sales from corn farms came from moderate, midsize, and large farms.
181. 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, 6 tbl. 1, 12 tbl. 2 (2023).



**Table 4. Economic indicators for corn farms by size in Illinois, 2021**

Statistic	Moderate	Midsize	Large
Share of all crop sales among farms with a corn specialty	6.2%	21.7%	42.9%
Median acres operated	360	650	1,859
Median net cash farm income	\$89,930	\$267,350	\$693,131
Median farm assets	\$1.8 million	\$3.0 million	\$3.9 million
Median current liabilities	\$31,375	\$47,246	\$146,919
Average return on assets	3.5%	5.7%	10.6%
Average return on equity	3.8%	6.1%	11.4%
Median household income	\$153,700	\$321,514	\$608,715
Median household net wealth	\$1.5 million	\$2.9 million	\$4.5 million

Note: The denominator for share of crop sales is all farms with a corn specialization times average crop sales for corn specialization farms.

Source: Query from Econ. Rsch. Serv., USDA, ARMS Data Analysis, *supra* note 12 (all except share of crop sales); calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at Typology (share of all crop sales).

Farmers who rent at least some land produce most of the corn and soy in the Midwest: 88% of corn sales and 88% of soy sales.<sup>182</sup> Farm areas that produce corn and soy tend to have higher rates of rented acreage, so it is no surprise that the Midwest has a greater share of rented land than other parts of the country.<sup>183</sup> In Illinois, corn and soy farms enrolled in a state educational service program appear to have rented land at stable rates, between 75%-85%, depending on their location in the state, since the 1990s.<sup>184</sup> Although there are some tenants, almost all renters are part owners, who own some land and rent some land.

Analysts often take part owners' willingness to rent as a sign of their desire to expand their operations.<sup>185</sup> Part owners in the Midwest tend to run larger businesses: they are more likely than full owners—who own all their land—to operate farms with at least moderate sales.<sup>186</sup> Furthermore, the more acres a corn or soy farm has, the more likely it is to be operated by a part owner. Part owners make up 40% of operators on farms with 25-99.9 harvested corn acres, 62% on farms with 100-249 harvested acres, and 85% on farms with 500 or more harvested acres.<sup>187</sup> This analysis is generally true of farms with harvested soybean acres as

182. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 76.

183. Gary Schnitkey et al., *Weekly Farm Economics: Conservation and Farmland Tenure on Illinois Grain Farms*, 11 FARMDOC DAILY 1, 1-3, <https://farmdocdaily.illinois.edu/2021/07/conservation-and-farmland-tenure-on-illinois-grain-farms.html>; DANIEL BIGELOW ET AL., ECON. RSCH. SERV., U.S. FARMLAND OWNERSHIP, TENURE, AND TRANSFER (Cynthia A. Ray & Courtney Knauth eds., 2016).

184. Schnitkey et al., *supra* note 183; See Illinois Farm Business Farm Management, *What is Illinois Farm Business Farm Management?*, FBFM, <https://www.fbfm.org/> for information about the FBFM.

185. *Id.* (discussing larger farms renting a higher share of acres).

186. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

187. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 76.

well. We discuss tenure further in the “Farmer Economic Conditions” section.

So far, we have discussed the region’s dominant crop production system. We now close with a brief discussion of other types of corn production. We will examine other minor crop industries later.

Midwest farmers, in addition to the most common style of corn production, also grow corn silage, sweet corn, and corn for seed. The corn silage industry is linked to the dairy industry, since corn silage is a primary forage for dairy cows.<sup>188</sup> The Upper Midwest (Minnesota and Wisconsin), which produces most of the region’s milk, also produces two-thirds of the corn silage, by weight.<sup>189</sup> Iowa adds another 15% (see Table 5).<sup>190</sup> To produce corn silage, farmers operate machines that chop up corn plants into pieces, then they place those pieces in a silo to ferment. After several weeks or more, many farmers consider the silage ready to be used as feed.<sup>191</sup> The corn silage industry is mechanized and dominated by large producers.<sup>192</sup> Farms with at least moderate sales produce about 90% of all silage.<sup>193</sup>

**Table 5. Corn silage production in the Midwest, 2017**

State	Corn silage in tons
Illinois	1,915,681
Indiana	2,080,574
Iowa	5,525,996
Minnesota	6,702,696
Ohio	3,398,228
Wisconsin	17,474,959
Midwest	37,098,134

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, State Level Data at tbl. 1.

Farmers produce sweet corn for people to eat. The sweet corn industry is also dominated by farms with at least moderate sales, which have almost 90% of sweet corn acres.<sup>194</sup> The Upper Midwest also leads in sweet corn production (see Table 6).<sup>195</sup> Some sweet corn harvests can require a significant amount of labor. Some farms use a “moving conveyor belt” where a group of farmworkers harvests ears of corn and throws them on the belt, while another group cleans and packs the ears.<sup>196</sup> Some harvests feature drivers operating machines that

188. Luiz Ferraretto, *New Insights about Corn Silage Fatty Acids*, U. WIS. DAIRY DIVISION OF EXTENSION (Mar. 2023), <https://dairy.extension.wisc.edu/articles/new-insights-about-corn-silage-fatty-acids/#:~:text=High%2Dquality%20corn%20silage%20supplies,as%20gut%20motility%20and%20health>.

189. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 1.

190. *Id.*

191. Clark Israelsen et al., UTAH ST. U. AGRIC. EXTENSION AGENTS, CHOPPING AND STORING QUALITY CORN SILAGE (Dec. 2009), <https://extension.usu.edu/crops/research/chopping-and-storing-quality-corn-silage>.

192. Howell N. Wheaton & Fred Martz, *Corn Silage*, UNIVERSITY OF MISSOURI - EXTENSION, <https://extension.missouri.edu/publications/g4590> (Oct. 1993).

193. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

194. *Id.*

195. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA at tbl. 36.

196. Philip Martin, *For Farmers: Hand vs. Machine* N.Y. TIMES, Oct. 9, 2011 (moving conveyor belt); Philip L. Martin, *The Race in the Fields: Imports, Machines and Migrants*, 72 CAL. AGRIC. 100, 100-1 (2017) (picture of a conveyor belt); Tony 98 – Discovery, *US Farmers Harvest 2.9 Billion Pounds of Sweet Corn This Way – Farming*, YOUTUBE (Oct. 18, 2022), <https://www.youtube.com/watch?v=JOYwDUTOahU&t=46s>

harvest ears intact.<sup>197</sup> Sweet corn production can be for processing, like in canned corn, or for the whole ear. The vast majority of sweet corn acres are for processing (e.g., for canning or freezing), as opposed to being sold fresh (e.g., at a local market or grocery store).<sup>198</sup>

**Table 6. Harvested sweet corn acres in the Midwest, 2017**

State	Sweet corn acres for processing	Sweet corn acres for market	Total sweet corn acres
Illinois	9,941	3,863	13,804
Indiana	34	3,580	3,614
Iowa	996	1,743	2,739
Minnesota	104,508	3,447	107,955
Ohio	131	7,777	7,908
Wisconsin	51,792	4,823	56,615
Midwest	167,402	25,233	192,635

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at State Level Data at tbl. 36.

Some farms also produce corn seed. Commercial corn seed is a hybrid, produced by crossbreeding corn plants. To control the fertilization of the corn, workers “detassel” it, by removing the “tassel” at the top of the corn plant. The tassel contains pollen that could pollinate nearby plants or the plant itself. For many years, farms hired high school students to detassel, a “rite of passage” for many

Midwesterners.<sup>199</sup> In more recent years, farm owners have reduced their labor costs by using machines to complete most of the detasseling work. Agribusiness corporations like Bayer have also begun to hire H-2A farm laborers to detassel in the large fields they operate.<sup>200</sup> We will discuss the problems that H-2A workers face later on.

197. Agrifoto, *Sweet Harvest – Oxbo 2475 Corn Picker – Organic Sweet Corn Harvest 2017*, YouTube (Oct. 7, 2017), <https://www.youtube.com/watch?v=3eKSPCCzc2o>.  
 198. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 71.  
 199. Julian Epp, *Climate Change is Killing My Old Summer Job*, APOCALYPSE Soon (Nov. 5, 2021), <https://newrepublic.com/article/164231/climate-change-killing-summer-job-corn>.  
 200. Will Bauer, *As Teens Wait for Work, AG Firms Turn to Guest Workers to Tend to Midwest Cornfields*, NEB. PUB. MEDIA (Aug. 31, 2022), <https://nebraskapublicmedia.org/en/news/news-articles/as-teens-wait-for-work-ag-firms-turn-to-guest-workers-to-tend-to-midwest-cornfields/>.

## Animal production

Midwestern animal producers tend to operate concentrated, factory-style operations. The hog industry tends to keep animals indoors, in close quarters, often in what are called Concentrated Animal Feeding Operations (CAFOs). About 37% of the hog farms have 84% of the hogs in the Midwest (Table 7).<sup>201</sup> While the raising of cattle on ranches and farms is the only major agricultural industry that is not yet highly concentrated, the feeding of cattle in preparation for slaughter is one of the most concentrated. Furthermore, far

more cattle sales in the Midwest are captured by feedlots, where this feeding happens, than by ranches (or dairy farms).<sup>202</sup> Cattle feedlots also keep huge numbers of animals in confined spaces. There were about 6,150 cattle feedlot farms in the region, with average sales of almost \$900,000, at the time of the last census.<sup>203</sup> The dairy industry resisted concentration for many years but has now begun to consolidate. Enormous dairy farms with thousands of cattle have entered the business in recent years.<sup>204</sup>

**Table 7. Concentration in major Midwest animal industries, 2017**

Farm size	Cattle and calf sales		Milk sales		Hog sales		Poultry and egg sales	
	Share of farms	Share of sales	Share of farms	Share of sales	Share of farms	Share of sales	Share of farms	Share of sales
Low sales	62.4%	11.5%	21.3%	2.4%	53.6%	5.2%	85.7%	10.5%
Moderate	14.4%	10.3%	30.1%	9.3%	11.1%	11.2%	6.1%	11.8%
Midsized	14.0%	21.9%	30.4%	21.1%	16.9%	22.7%	4.1%	14.0%
Large	5.2%	30.8%	11.5%	29.7%	11.5%	27.2%	1.4%	12.8%
Very large	0.4%	17.4%	1.5%	25.5%	1.6%	20.7%	0.4%	30.5%
Nonfamily	3.5%	8.2%	5.1%	12.0%	5.4%	13.0%	2.2%	20.5%
Commercial	23.1%	78.3%	48.5%	88.3%	35.4%	83.6%	8.1%	77.8%

*Note: USDA suppressed hog sales for two sales categories in Wisconsin for privacy reasons. Due to the nature of the suppressions, the shares for the moderate sales and very large sales categories are likely slight underestimates.*

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, Typology.

201. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

202. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7. STATE LEVEL DATA at tbl. 75.

203. *Id.*

204. Monte Reel, *The Dairy Farm of Your Imagination is Disappearing*, BLOOMBERG (Feb. 28, 2020), <https://www.bloomberg.com/news/features/2020-02-28/the-dairy-farm-of-your-imagination-is-disappearing?leadSource=verify%20wall>.

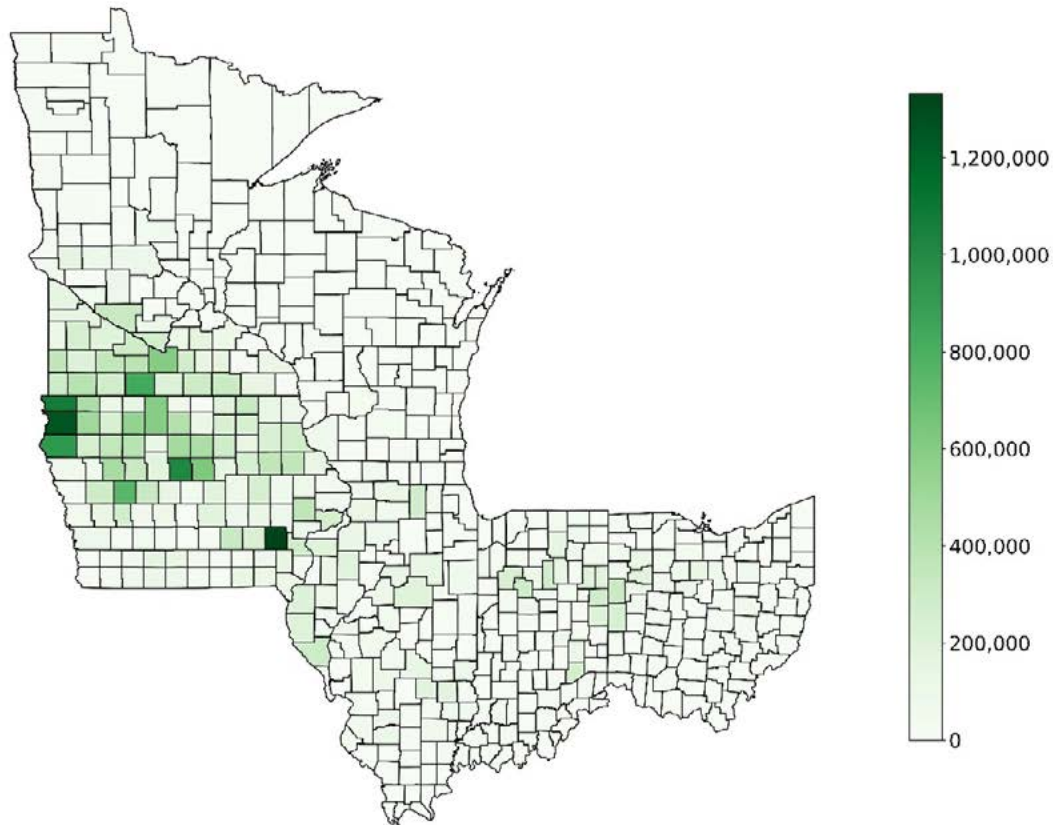


## HOGS

The advent of the CAFO revolutionized the hog business. The Midwest has led the nation in hogs since the late 1800s. As discussed in the history section, the region's farmers employed a system where they raised corn, fed cattle with it, then let hogs eat the waste. Farmers would raise hogs from birth to slaughter. They began to house large numbers of hogs indoors by the 1990s.<sup>205</sup> The North Carolina farmer Wendell Murphy had applied

industrial practices for raising chickens to hogs in the 1960s, such as housing large numbers of hogs indoors.<sup>206</sup> Murphy entered state office in the 1980s and secured various tax and environmental concessions for the hog industry that contributed to the growth of his style of farming.<sup>207</sup> Midwest hog farmers have now adopted the CAFO model on a broad scale (see Figure 4 for a map of hog inventory by county).

**Figure 4. Hog inventory by county in the Midwest, 2017**



Source: 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 12; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

205. HUDSON & LAINGEN, *supra* note 72, at 85.

206. *Id.*; Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 ENVTL. HEALTH PERSP. 182, 185 (2013).

207. Erica Hellerstein & Ken Fine, *A Million Tons of Feces and an Unbearable Stench: Life Near Industrial Pig Farms*, THE GUARDIAN (Sept. 20, 2017), <https://www.theguardian.com/us-news/2017/sep/20/north-carolina-hog-industry-pig-farms>.

The switch to the CAFO model changed the hog industry in profound ways. The number of farms fell by over 70% while the pork produced, measured in pounds, increased by almost 85% from 1990 to 2020.<sup>208</sup> Hog farmers in the “Heartland” region, including Iowa and Minnesota, expanded their average building capacity for breeding by 4.8 times, their farrowing (caring for pigs from birth until weaning) capacity 3.8 times, and their growing and finishing capacity by 6.6 times from 1992 to 2015.<sup>209</sup> Some hog farmers began to specialize in certain phases of hog-raising, such as finishing for slaughter.<sup>210</sup> A USDA study found that the Heartland region had significant numbers of various specialized hog farms—such as farms that raised hogs from birth until they were ready for finishing, or farms that raised hogs prepared for finishing until they were ready for slaughter—as well as many farms that continued to produce hogs from birth to finishing.<sup>211</sup> In addition to constructing new facilities, hog farmers have adopted various practices to increase “yield.” These practices include “terminal crossbreeding” to produce hogs that grow fast, “phase feeding” to adapt feed based on the hog’s development, “commercial seed stock” to produce new hogs, and artificial

insemination.<sup>212</sup> Larger farms appear to be more likely to adopt these practices and also have lower costs.<sup>213</sup>

Another major change in hog production is the widespread adoption of production contracts. Under a production contract, a contractor provides hogs to a farmer who raises them under certain guidelines until they deliver the hog to the next phase of the production process.<sup>214</sup> A contractor often provide inputs to the farmer, like feed.<sup>215</sup> While some hog farmers may appreciate the stability offered by a production contract, there are many news reports of farmers criticizing the degree of control agribusiness companies exert through these contracts.<sup>216</sup> As of 2017, Iowa and Minnesota farmers had resisted production contracts to a greater degree than North Carolina farmers. In Iowa and Minnesota, 59% of hogs sold were sold under contract, versus 91% in North Carolina.<sup>217</sup> Research by USDA found that, in the Midwest, independent (non-contract) feeder-to-finish producers had higher net farm incomes than farms using contracts.<sup>218</sup> Whatever relative success the region’s farmers may have had in resisting contracts, Iowa and Minnesota still saw a collapse in the number of farms that raised

208. ECON. RSCH. SERV., USDA, HOG & PORK SECTOR AT A GLANCE, fig. 2, <https://www.ers.usda.gov/topics/animal-products/hogs-pork/sector-at-a-glance/> (last updated Dec. 20, 2022). The increase in pounds was calculated by the authors.

209. Calculated by the authors from DAVIS ET AL., *supra* note 103, at 23 tbl. 10.

210. ECON. RSCH. SERV., USDA, HOG & PORK SECTOR AT A GLANCE, *supra* note 208.

211. DAVIS ET AL., *supra* note 103, at 8 tbl. 2.

212. NIGEL KEY & WILLIAM MCBRIDE, ECON. RSCH. SERV., USDA, THE CHANGING ECONOMICS OF U.S. HOG PRODUCTION 31 (terminal crossbreeding) (2007); DAVIS ET AL., *supra* note 103, at iv (phase feeding), 1 (artificial insemination), 41 (seed stock).

213. *Id.*

214. Allen Harper, *Hog Production Contracts: The Grower-Integrator Relationship*, VA COOPERATIVE EXTENSION, 1 (2005).

215. HUDSON & LAINGEN, *supra* note 72, at 85-86.

216. Charlie Mitchell & Austrin Frerick, *The Hog Barons*, Vox, <https://www.vox.com/the-highlight/22344953/iowa-select-jeff-hansen-pork-farming> (last updated Apr. 19, 2021); Compare HUDSON & LAINGEN, *supra* note 72, at 86-87 (arguing hog producers liked the stability of contracts), with Madison McVan, *Scaling Up: Use of Production Contracts has Become the Norm*, INVESTIGATE MIDWEST (Sept. 23, 2022), <https://www.iowapublicradio.org/agriculture/2022-09-23/production-contracts-hog-farming-investigate-midwest> (criticizing the contract system).

217. DAVIS ET AL., *supra* note 103, at 32-33.

218. *Id.* at 35 tbl. 15.

hogs between 2002 and 2017, especially among farms with more than 100 and fewer than 2,000 head of hog.<sup>219</sup>

The factory-like nature of modern hog farms requires massive investments from farmers. Iowa hog farm businesses, at the median, have \$3.0 million in farm assets, with \$2.5 million in land and buildings.<sup>220</sup> Hog CAFOs house hogs in, as two analysts put it, “windowless metal shed[s]” called confinements.<sup>221</sup> The typical confinement can hold 2,500 hogs.<sup>222</sup> The hogs defecate through openings in the floor into a “pit.” The confinements require large fan systems that disperse ammonia—which can burn the eyes of workers and worse—emitted from the pit.<sup>223</sup> The massive amounts of manure these farms produce pollute surrounding waterways and the air. We will return to the environmental consequences of hog CAFOs later.

Hog farms also employ specialized equipment and laborers. The median Iowa hog farm has \$445,000 in farm equipment.<sup>224</sup> Operations that farrow use metal cages called “farrowing crates” that trap sows in place while they feed piglets. Hog CAFOs use various other cages to pen in their animals.<sup>225</sup>

Midwest farmers may need to change some of these practices because of a recent California law, Proposition 12. This law requires pork sold in California to come from hogs whose mothers and themselves were raised with more free space than some of the more restrictive cages allow.<sup>226</sup> Since California is responsible for 15% of domestic hog consumption, this will likely force many Midwest hog producers to revamp their facilities.<sup>227</sup> In addition to facility costs, many hog farmers also have labor costs. In Iowa, they spent about \$188 million on hired labor, second-most of all reported farm specializations in the state. They also spent \$83 million on contract farm labor, most among all farm specializations and almost two-thirds of all contract labor expenditures in the state.<sup>228</sup> These workers must sometimes take on grim tasks, such as euthanizing and removing dead animals, or maintaining manure pits.<sup>229</sup>

Hog farmers have been able to channel some of their gains in productivity from these investments into foreign markets. Total exported hogs (in pounds) have increased about 30 times and the U.S. share of all hog exports grew from 2% to 29% from 1990 to 2020.<sup>230</sup> Politicians helped open up

219. *Id.* at 33 fig. 9.

220. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.

221. D’Anieri & Austin Frerick, *The Hog Baron*, FOOD & ENVIR. REPORTING NETWORK (Apr. 19, 2021), <https://thefern.org/2021/04/the-hog-baron/>.

222. *Id.*

223. *Id.*

224. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.

225. *Crate Controversy: Pig Farmers Face Growing Pressure*, 13 WTHR (Feb. 24, 2015).

226. Katie Peikes, *The US Supreme Court Upheld Proposition 12. What’s Next for Pork Producers in Iowa?*, IOWA PUBLIC RADIO (May 16, 2023), <https://www.iowapublicradio.org/agriculture/2023-05-16/the-us-supreme-court-upheld-proposition-12-whats-next-for-pork-producers-in-iowa>.

227. *Prop 12 is coming, but at what cost?* PIG PROGRESS (July 24, 2023), <https://www.pigprogress.net/the-industrymarkets/market-trends-analysis-the-industrymarkets-2/prop-12-its-coming-but-at-what-cost/#:~:text=Effects%20on%20the%20economy&text=As%20some%20pork%20will%20no,already%20low%2C%E2%80%9D%20he%20noted>.

228. Calculated by the authors CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

229. D’Anieri & Frerick, *supra* note 221; Sarah Fronczak, *The Dangers of Manure Gas and Strategies from Mitigation*, MICH. ST. U. (Sept. 18, 2018), (telling the story of a father and son who both died during routine maintenance of a manure pit).

230. Calculated by the authors from ECON. RSCH. SERV., USDA, HOG & PORK SECTOR AT A GLANCE, *supra* note 208, at fig. 3.

these markets. Pork exports to Mexico, usually the largest or second-largest importer, rose massively after the North American Free Trade Agreement (NAFTA).<sup>231</sup> The U.S. signed a recent agreement with Japan that USDA projects will significantly boost pork exports to that country.<sup>232</sup> In addition to help through trade deals, the government also makes payments to farmers. Through one program, the government purchases pork “when producers are undergoing financial stress.”<sup>233</sup> Farms with a pork specialization that received government payments got an average of \$10,200 in Iowa and \$14,500 in Minnesota in 2017.<sup>234</sup>

The hog farmers that have been able to stay in business have reaped significant financial benefits. Hog farms with at least moderate sales capture 95% of all sales and have at least 94% of the hog inventory.<sup>235</sup> Large and very large farms are only 14% of farms with hogs but have 49% of the inventory.<sup>236</sup> USDA analysis and data show that Midwest hog farmers also receive significant

income from crop sales, in particular sales of corn and soy.<sup>237</sup> The census of agriculture shows Iowa hog farms with corn sales (65% of hog farms) received an average of \$245,000 from corn sales.<sup>238</sup> A little over half of hog farms had soybean sales (56%) and received an average of \$139,000 from soybean sales.<sup>239</sup> In Minnesota, hog farms with corn sales (53%) received an average of \$282,000 from corn sales.<sup>240</sup> Hog farms with soybean sales (48%) received an average of \$177,000 from soybean sales. These figures exceed the average corn and soybean sales for farms with an oilseed and grain specialization (approximating corn and soy farms) in their respective states.<sup>241</sup> Still, hog farms receive most of their revenues from hogs. Hog farms in Iowa received an average of \$2.0 million for hog sales and Minnesota farms \$1.8 million.<sup>242</sup> Overall, these farms enjoy significant incomes and wealth: the median Iowa hog farm business had \$234,000 in household income and \$1.7 million in net household wealth in 2021 (Table 8).<sup>243</sup>

231. *NAFTA Huge Benefit to Pork Producers*, FARM PROGRESS (June 26, 2017), <https://www.farmprogress.com/farm-business/nafta-huge-benefit-to-pork-producers>.

232. ECON. RSCH. SERV., USDA, TRADE AGREEMENT WITH JAPAN PROJECTED TO HELP U.S. PORK EXPORTS GROW, <https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=106593> (last updated May 25, 2023).

233. ECON. RSCH. SERV., USDA, HOG & PORK SECTOR AT A GLANCE, *supra* note 208; AGRIC. MKTG. SERV., USDA, USDA PORK PRODUCTS PURCHASE PROGRAM ANNOUNCED (May 24, 2018), <https://www.ams.usda.gov/content/usda-pork-products-purchase-program-announced>.

234. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.

235. Calculated by the authors using *id.* at TYPOLOGY. Note that USDA suppressed, for privacy reasons, hog sales and inventories for moderate sales and large farms in Wisconsin. The total for Wisconsin includes these estimates. Since we treated suppressions as zeroes but used the overall totals in our denominator, the reported concentrations of sales and inventories are slightly understated.

236. *Id.* The remarks about Wisconsin in the previous footnote also apply to this hog inventory calculation.

237. DAVIS ET AL., *supra* note 103, at tbl. 15; calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

238. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.

239. *Id.*

240. *Id.*

241. *Id.*

242. *Id.*

243. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12. Note that household income is available only for all farms, rather than farm businesses, so we report the figure for all farms here.

**Table 8. Economic indicators for hog farm businesses in Iowa, 2021**

Indicator	Amount
Median net cash farm income	\$325,990
Median household income*	\$233,723
Median farm assets	\$1.74 million
Median household net worth	\$1.72 million

\* Median household income is not available for farm businesses only so we report median household income for all farms with a hog specialization.

Source: Query from Econ. Rsch. Serv., USDA, ARMS Data Analysis, *supra* note 12.

## DAIRY

The Midwest dairy industry, for decades a leader in milk for cheese and butter production, resisted consolidation for many years but has recently undergone significant concentration.<sup>244</sup> Although previous generations believed the Upper Midwest

had an ideal climate in which to raise dairy cows, California actually surpassed Wisconsin in milk production in the 1990s.<sup>245</sup> California pioneered the “western model” of fewer, larger farms with massive herds that has spread throughout the American West.<sup>246</sup> At the national level, larger farms have captured a greater share of production and consistently shown higher returns than smaller farms over the past two decades.<sup>247</sup> The number of dairy farms with at least 10 cows fell by an average annual rate of 4.2% from 1978 to 2017.<sup>248</sup> Smaller commercial farms with herds of 10 to 199 cows saw their collective share of total inventory collapse from 68% of all milk cows to 22% from 1992 to 2017, whereas farms with at least 1,000 cows saw their collective share of total inventory rise from less than 10% to 55% of all cows.<sup>249</sup> The pace of this consolidation has exceeded that of crop production over the past three decades.<sup>250</sup> Reporters have published many articles on foreclosures of dairy farms in recent years.<sup>251</sup>

244. HUDSON & LAINGEN, *supra* note 72, at 66; MACDONALD ET AL., *supra* note 112.

245. HUDSON & LAINGEN, *supra* note 72, at 64.

246. *Id.* at 65.

247. MACDONALD ET AL., *supra* note 112, at 7 fig. 4 (showing returns).

248. MACDONALD ET AL., *supra* note 112 at 10. Note this report considers farms with fewer than 10 cows to be producing milk for home consumption.

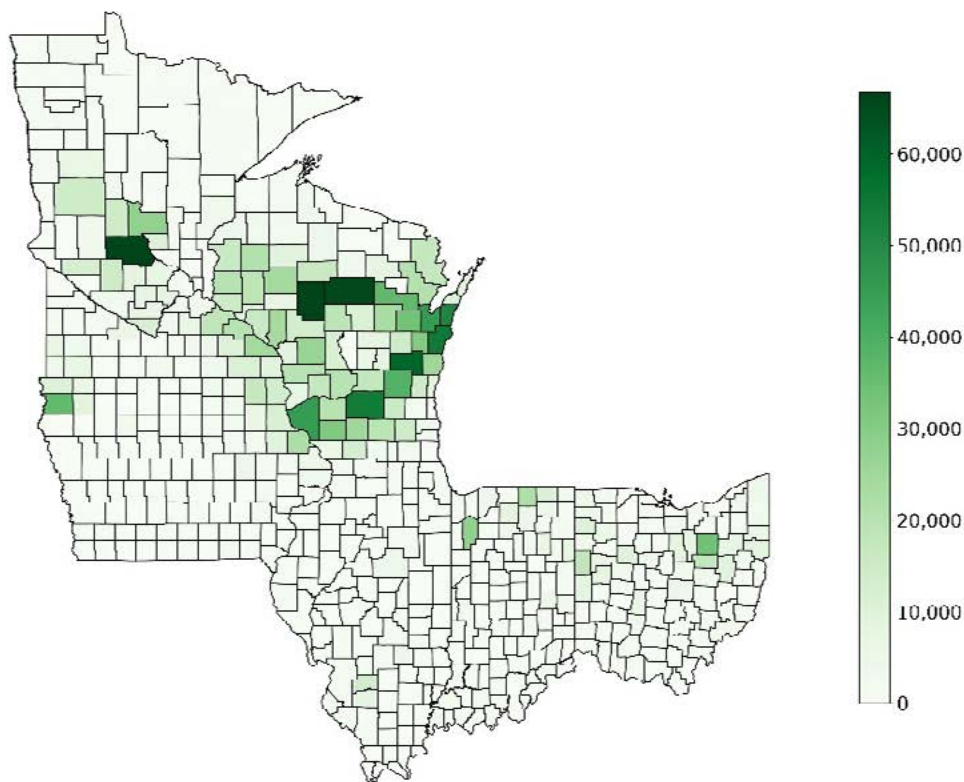
249. *Id.* at 11.

250. *Id.* at 11; JAMES M. MACDONALD ET AL., ECON. RSCH. SERV., USDA, THREE DECADES OF CONSOLIDATION IN U.S. AGRICULTURE (Dale Simms & Lori Fields eds., 2018) (for more detail on the relative pace of dairy consolidation).

251. Jesse Newman, ‘This One Here is Gonna Kick my Butt’—Farm Belt Bankruptcies are Soaring, WALL ST. J. (Feb. 6, 2019, 10:59 AM), <https://www.wsj.com/articles/this-one-here-is-gonna-kick-my-butt-farm-belt-bankruptcies-are-soaring-11549468759>; Corey Kilgannon, *When the Death of a Family Farm Leads to Suicide*, N.Y. TIMES (Mar. 19, 2018), <https://www.nytimes.com/2018/03/19/nyregion/farmer-suicides-mark-tough-times-for-new-york-dairy-industry.html>.



**Figure 5. Milk cow inventory by county in the Midwest, 2017**



Source: 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 11; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

Shifts like these have also happened in the Midwest.<sup>252</sup> Wisconsin produces by far the most milk of any state in the region (see Figure 5 for milk cow inventories by county), and second-most in the country, so we will focus on the Badger State.<sup>253</sup> In 2007, farms with herds of 200 or fewer cows had 61% of total milk cow inventories, whereas in 2017

they had only 37%. Meanwhile farms with at least 500 milk cows saw their share of total inventories rise from 21% to 41% (see Figure 6 for distributions of milk cow inventory by herd size in 2007 and 2017).<sup>254</sup> Midsize to very large farms capture about 75% of milk sales in the Midwest.<sup>255</sup> If we include nonfamily farms, the share is 88%.<sup>256</sup>

252. HUDSON & LAINGEN, *supra* note 72, at 65-66.

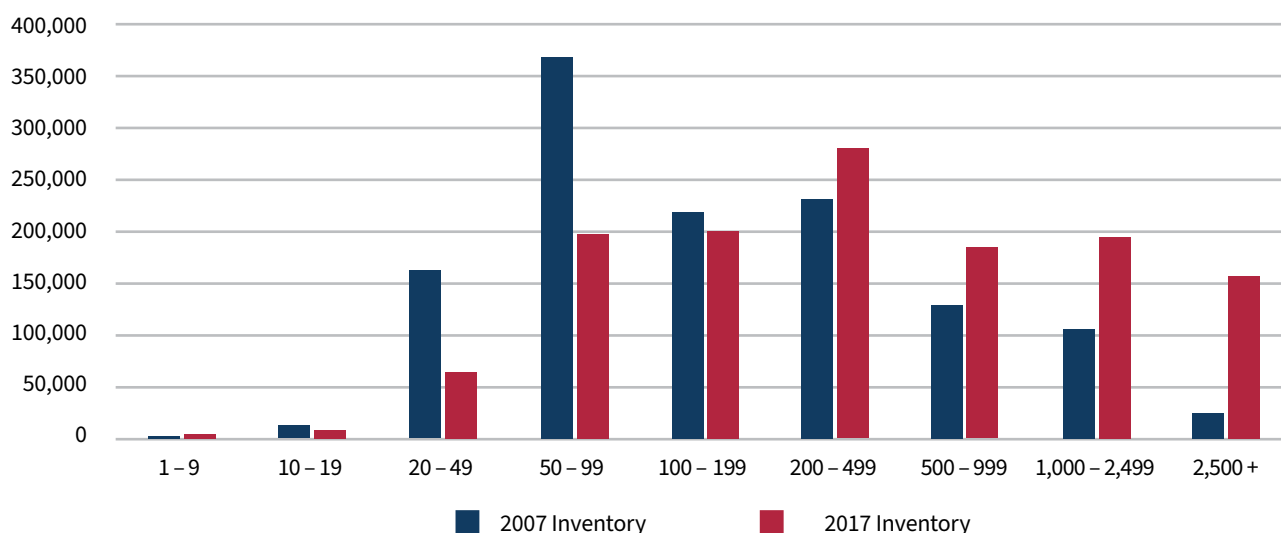
253. MACDONALD ET AL., *supra* note 112, at 8.

254. Calculated by the authors using NAT'L AGRIC. STAT. SERV., USDA, 2007 CENSUS OF AGRICULTURE (2007) [hereinafter 2007 CENSUS OF AGRICULTURE] STATE LEVEL DATA tbl. 17; 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 17.

255. Calculated by the authors using *id.* at TYPOLOGY.

256. *Id.*

**Figure 6. Distribution of milk cows by herd size in Wisconsin, 2007 to 2017**



Source: Calculated by the authors using 2007 Census of Agriculture, *supra* note 254, at State Level Data tbl. 17; 2017 Census of Agriculture, *supra* note 7, at State Level Data tbl. 17.

At the national level, the largest dairy farms tend to have the lowest unit costs. Farms with 500-999 cows had unit costs (per hundredweight of milk sold) almost 30% lower than the unit costs of farms with 50-99 cows in 2016.<sup>257</sup> Farms with 2,000 or more cows, in turn, had unit costs 10% lower than the unit costs of farms with 500-999 cows.<sup>258</sup> Dairy farms with at least 500 cows are much more likely to milk cows three times a day, use computerized milking systems, and use computerized feed systems that tailor feed mixes based on a “cow’s age and place in a lactation cycle.”<sup>259</sup> These practices appear to reduce costs.<sup>260</sup> Some large farms are

even purchasing cow-milking robots.<sup>261</sup> Farms with more cows also tend to have greater milk output per cow.<sup>262</sup> A large share of dairy farmers artificially inseminate their animals.<sup>263</sup> Companies that sell “germplasm” appear to have adopted “genomic selection” to identify and select traits.<sup>264</sup> This practice appears to have precipitated large increases in the fertility, lifespan, and disease-resistance of Holstein cows.<sup>265</sup>

Many Wisconsin dairy farms appear to be somewhat diversified. Almost two-thirds of Wisconsin dairy farms operate permanent pasture or

257. Calculated by the authors using ECON. RSCH. SERV., USDA, MILK PRODUCTION COSTS AND RETURNS FROM THE 2016 ARMS, <https://www.ers.usda.gov/data-products/commodity-costs-and-returns/organic-costs-and-returns/> (last updated Jan. 5, 2022).

258. Calculated by the authors from *id.*

259. MACDONALD ET AL., *supra* note 112, at 24-25.

260. *Id.* at 25 tbl. 7.

261. Humble, *supra* note 10.

262. NJUKI, *supra* note 104 at 11-12.

263. *Id.* at 4.

264. J. L. Hutchison et al., *Short Communication: Use of Young Bulls in the United States*, 97 J. DAIRY Sci. 3213, 3213 (2014).

265. Adriana García-Ruiz et al., *Changes in Genetic Selection Differentials and Generation Intervals in US Holstein Dairy Cattle as a Result of Genomic Selection*, 113 PNAS 3995, 3995 (2016).

rangeland, an average of around 50 acres.<sup>266</sup> Around 95% operate cropland, an average of about 400 acres.<sup>267</sup> Dairy farms raised about 30% of the state's wheat, 40% of the oats, alfalfa hay, and barley, and 70% of the corn silage, all feed for dairy cattle.<sup>268</sup> They also raised a substantial amount of corn, around 20% of the state total, which is also a dairy feed.<sup>269</sup> Over 90% of dairy farms had some forage land. Dairy farms produced about 56% of the state's forage matter by dry weight.<sup>270</sup> Dairy farmers also raised a non-trivial amount of soy.<sup>271</sup> This suggests dairy farms tend to be somewhat diversified—at least in that they have some pasture, tend to grow forage crops, and that some grow corn and soy—as of the last census.

Some of the largest operations use a variety of dairy technologies. A recent article from the *Star Tribune*, of Minnesota, discussed a farm that uses a “milk carousel” that operates 22 hours a day.<sup>272</sup> Workers herd cows onto these machines, then clean them and attach a device that extracts milk. Some machines detect when the cow has been milked, after which they detach.<sup>273</sup> The Louriston

Dairy, owned by a company called Riverview LLP, includes a facility that resembles an airline hangar filled with rows of penned-in cattle receiving feed. Riverview owned 92,000 cows and nine dairies in Minnesota, with more dairies across the country, in 2018. “One of the reasons we chose the dairy industry is it was one industry that hadn't consolidated,” a founder of Riverview LLP told the *Star Tribune*.<sup>274</sup> Large dairy farms use huge amounts of water and their cows can generate enormous amounts of waste.<sup>275</sup> Food & Water Watch (FWW) recently provided an analysis to *The Guardian* that found dairy farms have more than doubled their methane emissions from manure since 1990, even as the number of cows has remained roughly stable.<sup>276</sup> The FWW analysis attributed the increase in emissions to manure management practices.<sup>277</sup> We further discuss the environmental damage caused by dairy farms later in the report.

Large dairy farms not only require sizable investments in facilities and equipment, but also in hired workers. Riverview LLP employed 1,200 people at the time of the *Star Tribune*

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266. JAMES M. MACDONALD ET AL., ECON. RSCH. SERV., USDA, CONSOLIDATION IN U.S. DAIRY FARMING at 1 (Dennis Vilorio et al. eds., 2020) (discussing growing crops and larger purchasing feed); calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

267. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.

268. *Id.*

269. *Id.*

270. *Id.*

271. *Id.*

272. Adam Belz, *Milking Cows on an Industrial Scale Arrives in Western Minnesota, and Some Farmers Shudder*, STARTRIB. (Aug. 11, 2018), <https://www.startribune.com/milking-cows-on-an-industrial-scale-arrives-in-western-minnesota-and-some-farmers-shudder/490589351/?refresh=true>.

273. For a demonstration, see MVP Dairy, LLC, *Inside our Milking Carousel*, YouTube (Aug. 29, 2019), <https://www.youtube.com/watch?v=UefRKKd7x24>.

274. Belz, *supra* note 272.

275. *E.g.*, Twilight Greenaway, *California Dairy Uses Lots of Water. Here's Why It Matters*, CIV. EATS (June 30, 2022), <https://civileats.com/2022/06/30/california-dairy-water-uses-climate-change-drought-pollution/> (demonstrating that dairy cows need ample water when they produce milk).

276. Nina Lakhani, *US Dairy Policies Drive Small Farms to 'Get Big or Get Out' as Monopolies Get Rich*, THE GUARDIAN (Jan. 31, 2023, 5:00 PM), <https://www.theguardian.com/environment/2023/jan/31/us-dairy-policies-hurt-small-farms-monopolies-get-rich>.

277. *Id.*

article.<sup>278</sup> According to the 2017 census, about 5,000 Wisconsin dairy farms spent \$591 million on hired labor, over half of the state’s total expenditure on hired labor and the most of any farm specialization.<sup>279</sup> Dairy farms also spent more than any other specialization on contract farm labor, almost a third of the state total.<sup>280</sup> The *Milwaukee Journal Sentinel* recently reported on a study

from over a decade ago that found immigrants made up more than 40% of the dairy workforce in Wisconsin.<sup>281</sup> Workers told the *Sentinel* the share was probably higher today.<sup>282</sup> These workers take very few, sometimes no, days off.<sup>283</sup> See Table 9 for economic indicators for dairy farms in Wisconsin.

**Table 9. Economic indicators for dairy farms in Wisconsin, 2021**

Farm type	Share of dairy sales*	Average labor expenditure	Average farm assets	Average net cash farm income	Rate of return on equity	Average farm equity
Midsized	19.8%	\$25,689	\$3.3 million	\$187,247	0.9%	\$2.8 million
Large	33.3%	\$256,302	\$7.9 million	\$431,469	3.3%	\$6.3 million
Very large	21.2%	\$1.4 million	\$24.6 million	\$2.5 million	10.5%	\$17.3 million
Nonfamily	14.3%	\$190,180	\$7.4 million	\$422,918	3.3%	\$5.7 million

\* Share of dairy sales is for 2017. Note: We included averages in this table because USDA suppressed many median estimates for our categories of interest for privacy reasons.

Source: Calculated by the authors from 2017 Census of Agriculture, *supra* note 7, at Typology (share of dairy sales by all farms, not just farms with a dairy specialization); Econ. Rsch. Serv., USDA, ARMS Data Analysis, *supra* note 12.

The dairy industry has been able to protect its revenues at a time of falling domestic milk demand in part by reaching larger export markets.<sup>284</sup> Dairy

exports have been increasing for many years.<sup>285</sup> Domestic dairy farmers exported almost a fifth of their milk in 2021.<sup>286</sup> The country’s biggest

278. Belz, *supra* note 272.

279. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

280. *Id.*

281. Maria Perez, *Wisconsin’s Dairy Industry Would Collapse Without the Work of Latino Immigrants—Many of them Undocumented*, MILWAUKEE J. SENTINEL (Nov. 12, 2019), [https://www.jsonline.com/in-depth/news/special-reports/dairy-crisis/2019/11/12/wisconsin-dairy-farms-rely-immigrant-workers-undocumented-laborers/2570288001/?utm\\_source=ombed&utm\\_medium=on-site&utm\\_campaign=topicseriesrecirc&utm\\_content=dairycrisis](https://www.jsonline.com/in-depth/news/special-reports/dairy-crisis/2019/11/12/wisconsin-dairy-farms-rely-immigrant-workers-undocumented-laborers/2570288001/?utm_source=ombed&utm_medium=on-site&utm_campaign=topicseriesrecirc&utm_content=dairycrisis).

282. *Id.*

283. *Id.*

284. HAYDEN STEWART & FRED KUCHLER, ECON. RSCH. SERV., USDA, FLUID MILK CONSUMPTION CONTINUES DOWNWARD TREND, PROVING DIFFICULT TO REVERSE (June 21, 2022), <https://www.ers.usda.gov/amber-waves/2022/june/fluid-milk-consumption-continues-downward-trend-proving-difficult-to-reverse/>.

285. U.S. Dairy Export Council, *What’s next for rising U.S. dairy exports?*, U.S. DAIRY EXPORT COUNCIL (April 23, 2023) <https://blog.usdec.org/usdairyexporter/whats-next-for-expanding-u.s.-dairy-exports>.

286. Michael Dykes, *U.S. Dairy Industry Shatters Export Records in 2022*, INT’L DAIRY FOODS ASS’n (Feb. 7, 2023), <https://www.idfa.org/news/u-s-dairy-industry-shatters-export-records-in-2022#:~:text=%E2%80%99CAs%20we%20dig%20into%20the,%247.61%20billion%20achieved%20in%202021.>

trade partners are Mexico, Canada, China, and the Philippines.<sup>287</sup> The U.S. has a trade deal with Mexico and its major trading partners in south-east Asia are in the World Trade Organization.<sup>288</sup> The government also helps dairy farmers with a program that ties payments to the difference

## CATTLE

The cattle industry can be analyzed as two, generally distinct, businesses: the raising of cattle before finishing and the finishing of cattle for slaughter. The Midwest has played an important role in the cattle industry, especially in the cattle-finishing business, since the 19th century. As discussed in the history section, white settlers in Ohio practiced a system of farming that involved raising corn to feed cattle. By the mid-1800s, ranchers to the west and south, from Kansas to Texas, were already raising large herds of cattle. Ranchers would arrange for the transportation of many of their animals to the Midwest, where feedlot operators would “finish” them on corn in preparation for slaughter. Most beef cattle were fed on relatively small Midwest feedlots until the mid-1960s, when larger commercial feedlots started to become dominant.<sup>291</sup> Feedlots with a capacity of fewer than 1,000 head saw their share of sales collapse from

between an average milk price and feed input prices.<sup>289</sup> Wisconsin dairy farmers received about a quarter of all government payments in the state, second-most among all farm specializations, in 2017.<sup>290</sup>

the mid-1960s to the early 2000s, while feedlots with a capacity of 32,000 or more saw a massive expansion over the same period.<sup>292</sup>

While most cow-calf operations—which keep cows so they can give birth to calves—specialize in raising calves only to weaning (i.e., when they are removed from their mothers), a substantial share of farms and ranches retain their cattle past weaning, including a small share that raise their calves through finishing.<sup>293</sup> Cow-calf operations that raise cattle past weaning tend to use more advanced technologies and techniques, and to produce more cattle.<sup>294</sup> After beef cattle reach a certain weight, they typically go to a feedlot.<sup>295</sup>

Midwest cattle farmers and ranchers (including farmers raising dairy cattle) captured 9% of sales from all cattle ranches across the country.<sup>296</sup>

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287. *Id.*

288. JERRY CESSNA & CHRISTOPHER DAVIS, ECON. RSCH. SERV., USDA, GROWTH IN U.S. DAIRY PRODUCT EXPORTS TO SOUTHEAST ASIA DEPENDS ON COMPETITION WITH OTHER MAJOR DAIRY EXPORTERS (Feb. 1, 2021), <https://www.ers.usda.gov/amber-waves/2021/february/growth-in-us-dairy-product-exports-to-southeast-asia-depends-on-competition-with-other-major-dairy-exporters/>.

289. Carl Zulauf et al., *US Dairy Market and Policy Overview*, 11 *FARMDOC DAILY* 1, (2021).

290. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

291. JAMES M. MACDONALD & WILLIAM D. MCBRIDE, ECON. RSCH. SERV., USDA, THE TRANSFORMATION OF THE U.S. LIVESTOCK AGRICULTURE: SCALE, EFFICIENCY, AND RISKS 12 (Dale Simms ed., 2009)

292. *Id.*, at 13 fig. 5.

293. JEFFREY GILLESPIE ET AL., ECON. RSCH. SERV., USDA, STRUCTURE, MANAGEMENT PRACTICES AND PRODUCTION COSTS OF U.S. BEEF COW-CALF FARMS 1 (2023) at 13 tbl. 2. Note that the North Central region on this table consists of Iowa and Missouri. This region's cow-calf farms are 56% cow-calf only, 34% cow-calf/stocker (raising animals after weaning), and 11% cow-calf/finishing.

294. *Id.* at iv.

295. ECON. RSCH. SERV., USDA, CATTLE BEEF SECTOR AT A GLANCE, <https://www.ers.usda.gov/topics/animal-products/cattle-beef/sector-at-a-glance/> (last updated Aug. 30, 2023).

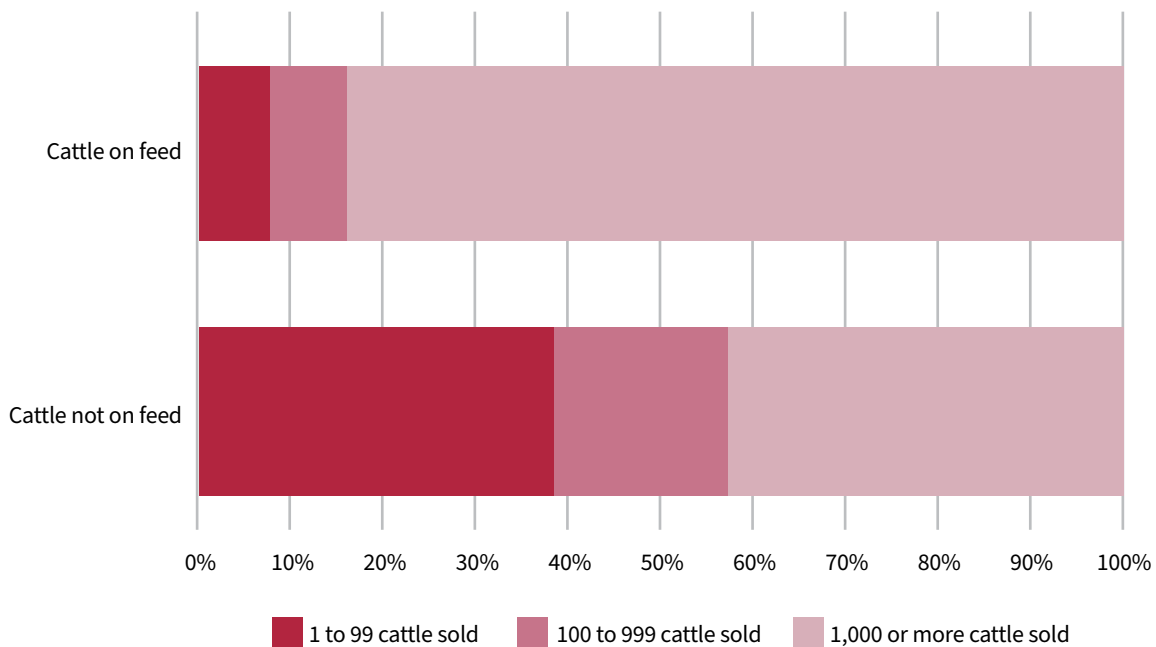
296. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.



Midwest feedlots captured 11% of all feedlot sales in 2017.<sup>297</sup> Feedlots generate more sales than other cattle farms: feedlots have about 20% more sales than other cattle farms at the national level. Feedlots generate 59% more sales than other cattle farms in the Midwest. Since there are far fewer feedlots than other cattle farms in the region—about 6,100 feedlots versus 58,000 cattle farms and ranches—this means feedlots have much higher sales per operation than cattle farms and ranches. Feedlot operations receive about 15 times more

sales per operation than cattle farms and ranches in the Midwest.<sup>298</sup> As mentioned earlier, feedlots are much more concentrated than ranches. Iowa has the most cattle farm and ranch sales and the most feedlot sales of any Midwest state—36% and 63% of the region’s sales, respectively—so we use it as an example. In Iowa, operations that sell more than 1,000 cattle a year are responsible for 42% of sales of cattle not on feed, while operations that sell more than 1,000 cattle a year are responsible for 84% of sales of cattle on feed.<sup>299</sup>

**Figure 7. Distribution of cattle sales by operation sales-volume category, for cattle on feed (feedlots) and cattle not on feed in Iowa, 2017**



Source: Calculated by the authors from 2017 Census of Agriculture, supra note 7, at State Level Data tbl. 13.

297. *Id.*

298. *Id.*

299. *Id.* at STATE LEVEL DATA tbl. 13.

The cattle farm and ranch business is one of the few major farm specializations not concentrated to the degree typical of the modern food system.<sup>300</sup> This may be because cattle farmers require a certain minimum number of acres for their herd size and that land sales are infrequent enough that it prevents them from expanding their ranch.<sup>301</sup> A little over three-quarters of cattle farms report pastureland, an average of 46 acres, and about half grow hay or haylage, an average of 41 acres.<sup>302</sup> Cattle farmers tend to raise cattle on pastureland that is less expensive than cropland.<sup>303</sup> Since land tends to be expensive in the Midwest, there is relatively less pastureland than in the cattle-raising areas of the Great Plains.<sup>304</sup> Many cattle farmers also appear able to raise animals with relatively limited labor time. The vast majority of Midwest cattle farmers appear to work part-time: most worked at least 100 days off the farm in 2017.<sup>305</sup> This is consistent with the national trend of most cattle farmers working at least 100 days a year off the farm.<sup>306</sup> In 2021, most farmers with a cattle specialization worked less than 2,000 hours on the farm in the Midwest.<sup>307</sup> Operations with only

20-49 beef cows, which are more labor-intensive than operations with larger herds, still average only 43.7 hours per cow a year (between the operator, unpaid labor, and hired labor).<sup>308</sup> Since their land tends to be less expensive—implying lower rents and property taxes—and since farmers appear able to manage small herds with relatively limited labor, cattle farmers, in general, appear to be under less pressure to consolidate than other animal farmers. Furthermore, since farmers do not often sell their land, there are likely limited opportunities for a given cattle farmer to expand their operation, even if they wanted to do so.

Even though cattle farmers, in general, produce relatively low sales, they still require some investment. Over half of Midwest cattle farms had over \$240,000 (converted to 2022 dollars) in land and buildings in 2017, significantly greater than the rural median family net wealth of \$150,000 in 2022.<sup>309</sup> There are some large cattle farms in the region. About 1% of cattle farms had over \$5 million in land and buildings, and about 150 had land and buildings worth over \$10 million as of the last

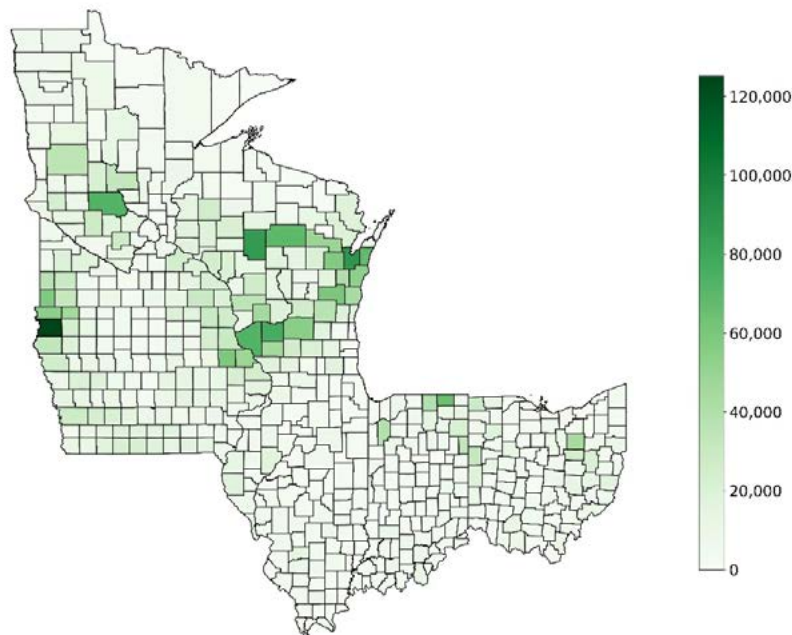
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300. GILLESPIE, *supra* note 293, at 1 (discussing diversity of size of cow-calf operations); MACDONALD ET AL., *supra* note 250, AT 2; see *infra* Table 24 where the distribution of cattle not on feed sold, a proxy for ranch production, is much less concentrated than milk cow inventory, hog inventory, or cattle on feed sold.
301. Kristen Boye, *How Many Acres do you Need to Raise Cattle?*, RETHINK RURAL (Mar. 17, 2016), <https://rethinkrural.raydientplaces.com/blog/how-many-acres-do-you-need-to-raise-cattle> (explaining how many acres are needed to raise cattle).
302. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, STATE LEVEL DATA tbl. 75. Future researchers may want to investigate why almost a quarter of ranches report no pastureland.
303. ECON. RSCH. SERV., USDA, FARMLAND VALUE, <https://www.ers.usda.gov/topics/farm-economy/land-use-land-value-tenure/farmland-value/> (last updated Nov. 2, 2020) (illustrating that pastureland is less expensive than farmland value).
304. ECON. RSCH. SERV., USDA, MAJOR USES OF LAND IN THE UNITED STATES (2012), <https://www.ers.usda.gov/data-products/major-land-uses/maps-and-state-rankings-of-major-land-uses/> (last updated Aug. 20, 2019) (illustrating that pastureland rates in the Midwest are much lower than in the Plains states); NAT'L AGRIC. STAT. SERV., USDA, 2023 FARM REAL ESTATE VALUE BY STATE (Aug. 4, 2023), [https://www.nass.usda.gov/Charts\\_and\\_Maps/Land\\_Values/farm\\_value\\_map.php](https://www.nass.usda.gov/Charts_and_Maps/Land_Values/farm_value_map.php) (showing difference in land value by state).
305. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.
306. *Id.*
307. ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.
308. GILLESPIE, *supra* note 293, at 23 tbl. 9.
309. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75; *CPI Inflation Calculator*, *supra* note 168. Converted to Dec. 2022 dollars; Aladangady, *supra* note 181, at 12 tbl. 2 (non-MSA median net worth).

census.<sup>310</sup> A recent USDA analysis found that larger operations have lower unit-production costs and are more likely to adopt new technologies to increase production, such as artificial insemination, more intensive breeding, and using a computer.<sup>311</sup> This could portend future consolidation.

There are farms that do not specialize in raising cattle for beef that still raise substantial amounts of cattle. Many farms raise and sell dairy cows. Figure 8 indicates significant amounts of cattle sales in Wisconsin, likely of dairy cattle. Dairy

farms sold 29% of cattle not on feed (i.e., not being finished for slaughter) in the Midwest.<sup>312</sup> Some dairy farms sell their older animals to feedlots. Meat processors make ground beef from these cows.<sup>313</sup> Oilseed and grain farms, farms whose production is mostly corn and soy, produce another 16% of sales of cattle not on feed in the region.<sup>314</sup> Many farmers feed their cattle corn.<sup>315</sup> Farms that have land not in crop production may choose to raise some cattle because it is not labor-intensive.

**Figure 8. Number of cattle not on feed sold by county in the Midwest, 2017**



Source: Calculated by the authors from 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 11; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

310. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

311. GILLESPIE, *supra* note 293, at 24 tbl. 10 (lower unit costs), 23 tbl. 9. (adopt new technologies).

312. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

313. Tara L. Felix et al., *Dairy-Beef Production*, PENN ST., <https://extension.psu.edu/dairy-beef-production> (last updated June 20, 2017); Lisa E. Held, *Could Eating Dairy Cows in New Ways Help Support Sustainable Farms?*, FOODPRINT, <https://foodprint.org/blog/eating-dairy-cow-meat/> (last updated Mar. 13, 2020).

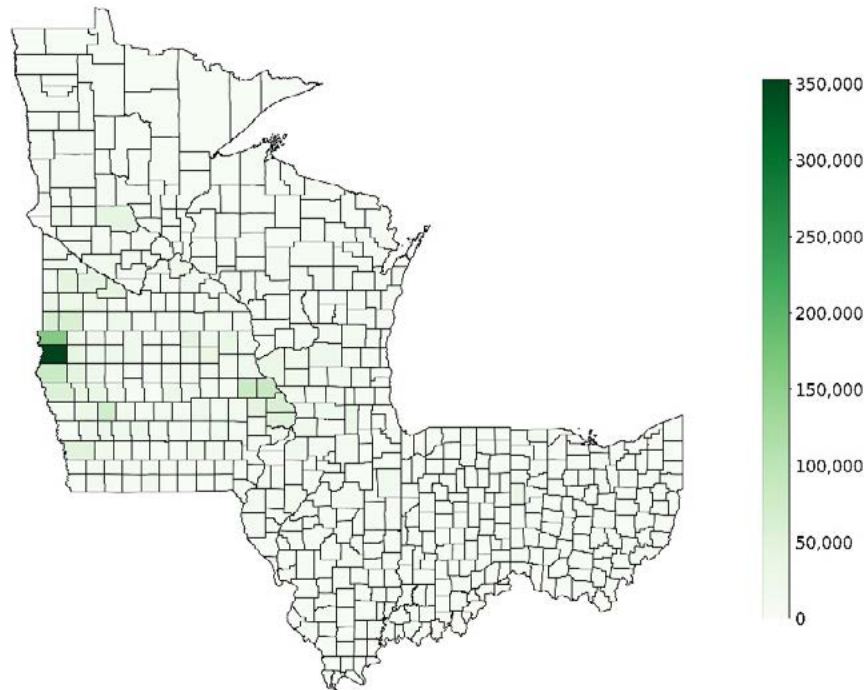
314. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

315. Paul L. Greenwood, *Review: An overview of Beef Production from Pasture and Feedlot Globally, as Demand for Beef and the Need for Sustainable Practices Increase*, 15 ANIMAL 1, (2021).

Feedlots tend to be more concentrated than cattle farms.<sup>316</sup> Farms with at least moderate sales were responsible for 96% of all cattle on feed sold in the Midwest, whereas farms with at least moderate sales were responsible for about 78% of cattle not

on feed, at the time of the last census.<sup>317</sup> The concentration of feedlot sales is comparable to that of hog sales.<sup>318</sup> As mentioned earlier, Iowa has the highest levels of feedlot production in the region (see Figure 9 for sales by county).

**Figure 9. Number of cattle on feed sold by county in the Midwest, 2017**



Source: 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 11; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

Feedlots raise animals for several months, feeding them to get them to a target weight, before they sell the animals for slaughter. Industrial feedlots house large numbers of cattle in open-air pens where, according to USDA, workers feed them “a

high energy ration” including “grain, silage, hay, and/or protein supplements.”<sup>319</sup> Workers on these operations use machines to prepare and deliver feed, and to store and process animal waste.<sup>320</sup> Midwest feedlots have an average of \$2.4 million

316. MACDONALD ET AL., *supra* note 250, at 36 tbl. 9.

317. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

318. *Id.*

319. MACDONALD & MCBRIDE, *supra* note 291, at 5, 12.

320. *Id.* at 19.

in land and buildings, with another \$340,000 in machines and equipment.<sup>321</sup> Some large feedlots hire professionals to feed the cattle, handle cattle intake purchases, and deal with sales of fed cattle. Some feedlots hire veterinarians to care for the herd.<sup>322</sup> Around 40% of feedlots have labor expenses, at an average of \$37,000 per operation. About 9% had contract farm labor expenses, at an average of \$14,000 per operation.<sup>323</sup> A USDA analysis found that larger feedlots are able to reduce costs until they acquire cattle up to their facility's capacity, at which point there is not much variation in unit costs across herd size.<sup>324</sup> Since feedlots are already consolidated, this suggests further consolidation may await discovery of new technologies or management techniques.

Production contracts play a smaller role in beef production than in hog production. Only about 12% of cattle on feed were sold on contract in the Midwest.<sup>325</sup> Feedlot operators and meat packers use "alternative market arrangements" (AMAs) to contract for a delivery of cattle at prices tied to

market prices at the time of the exchange. Some authors argue this may depress the prices feedlot operators receive because packers have an incentive to keep market bids on cattle down at the time of exchange.<sup>326</sup>

Beef producers, like other Midwest farmers, have found large export markets for their products. The biggest export markets are Japan, South Korea, and China, which purchased about two-thirds of exports in 2022.<sup>327</sup> An analysis by USDA found that Japan's recent renegotiation of trade deals with various partner countries should increase U.S. beef exports to Japan.<sup>328</sup> Another department analysis suggested that Chinese beef consumption and imports would increase in the future, possibly giving U.S. farmers more buyers.<sup>329</sup> Domestic consumption of beef per capita has increased slightly in the past several years, after a period of decline.<sup>330</sup> Organic sales from cattle farms and feedlots in the Midwest made up a tiny share of all sales, at the time of the last census.<sup>331</sup>

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321. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.

322. MACDONALD ET AL., *supra* note 250, at 44.

323. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.

324. MACDONALD & MCBRIDE, *supra* note 291, at 19.

325. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 42.

326. FRANCISCO GARRIDO ET AL., BUYER POWER IN THE BEEF PACKING INDUSTRY: AN UPDATE ON RESEARCH IN PROGRESS 14 (2022).

327. ECON. RSCH. SERV., USDA, CATTLE BEEF SECTOR AT A GLANCE, *supra* note 295.

328. ETHAN SABALA & ERIC DAVIS, ECON. RSCH. SERV., USDA, THE IMPACT OF JAPAN'S TRADE AGREEMENTS AND SAFEGUARD RENEGOTIATION ON THE U.S. ACCESS TO JAPAN'S BEEF MARKET 28 (Casey Keel et al. eds., 2023).

329. FRED GALE & FENGXIA DONG, ECON. RSCH. SERV., USDA, CHINA'S MEAT CONSUMPTION: GROWTH POTENTIAL 1, 33-34 (Elaine Symanski & Chris Whitney eds., 2023).

330. Gretchen Kuck & Gary Schnitkey, *An Overview of Meat Consumption in the United States*, 11 FARMDOC DAILY 1, 1-2 (2021).

331. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.



## MINOR INDUSTRIES

A little over 10% of Midwest farm receipts come from products besides corn, soy, hogs, dairy, or cattle (see Figure 1).<sup>332</sup> Even though farms generate relatively fewer sales from these commodities, many of the farms that grow them use specialized equipment, and their sales also tend to be concentrated among larger farms. Since these products play a small role in the Midwest farm system, we give only a brief overview of them here.

### Overview

Although almost all the region's harvested cropland is in corn or soy, Midwest farmers still grow a variety of vegetables and root crops. They also raise animals besides hogs and cattle. Some farmers also grow farm products not for food, like flowers and Christmas trees. What follows is a summary of these minor products.

### Crops

Most farms that raise vegetables grow some for “fresh markets.” These are products that are sold

fresh, as opposed to those sold after “processing,” like canned beans. Farmers that harvest vegetables and fruit for fresh sales, like at a farmers market or a grocery store, tend to have them harvested by hand, which they either do themselves or they hire laborers to do. Farmers that harvest products that are less susceptible to damage by machine harvest, like potatoes, or where appearance is less important, like sugar beets processed for sugar, tend to use machines. Even for these products with smaller markets, the largest farms tend to capture most of the sales (see Table 10).

Most farms that raise vegetables in the Midwest raise at least some vegetables for “fresh markets.”<sup>333</sup> These farms are spread throughout the region. Figure 10 shows farms with cucumbers grown for fresh market by county, with a fairly wide dispersion of production across the region. There is a similarly broad dispersion for squash, bell peppers, lettuce, and other vegetables.<sup>334</sup>

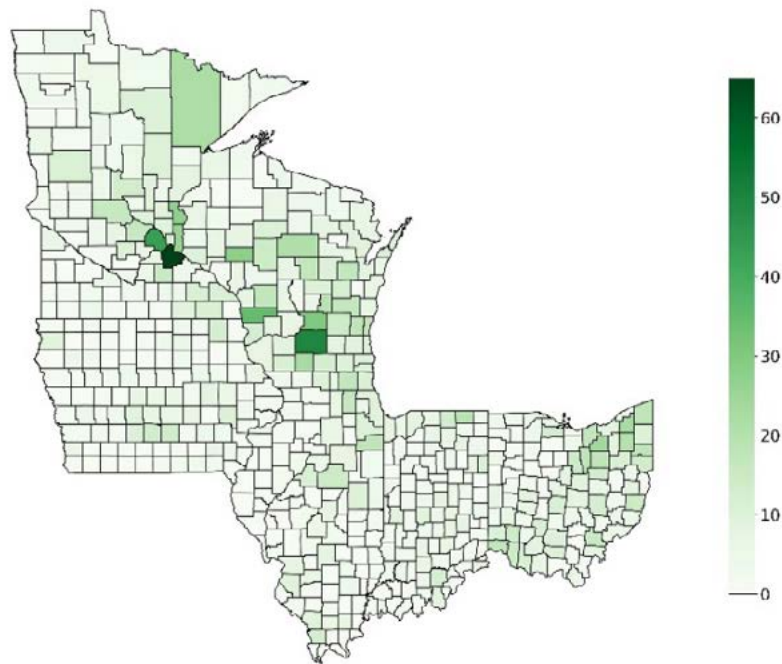
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332. Query from ECON. RSCH. SERV., USDA, CASH RECEIPTS BY COMMODITY STATE RANKING Tool, *supra* note 3.

333. 2017 CENSUS OF AGRICULTURE, *supra* note 7, COUNTY LEVEL DATA tbl. 29.

334. *Id.*

**Figure 10. Farms with cucumbers for fresh market by county in the Midwest, 2017**



Source: 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 29; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

Midwest farms grow many other kinds of crops. Minnesota produces substantial amounts of sugar beets, green peas, and dry beans.<sup>335</sup> Farmers can use machines to harvest all of these products and their production is dominated by large farms. Almost 100% of Minnesota sugar beets, by weight, are produced on commercial farms.<sup>336</sup> The same is

true of potatoes, as measured by acreage.<sup>337</sup> Some Ohio farmers have mechanized their harvest of tomatoes (for processing).<sup>338</sup> Wisconsin is home to mechanized cabbage, carrot, and cucumber farms.<sup>339</sup> About 240 farms in the region raise cranberries, with Wisconsin responsible for about two-thirds of national production.<sup>340</sup> Cranberry farms

335. Query from ECON. RSCH. SERV., CASH RECEIPTS BY COMMODITY STATE RANKING TOOL, *supra* note 3.

336. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

337. *Id.*

338. Dan Cummins, *Local Farmer Exceeds Typical Yield for Annual Tomato Harvest*, WTOL 11 (Sept. 30, 2022), <https://www.wtol.com/article/news/local/triple-h-farm-exceeds-typical-yield-for-annual-tomato-harvest/512-762e1b89-5a5c-4dfd-a505-fa19af55ffc4> (describing mechanical harvest).

339. Processed cabbage is machine harvested while cabbage sold fresh at markets is hand harvested. KAREN DELAHAUT, CROP PROFILE FOR CABBAGE IN WISCONSIN, <https://ipmdata.ipmcenters.org/documents/cropprofiles/WIcabbage.pdf> (last updated Aug. 2003); Millaine Wells, *See the Unique Equipment Used to Harvest Carrots in Wisconsin*, WE ARE GREENBAY (Nov. 6, 2020), <https://ipmdata.ipmcenters.org/documents/cropprofiles/WIcabbage.pdf> (carrots); THE MID-WEST FARM REPORT, *Your Pickle May Have Started Here in Wisconsin* (Sept. 14, 2022), <https://www.midwestfarmreport.com/2022/09/14/your-pickle-may-have-started-here-in-wisconsin/> (cucumbers).

340. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at COUNTY LEVEL Data tbl. 33; ECON. RSCH. SERV., USDA, CRANBERRY PRODUCTION IN TOP-PRODUCING STATES TO INCREASE MODESTLY IN 2021, <https://www.ers.usda.gov/data-products/>

require substantial investment. Farmers flood cranberry fields, then operate huge machines that knock berries loose and suck them into a storage

vat.<sup>341</sup> Wisconsin also promotes tourist visits to cranberry farms.<sup>342</sup>

**Table 10. Shares of farms and acres among farms with at least moderate sales for selected minor crops in the Midwest, 2017**

Statistic	Sugar beets	Potatoes	Vegetables	Snap beans
Share of farms	93.2%	21.8%	28.5%	22.0%
Share of acres	99.2%	94.1%*	91.2%	86.2%*

\* USDA suppressed the underlying data in such a way that this is probably an underestimate.

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at Typology.

The region is also home to various forms of niche production. Ohio raises the most spelt, a type of wheat, in the country (production is very limited).<sup>343</sup> Farmers can plant, treat, and harvest spelt like more common types of wheat.<sup>344</sup> Iowa's niche aronia berry farmers have mechanized their harvest.<sup>345</sup> The region has about 280 aronia berry farms.<sup>346</sup> If aronia farmers and marketers successfully expand the market for this berry, which has many health benefits, then mechanized farms will likely be in the best position to drive out their competitors.<sup>347</sup>

A large number of farms produce grains and forage. About a third of farms in the Midwest produce hay.<sup>348</sup> A substantial portion of these are likely retirement and hobby farms, about which we will say more later. Farmers in certain areas of Illinois, Indiana, Ohio, and Wisconsin produce significant amounts of winter wheat, so-named because farmers normally plant it in the winter (or around winter).<sup>349</sup> Northwestern Minnesota farmers grow a significant amount of spring wheat, planted in the spring.<sup>350</sup> Farmers with at least moderate sales

chart-gallery/gallery/chart-detail/?chartId=102649 (last updated Nov. 24, 2021).

341. Katherine Rodeghier, *Midwest Traveler: Seeing Red in Wisconsin Cranberry Country*, CHICAGO TRIB. (Sept. 15, 2017), <https://startribune.com/midwest-traveler-seeing-red-in-wisconsin-cranberry-country/444524703/>; TRUE FOOD TV, *How Does it Grow?*, YOUTUBE (Nov. 11, 2014), [https://www.youtube.com/watch?v=XZPXQ7nw\\_9Y](https://www.youtube.com/watch?v=XZPXQ7nw_9Y).
342. Wis. ST. CRANBERRY GROWERS ASS'n, *Experience*, <https://www.wiscran.org/experience/cranberry-marsh-tours/>.
343. Jodi Uhlenhake-Borger, *French Family Leads the Way in Spelt Production*, OH. FARM BUREAU (Nov. 15, 2022), <https://ofbf.org/2022/11/15/french-family-ohio-spelt-production/>; U. WIS., CORN AGRONOMY, *Spelt* (Nov. 1, 2023), <http://corn.agronomy.wisc.edu/Crops/Spelt.aspx>.
344. U. Wis., *supra* note 343.
345. See Bellbrookberryfarm, *Bellbrook Berry Farm Harvest 2016*, YOUTUBE (Sept. 21, 2016), <https://www.youtube.com/watch?v=zeTS-RPttt4> (showing the state's first commercial aronia berry farm).
346. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at COUNTY LEVEL Data tbl. 33.
347. Yulin Ren et al., *Potential Benefits of Black Chokeberry (Aronia Melanocarpa) Fruits and Their Constituents in Improving Human Health*, 27 MOLECULES (Nov. 13, 2022), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9696386/#:~:text=The%20fruits%20of%20Aronia%20melanocarpa,liver%2D%2C%20and%20neuroprotective%20effects> (describing the health benefits of Aronia berries).
348. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at COUNTY LEVEL Data tbl. 26.
349. GARY VOCKE & MIR ALI, ECON. RSCH. SERV., USDA, *WHEAT PRODUCTION PRACTICES, COSTS, AND YIELDS: VARIATIONS ACROSS REGIONS 5-6* (Courtney Knauth & Cynthia Ray eds., 2013) at 5 Figure 4.
350. *Id.* at 6 Figure 5.

produce 90% of all wheat bushels in the region.<sup>351</sup> Farmers use combines to harvest wheat, sometimes operated by roving combine operators who drive their machines across the country.<sup>352</sup>

There are also many farms that raise agricultural products not primarily intended for food or animal feed. Nursery, greenhouse, floriculture, and sod farms brought in about 5% of sales in Ohio in 2017.<sup>353</sup> Farms that were midsize or larger captured almost 90% of these sales, with very large farms capturing a full 43%.<sup>354</sup> Even though there are few of these farms in Ohio, they had the greatest total hired labor expense of any farm specialization in the state, recording roughly 26% of all farm labor expenses, at about \$211,000 per operation.<sup>355</sup>

Christmas tree farms also constitute a small Midwest industry. Wisconsin produces more Christmas trees than any other state in the region.<sup>356</sup> Only three Wisconsin operations produce a third of all Christmas trees.<sup>357</sup> Even so, farms with low sales still produce around a third of all Christmas

trees, so the industry relies on production from smaller operators more than most other farm specializations.<sup>358</sup>

## Animals

Midwest farmers produce various animal products that make up a relatively small share of the region's farm economy. Farmers raise many of these animals in CAFOs or CAFO-like conditions. Egg production makes up a significant share of total receipts in Indiana, Iowa, and Ohio.<sup>359</sup> Egg production is extremely concentrated. Only 2% of Midwest farms have 80% of the layers, chickens bred to lay eggs.<sup>360</sup> Wisconsin leads the nation in mink production.<sup>361</sup> Mink farmers keep their animals in warehouse-like facilities. Mink farmers try to keep their operations secret because animal rights activists often try to release minks.<sup>362</sup> Minnesota and Indiana have significant turkey industries.<sup>363</sup> Farms with at least moderate sales have over 90% of total turkey inventory.<sup>364</sup> Today's turkeys have been bred to have such large breasts that they cannot reproduce on their own. Farmers

351. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

352. Craig Savoye, *Nomadic 'Cowboys' Harvest the Midwest's Wheatfields*, CHRISTIAN SCI. MONITOR (July 11, 2001), <https://www.csmonitor.com/2001/0711/p2s2.html> v.

353. Calculated by the authors, from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 2.

354. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

355. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.

356. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 2.

357. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. Note that while very large and nonfamily farms have their Christmas tree sales suppressed for privacy reasons, we can deduce the sum of sales from these two groups from the provided data.

358. *Id.*

359. Query from Econ. Rsch. Serv., USDA, Cash Receipts by Commodity State Ranking Tool, *supra* note 3.

360. Calculated by the authors 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

361. Kate Golden, Wisconsin Watch, *Wisconsin's No. 1 Mink Farming Industry Now Seen as a COVID-19 Risk*, INVESTIGATE MIDWEST (Feb. 1, 2021), <https://investigatamidwest.org/2021/02/01/wisconsins-no-1-mink-farming-industry-now-seen-as-a-covid-19-risk/>.

362. Truth About Fur, *Zimbal Mink Farm: A Wisconsin Family Affair* (Feb. 13, 2015), <https://www.truthaboutfur.com/zimbal-mink-farm-wisconsin-family-affair/> (showing minks in warehouse-like facilities); Mike Snider, *Break-in at Ohio Farm Releases as Many as 10,000 Carnivorous Mink into the Wild, Police Say*, USA TODAY (Nov. 15, 2022), <https://www.usatoday.com/story/news/nation/2022/11/15/ohio-mink-farm-40000-released-vandalism/10703554002/> (stating that "animal rights activists have released mink from mink farms").

363. Query from ECON. RSCH. SERV., USDA, CASH RECEIPTS BY COMMODITY STATE RANKING TOOL, *supra* note 3.

364. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

use artificial insemination to breed them.<sup>365</sup> The Hoosier State leads the nation in duck production.<sup>366</sup> Only two Indiana companies produce three-quarters of all the nation's ducks.<sup>367</sup> About 650 farms raise deer.<sup>368</sup> These operators may sell the deer meat, charge customers to hunt the deer, or simply hunt the deer themselves.<sup>369</sup>

Someone raises almost any animal one can imagine in the Midwest. The census reports quail, chukar, rhea, Angora goat, emu, bison, pigeon, mollusk, ostrich, and, of course, llama farms.<sup>370</sup> The *Ames Tribune* reported a young couple recently opened a shrimp farm in an old outlet mall in Story City, Iowa.<sup>371</sup> A former employee in the New York Yankees front office now raises Wagyu beef outside Fort Wayne, Indiana.<sup>372</sup> An operation that

describes itself as the world's largest fancy color guinea hatchery calls New Vienna, Iowa, home.<sup>373</sup>

## Lifestyle and Retirement Farms

The Midwest is home to some production that is not particularly concentrated (see Table 11). These less concentrated products include oats, hay, and horses. Oat farmers have tended to produce oats as an animal feed.<sup>374</sup> In recent years, consumers have shown an increased demand for oats for oat milk and other health foods.<sup>375</sup> Producers of hay, an animal feed, have larger markets, as many animals eat hay, such as cattle and horses.<sup>376</sup> Farm owners may employ hay farmers to cultivate the crop. Some of these hired farmers harvest large amounts of land. A hay farmer named Jo Daviess

365. Daron Taylor, *Humans have changed industrial turkeys so much they can't even mate without our help*, WASHINGTON POST (Nov. 22 2016), <https://www.washingtonpost.com/news/wonk/wp/2016/11/22/humans-have-changed-industrial-turkeys-so-much-they-cant-even-mate-without-our-help/>.

366. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 30.

367. Julie S. Bettinger, *Why the Indiana Duck Industry is No. 1*, MY IND. HOME (Feb. 9, 2021), <https://my-indiana-home.com/farm/livestock/why-the-indiana-duck-industry-is-no-1/>.

368. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 32.

369. Bryce Beitzel, *Owning a Deer Farm is Work but Worth It*, TARTAN (Nov. 23, 2021), <https://mc Tartan.com/1673/features/owning-a-deer-farm-is-work-but-worth-it/>; Kristen Schmitt, *Deer Farming: The Next Adventure in Agriculture*, MOD. FARMER (Feb. 19, 2014), <https://modernfarmer.com/2014/02/deer-farming-next-adventure-agriculture/>.

370. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at COUNTY LEVEL Data tbl. 16, 20, 22, 23.

371. Ronna Faaborg, *Iowa Shrimp Farm Midland Co. Starts up in Former Story City Outlet Mall*, AMES TRIB. (Sept. 25, 2020, 9:34 AM), <https://www.amestrib.com/story/business/agricultural/2020/09/25/midland-co-aquaculture-iowa-state-grad-starts-shrimp-farm-former-story-city-outlet-mall/3510095001/>.

372. Karl Schneider, *Grown IN Indiana: Wagyu Farmer Pursuing Perfection in Cattle Operation, Restaurant*, INDYSTAR (Aug. 10, 2022, 5:02 AM), <https://www.indystar.com/story/news/2022/08/10/former-pitcher-raising-wagyu-cattle-at-indiana-farm-near-fort-wayne/10003201002/>.

373. GUINEA FARM, <https://www.guineafarm.com/> (last visited Nov. 4, 2023).

374. Northern Crops Institute, *Oats*, NORTHERN CROPS INSTITUTE (Mar. 21, 2014), <https://www.northern-crops.com/northern-region-crops-of-the-northern-us/2014/3/21/oats>.

375. Donnelle Eller, *Iowa has World's Largest Cereal Plant, but State's Farmers Lack Market for Oats*, DES MOINES REG. (Oct. 5, 2017, 6:50 AM), <https://www.desmoinesregister.com/story/money/agriculture/2017/10/05/iowa-has-worlds-largest-cereal-plant-but-states-farmers-lack-market-oats/690998001/>; *Oats Market Size, Share, Analysis and Growth to 2028, Market Insights and Analyst View*, INSIGHT PARTNERS (Nov. 2021), <https://www.theinsightpartners.com/reports/oats-market#:~:text=The%20growing%20awareness%20of%20health,bars%2C%20and%20snacks%20have%20increased>.

376. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at National Level Data tbl. 35. Note that there were about 800,000 oats for grain acres versus 50 million for hay in 2017; Ed Rayburn, *A Quick Guide to Hay Feeding on Meadows & Pastures*, WEST VIRGINIA UNIVERSITY EXTENSION. (Feb. 14, 2019), <https://extension.wvu.edu/agriculture/pasture-hay-forage/hay-management/hay-feeding-on-meadows-pastures> (cattle); Loretta Sorensen, *Some Land is Better Suited for Hay*, HAY & FORAGE (Nov. 17, 2020, 9:12 AM), <https://hayandforage.com/article-3276-some-land-is-better-suited-for-hay.html> (dairy farmers); Phyllis Coulter, *Top Hay Farmers Lead for Decade*, ILL. FARMER TODAY (Aug. 20, 2021), [https://agupdate.com/illinoisfarmertoday/news/crop/top-hay-farmers-lead-for-decades/article\\_089d460e-004f-11ec-8388-cf959e945b9d.html](https://agupdate.com/illinoisfarmertoday/news/crop/top-hay-farmers-lead-for-decades/article_089d460e-004f-11ec-8388-cf959e945b9d.html) (horse farmers).



harvested 21,500 acres of hay in Illinois in 2021.<sup>377</sup> Horse farmers raise horses for themselves or to supply to people interested in equestrian sports. The “horse belt” stretches across a wealthy region from northern Virginia to the suburbs of

Philadelphia.<sup>378</sup> Indiana, Ohio, and Wisconsin all had more than 10,000 farms with horse inventory, almost all of them low sales farms, at the time of the last census.<sup>379</sup>

**Table 11. Farm size distribution for selected less concentrated products in the Midwest, 2017**

Farm type	Oats for grains – bushels	Forage matter for animals – tons dry equivalent	Horses and ponies – inventory*
Low sales	30.2%	35.2%	85.4%
Moderate	20.9%	16.5%	7.2%
Midsized	22.0%	22.6%	3.2%
Large	16.7%	15.4%	0.7%
Very Large	1.8%	3.7%	0.0%
Nonfamily	7.5%	6.6%	3.2%

\* USDA suppressed certain horse and pony inventory estimates for privacy reasons. Due to the nature of the suppressions, the large, very large, and nonfamily categories are likely slight underestimates. Note: Columns may not sum to 100% due to rounding.

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at Typology.

Many oat, hay, and horse farms in the Midwest are likely retirement or “lifestyle” farms. Lifestyle farms were so-named, according to USDA, “because many of the operators on these farms view their farms largely as an avocation or a place to live where they can enjoy a rural lifestyle.”<sup>380</sup> The owners of these properties tend to have high net worths and sufficient incomes to farm part-time or as a hobby. Retirement farmers are retired people

who have a farm property.<sup>381</sup> As shown in Table 12, retirement farms tend to have high net worths, albeit with relatively modest household incomes, as compared with lifestyle farmers. We might expect retirement farms to have lower incomes than lifestyle farms because retired people tend to have lower incomes than working people.<sup>382</sup>

377. Coulter, *supra* note 376.

378. SUSAN OFFUTT & PENNI KORB, ECON. RSCH. SERV., USDA (Sept. 1, 2006), <https://www.ers.usda.gov/amber-waves/2006/september/data-feature/>.

379. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLGY.

380. ROBERT A. HOPPE & JAMES M. MACDONALD, ECON. RSCH. SERV., USDA, UPDATING THE ERS FARM TYPOLOGY 11 (Dale Simms & Maria Williams eds., 2013).

381. *Id.* at iii.

382. Pension Rights Center, *Income of Today’s Older Adults* (Oct. 23, 2023), <https://pensionrights.org/resource/income-of-todays-older-adults/> (median incomes of older people and retirees); GLORIA GUZMAN & MELISSA KOLLAR, *Income in the United States: 2022 U.S. CENSUS BUREAU* (Sept. 12, 2023), <https://www.census.gov/library/publications/2023/demo/p60-279.html> (median incomes of all households; also see tables for details on workers).

**Table 12. Median household income and net worth for lifestyle and retirement farms, with median household income for all rural households in the Midwest, 2021**

State	Lifestyle Farms		Retirement Farms		All rural households*
	Median household income	Median household net worth	Median household income	Median household net worth	Median household income
Illinois	\$136,286	\$920,535	\$78,579	\$1,373,995	\$68,000
Indiana	\$114,601	\$1,283,808	Not released	Not released	\$66,000
Iowa	\$149,102	\$1,309,862	\$85,800	\$1,594,680	\$69,170
Minnesota	\$109,403	\$1,122,785	\$76,330	\$1,135,804	\$70,000
Wisconsin	\$107,251	\$930,937	\$75,008	\$1,368,651	\$73,000

\* Data for rural household income is for 2019.

Source: Query from Econ. Rsch. Serv., USDA, ARMS Data Analysis, *supra* note 12 (lifestyle and retirement farm statistics); Ruggles et al., *supra* note 116 (rural median household income).

In 2012, the most recent year for which USDA reported census results for lifestyle and retirement farms, these farms were responsible for about 20% of oat bushels, 25% of forage materials measured in tons, and 65% of horse and pony inventory.<sup>383</sup>

### Low and no sales farms

While many lifestyle and retirement farms engage in some production, a significant share raise no agricultural products at all. These properties are in the census because USDA counts any property capable of producing \$1,000 of agricultural goods as a farm, whether it actually produces those goods or not. Over the years, USDA has included more and more zero-sales farms in the census—with

these farms' share of all farms going from 5% in 1982 to over 20% by 2012.<sup>384</sup> BIPOC and women farmers are more likely than farmers in general to be zero-sales farmers.<sup>385</sup> We do not have data on zero-sales farms in the Midwest. In spite of that, we can still estimate how many there are. At the national level, about 30% of farms had less than \$1,000 in sales and about 20% had no sales 2017.<sup>386</sup> If this same ratio applies in the Midwest, where 25% of farms had sales of less than \$1,000, then about 17% of Midwest farms have zero sales.<sup>387</sup>

So far in this report, we have tried to avoid analyzing all farms in the Midwest as one group because a significant share of these farms have very low or no sales. Farms with very low sales are so

383. Calculated by the authors using NAT'L AGRIC. STAT. SERV., USDA, 2012 CENSUS OF AGRICULTURE (2014) [hereinafter 2012 CENSUS OF AGRICULTURE], TYPOLOGY.

384. See Nathan A. Rosenberg, *Farmers Who Don't Farm: The Curious Rise of the Zero-Sales Farmer*, J. AGRIC., FOOD SYS., CMTY. Dev. 1, 5 (2017).

385. *Id.*

386. 2017 CENSUS OF AGRICULTURE, *supra* note 7, NATIONAL LEVEL DATA at tbl. 2 (about 30% of farms had less than \$1,000 in sales); calculated by the authors using Special Tabulation Request From USDA to Nathan Rosenberg (Nov. 20, 2019) (on file with authors) (about 20% had zero sales).

387. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 2.

numerous that they seriously distort overall averages. To provide a sense of this effect, we compute average sales with and without farms with very low sales. In 1974, USDA set a minimum sales threshold for farms that it has never adjusted for inflation. If we adjust this threshold for inflation,

we get roughly \$5,000.<sup>388</sup> Farms with less than \$5,000 in sales make up 39% of Midwest farms.<sup>389</sup> If we remove these farms, we get average sales of \$367,294, an almost two-thirds increase over the straightforward average of \$225,474.<sup>390</sup>

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388. Peter Lehner et al., *The Stakeholders in Agriculture Policy*, 39 ENV'T F. 42, 45 (2022).

389. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 2.

390. *Id.*







# FARMER ECONOMIC CONDITIONS

## OVERVIEW

In earlier sections of this report, we established that the Midwest’s major farm industries, which account for almost all sales in the region, are dominated by large farms that have significant amounts of capital. This pattern also tends to hold in smaller industries. Across these industries, a relatively small number of farms capture most of the sales. These farms also tend to have high incomes and wealth. There are some exceptions to this general pattern, such as cattle farming or hay production, where smaller operations still account for a significant share of total production. Bearing in

mind that there are differences by specialization, we now analyze the economic status of Midwest farms in general. We do this to emphasize the concentration of resources among farms, regardless of what they produce.

Midwest agriculture is dominated by large farms (see Table 13). Farms with at least moderate sales capture 92% of sales and 94% of net cash farm income. These farms also operate about 84% of cropland. They average \$745,000 in sales and \$195,000 in net cash income.<sup>391</sup>

**Table 13. Farms, acres, sales, and net cash farm income by farm size in the Midwest, 2017**

Farm size	Farms		Cropland acres in farms with cropland		Sales (\$1,000)		Net cash farm income	
	Count	Share total	Per farm	Share total	Per farm	Share total	Per farm	Share total
Low sales	308,396	72.3%	67	16.4%	\$26,052	8.3%	\$4,747	6.0%
Moderate sales	44,102	10.3%	368	14.9%	\$269,864	12.4%	\$83,057	14.9%
Midsized	39,197	9.2%	842	30.6%	\$661,362	26.9%	\$186,687	29.8%
Large	14,946	3.5%	1,953	26.7%	\$1,868,052	29.0%	\$499,482	30.4%
Very large	1,087	0.3%	3,660	3.0%	\$10,998,428	12.4%	\$2,070,783	9.2%
Nonfamily	19,096	4.5%	514	8.4%	\$550,014	10.9%	\$127,065	9.9%

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at Typology.

391. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. Note that these figures on concentration may actually understate the case. We included so-called “nonfamily farms,” which are farms not operated by a family. While many people will imagine these are large corporations, at the national level, 26% have less than \$5,000 in sales and government payments combined. In the Midwest, over a fifth of nonfamily farms have less than \$5,000 in sales and government payments combined. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. Therefore, including these farms understates the extent of concentration.



Although low sales farms make up 72% of Midwest farms, they are responsible for only 8% of total sales.<sup>392</sup> This is because the category appears to include a huge number of very low sales farms.<sup>393</sup> Among farms with less than \$100,000 in sales, those with sales between \$25,000 and \$99,999 make up 21% of farms and 77% of sales.<sup>394</sup> Meanwhile, a little over half of farms with less than \$100,000 in sales would not be in the census if USDA were to adjust its minimum sales threshold for inflation.<sup>395</sup> These farms produce only 4% of the category's sales.<sup>396</sup> Therefore, among farms with less than \$100,000 in sales, most generate very few sales, while a small share generate almost all sales in the category. Low sales farms likely follow the same pattern.<sup>397</sup>

Midwest farms spend significant amounts of money on inputs and have large investments in machines, land, and buildings (see Table 14). Farms with at least moderate sales spent an average of \$172,000 on fertilizers, chemicals, seeds, and plants in 2017.<sup>398</sup> Animal farms, which tend to have more concentrated production, spent an average of \$453,000 on livestock and feed.<sup>399</sup> Larger farms tend to spend more on hired labor, with the largest farms spending nearly \$900,000 a year on average.<sup>400</sup> The average farm with at least moderate sales also owned over \$500,000 in machines and equipment and another \$5 million in land and buildings.<sup>401</sup>

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392. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

393. For the analysis that follows in the paragraph, we use census data on farms with less than \$100,000 in sales. These data include nonfamily and family farms, so it is more expansive than low sales farms with sales less than \$100,000, since the category of low sales farms includes only family farms. Even so, since there are far more family farms than nonfamily farms, an analysis of family farms with less than \$100,000 in sales would probably yield similar results.

394. Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at STATE LEVEL DATA tbl. 2

395. See *supra* “Low and no sales farms”; calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 2. There are 165,258 farms with less than \$5,000 in sales among 303,563 farms with less than \$100,000 in sales. Note that USDA also counts government payments toward its “sales” threshold when it determines whether an operation is a farm. Since our analysis is focused on production, we prefer a threshold based on sales.

396. Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at State Level Data tbl. 2

397. *Id.* Note that there are some complications to comparing low sales farms and farms with low amounts of sales. As mentioned in *supra* note 393, the low sales farms category includes only family farms, while our analysis of farms with low sales (farms with sales less than \$100,000) includes family and nonfamily farms. Another complication is that the cutoff for low sales farms is based on GCFI, which includes sales as well other sources of income, like government payments and “farm-related income,” like farm tourism. This means farms with sales below \$150,000 could have GCFI above \$150,000. In the Midwest, government payments and farm-related income make up a significant share of gross income for low sales farms. We would need more detailed data to the similarities in the sales distribution among low sales farms and farms with low sales. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

398. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. We added the average expenditures on fertilizers, chemicals, seeds, and plants to get \$172,000. The denominators for each of these averages includes only farms with these expenses. Therefore, this is a hypothetical calculation for a farm that spent the average on each set of items.

399. *Id.* Similar to the previous calculation, we added the average expenditures on livestock and feed for farms with those expenses to get \$453,000. Therefore, this is also a hypothetical calculation for a farm that that spent the average on each set of items.

400. *Id.* Note that over 80% of hired managers are on farms with at least moderate sales. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. Most hired managers are on oilseed and grain farms (48%) or dairy cattle farms (17%). *Id.* at STATE LEVEL DATA tbl. 75.

401. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.

**Table 14. Average expenditures and value of capital by farm size in the Midwest, 2017**

Farm size	Fertilizers, etc.	Chemicals	Seeds, plants, etc.	Livestock purchased	Feed purchased	Hired labor	Machines & equipment	Land & buildings
Low sales	\$5,261	\$3,586	\$6,491	\$9,638	\$7,952	\$7,306	\$62,575	\$509,843
Moderate	\$26,427	\$17,582	\$28,870	\$76,092	\$69,054	\$17,285	\$272,943	\$2,536,565
Midsized	\$63,612	\$39,983	\$67,157	\$142,070	\$131,530	\$33,580	\$573,300	\$5,883,366
Large	\$156,771	\$94,026	\$160,333	\$425,205	\$391,060	\$107,325	\$1,189,622	\$13,400,341
Very large	\$379,406	\$242,055	\$470,274	\$2,373,395	\$4,034,501	\$888,464	\$2,387,093	\$22,279,419
Nonfamily	\$55,156	\$35,606	\$64,369	\$252,453	\$298,300	\$112,050	\$343,769	\$3,520,624
Moderate or more	\$63,430	\$40,002	\$68,344	\$225,491	\$227,916	\$67,196	\$518,867	\$5,355,211

Note: “Fertilizers, etc.” includes lime and soil conditioners. “Seeds, plants, etc.” includes vines and trees. “Livestock purchased” includes poultry and expenses for animal leases. The expenditures are for farms with those expenditures. The averages for machines and equipment, and for land and buildings are the averages across all farms.

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at Typology.

Farms can use their expenditures and investments to reap significant profits. Moderate sales farms in all states for which the data are available bring in median net cash farm incomes from \$67,000 in Indiana to \$111,000 in Iowa.<sup>402</sup> Midsized farms receive median net cash farm incomes around 3 to 4 times the national rural median family income (of approximately \$57,000; see Table 15).<sup>403</sup> Furthermore, farms with higher revenues tend to have higher profit rates (see Figure 11

below).<sup>404</sup> This means they will likely have even higher incomes in the future. Farms with high incomes also tend to have large amounts of wealth. Families with midsized farms in the states under study have median household net wealth—assets minus debts—ranging from 15 to 21 times the rural median family wealth of roughly \$146,000.<sup>405</sup> This analysis complicates a common argument that farmers everywhere in the country are “land rich but cash poor.”

402. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12. These statistics are not available for Ohio.

403. Calculations by authors using Aladangady, *supra* note 181, at 6 tbl. 1.

404. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.

405. Calculations by authors using Aladangady, *supra* note 181, at 12 tbl. 2; Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.

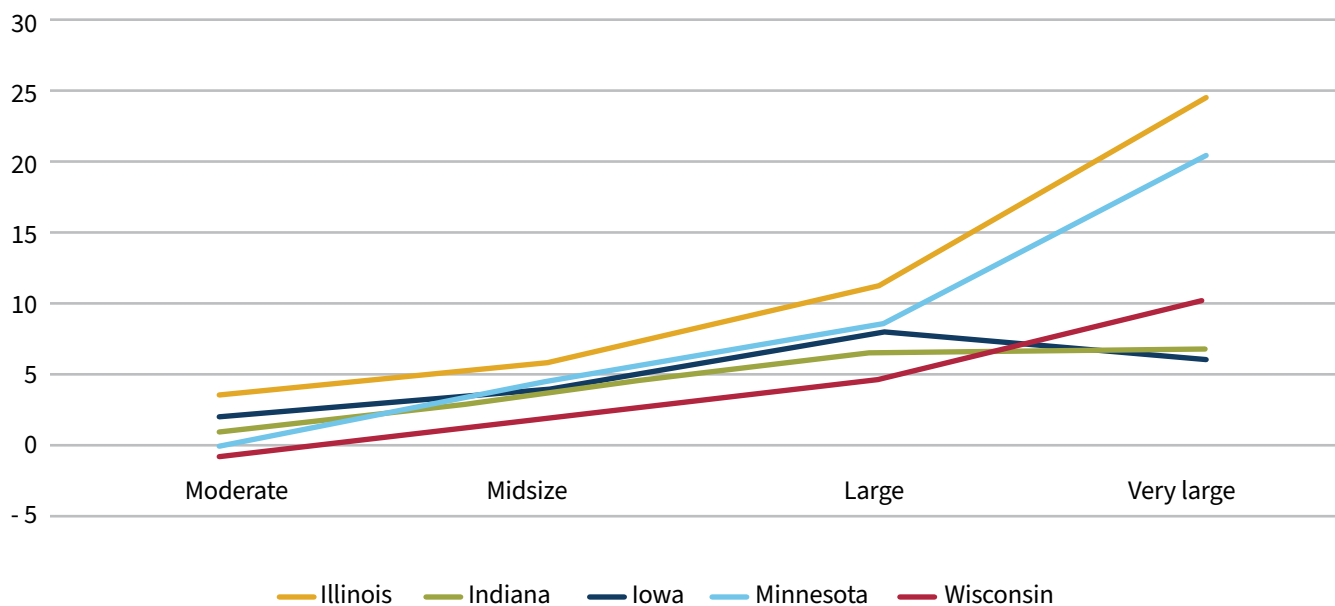
**Table 15. Financial indicators for midsize farms in the Midwest, 2021**

State	Median net cash farm income	Median household income	Median net farm wealth	Median net household wealth
Illinois	\$252,200	\$305,738	\$2.25 million	\$2.84 million
Indiana	\$190,022	\$182,735	\$2.06 million	\$2.68 million
Iowa	\$231,050	\$218,375	\$2.35 million	\$3.09 million
Minnesota	\$197,400	\$204,849	\$2.08 million	\$2.82 million
Wisconsin	\$160,453	\$156,900	\$1.85 million	\$2.16 million

Note: This table excludes Ohio because the relevant data are not available from the data source.

Source: Query from Econ. Rsch. Serv., USDA, ARMS Data Analysis, supra note 12.

**Figure 11. Return on equity (%) by farm size in the Midwest, 2021**



Source: Query from Econ. Rsch. Serv., USDA, ARMS Data Analysis, supra note 12.

Midwest farmers also receive significant federal assistance. The government sent \$2.4 billion in payments to Midwest farms in 2017.<sup>406</sup> About two-thirds went to farms with more than \$250,000 in combined sales and government payments.<sup>407</sup> Furthermore, farms with at least moderate sales had 91% of

406. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, supra note 7, at State Level Data tbl. 3.

407. *Id.*

their acreage enrolled in crop insurance, the vast majority of which has premiums subsidized by the federal government.<sup>408</sup> Crop insurance protects farmers from crop losses due to events like bad weather.<sup>409</sup> The distribution of total government payments (not including crop insurance subsidies or payments) is somewhat less lopsided than one

might expect, since low sales farms receive about two-thirds of conservation payments.<sup>410</sup> Still, farms with over \$100,000 in sales received about three-quarters of all government payments in 2021.<sup>411</sup> See Table 16 for distributions of different types of government payments by farm sales.

**Table 16. Share of government payments by sales category in the Midwest, 2021**

Sales	All government payments	Conservation payments	Counter-cyclical payments	Marketing loan benefits payments	Other payments
Less than \$100,000	24.8%	68.0%	6.0%	11.1%	14.7%
\$100,000 to \$249,999	13.1%	7.4%	9.9%	13.4%	15.1%
\$250,000 to \$499,999	16.1%	5.7%	13.0%	14.1%	19.7%
\$500,000 to \$999,999	16.3%	6.6%	17.7%	24.5%	18.5%
\$1,000,000 or more	29.7%	12.4%	53.4%	36.9%	32.0%

*Note: This table excludes Ohio because the relevant data are not available from the data source. Conservation payments are made to producers to keep land out of production or for practicing resource conservation on land in production. Counter-cyclical payments are “income protection” payments made to producers whose eligible crops receive prices below certain designated levels. Marketing loan benefits payments are made to farmers based on market prices of eligible commodities falling below targeted prices. Other government program payments include emergency and disaster relief payments, along with other miscellaneous payments. These definitions are available from Economic Research Service, supra note 12.*

Source: Query from Econ. Rsch. Serv., USDA, ARMS Data Analysis, supra note 12.

Farmers receive many other government benefits besides federal payments. All states offer some form of discount on property taxes to farmers.<sup>412</sup> Landowners can often get these benefits with only nominal gestures at agricultural production, like a few apple trees and cows. For example, Donald Trump has brought goats onto part of his New

Jersey country club to qualify for a tax break that likely saved him millions of dollars in property taxes.<sup>413</sup> Farmers also receive other tax benefits: they can count losses against future earnings and they can use “cash accounting,” a method that allows them to delay purchases or sales to reduce their taxable income in a given year, among other

408. Rosch, *supra* note 15, at 2.

409. *Id.* at 1.

410. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT TYPOLOGY.

411. Query from ECON. RSCH. SERV., USDA, ARMS DATA ANALYSIS, *supra* note 12.

412. Jennifer Ifft & Todd Kuethe, *The Ongoing Debate over Farmland Taxation*, 7 FARMDOC DAILY 1, 1-3 (2017).

413. Warren Rojas, *How Trump Used Goats to Cut Millions of Dollars Off His Local Property Taxes, and Paid Just \$700 Last Year*, INSIDER (Sept. 20, 2021, 9:04 AM), <https://www.businessinsider.com/trump-used-goats-to-save-millions-of-dollars-in-local-taxes-2021-9>.

benefits.<sup>414</sup> Farmers also appear to underreport their incomes to the federal government at high rates, likely to avoid taxes, according to a 2019 study by a USDA economist.<sup>415</sup> This study estimated that farmers, in the aggregate, understate their incomes by almost 40%, a level in line with IRS analyses.<sup>416</sup> Furthermore, the study found the

underreporting applied to data collected by ARMS, a source that we use extensively in this report.<sup>417</sup> Therefore, many of the income figures we report may significantly understate actual farmer incomes. This discussion of farmer tax benefits only scratches the surface of the many public benefits farmers receive.<sup>418</sup>

## OWNERSHIP AND TENURE

Journalists so often talk about “factory farming” that it is likely many readers believe a substantial portion of farms are corporations, like the corporations that dominate most aspects of economic life in the United States.<sup>419</sup> This is not the case for Midwest farms. Among farms with at least moderate sales, 84% are “family farms,” where the majority of the business is owned by the operator and their relatives.<sup>420</sup> These farms are responsible for 88% of sales and they operate 89% of farm acres.<sup>421</sup> The other 16% of farms with at least moderate sales are “nonfamily farms,” defined as operations

where the operator and their relatives do not own most of the farm.<sup>422</sup> This does not mean, however, that a family, besides the operator’s, does not own the farm. In fact, about 29% of nonfamily farms are family-held corporations and another 43% are partnerships, which could include family partnerships.<sup>423</sup>

While families own and operate most Midwest farms, they rent a significant share of land from non-farmer landlords. The states under study have some of the lowest rates of owner-operated acreage in the country.<sup>424</sup> Illinois, Indiana, and

414. *Ten Income Tax Benefits for Farmers*, GURIAN CPA Firm, <https://gurianco.com/ten-income-tax-benefits-for-farmers/> (last visited Nov. 4, 2023); Julie Spiegel, *The Cash vs. Accrual Accounting Difference*, SUCCESSFUL FARMING (Dec. 22, 2017), <https://www.agriculture.com/farm-management/finances-accounting/the-cash-vs-accrual-accounting-difference> (discussing “cash accounting”).

415. ERS Staff Directory, *Nigel Key*, USDA (February 23, 2023), <https://www.ers.usda.gov/authors/ers-staff-directory/nigel-key/>. Note that Key worked at USDA as of early 2023.

416. Nigel Key, *Do Most U.S. Farms Really Lost Money? Taxation and Farm Income Underreporting*, 51 J. AGRIC. APPLIED ECON. 646, “Conclusion” (2019). Key writes, “We find that farm households underreported 39% of their farm income in aggregate, a level in-line with IRS studies of tax compliance for schedule F filers.”

417. See *id.* “Introduction,” where Key writes, “In aggregate, the findings indicate that 39% of estimated true farm income is not reported on the ARMS—a rate that is in-line with past IRS audit studies.”

418. For further discussion on this topic, see Lehner, *supra* note 390..

419. See, e.g., Dan Kaufman, *Is It Time to Break Up Big Ag?*, NEW YORKER (Aug. 17, 2021), <https://www.newyorker.com/news/dispatch/is-it-time-to-break-up-big-ag>.

420. 2017 CENSUS OF AGRICULTURE, Typology Report, at iii (defining family farm). Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

421. *Id.*

422. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT TYPOLOGY; at TYPOLOGY iii (defining nonfamily farm).

423. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT TYPOLOGY. USDA notes that partnerships can be family partnerships. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at APPENDIX B, 8 (2017). Partnerships are fairly common among family farms with at least moderate sales, with about 14% of these farms organized as partnerships. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

424. BIGELOW ET AL., *supra* note 183, at 16 tbl. 1. Illinois has 40% owner-operator acreage, Indiana 46%, Iowa 46%, Minnesota 55%, Ohio 56%, and Wisconsin, an outlier, 68%.



Iowa have the three lowest rates.<sup>425</sup> Between 40% and 50% of the land in each of these states is owned by a non-operator landlord.<sup>426</sup> Among acres rented out by a non-operator landlord in the Midwest, about 48% of acres were owned by individuals, 22% by trusts, 19% by partnerships, 6% by family held corporations, and 3% by nonfamily corporations.<sup>427</sup> (Note that trusts and partnerships can be among family members.) Among non-operator landlords who owned land as individuals or through partnerships and rented to others, 99% of the landlords were white and 99% of the acreage was white-owned.<sup>428</sup>

Landowners tend to keep land in their families. A USDA study found that landowners who intended to retire in the next five years planned to sell only about 25% of their acres to non-relatives.<sup>429</sup> In our six states, plus Michigan and Missouri, this figure is only 13%.<sup>430</sup> Among all acreage in the Midwest, the owner acquired about 43% through a purchase from a non-relative, 28% through an inheritance or gift, 22% through a purchase from a relative,

and 6% through a purchase at an auction.<sup>431</sup> This means owners got roughly half their land through inheritance, a gift, or a purchase from a relative, while half got their land through a purchase from a non-relative or an auction.<sup>432</sup> Landowners do not often sell their land.<sup>433</sup> This limits opportunities for farmers to expand their operations or newcomers to purchase land. Land in the Midwest is very expensive and has shown a strong return, in terms of rent and appreciation, over a long period.<sup>434</sup> This helps explain why landowners try not to sell.

Since non-operator landlords own so much land, farmers have to rent substantial amounts of land. Farmers in the Midwest rent about 49% of their land.<sup>435</sup> Farmers have had to rent land at rates like these for decades. A 1978 USDA study found that, out of land that owners operated as part of a farm and land they rented to others, about 42% was rented to others in the Corn Belt.<sup>436</sup> A 1999 USDA study found about 60% of land was rented out in Illinois, Indiana, and Iowa.<sup>437</sup> A recurring survey of Iowa farmers shows a decline in owner-operated

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425. *Id.*

426. *Id.*

427. Calculated by the authors using 2012 CENSUS OF AGRICULTURE, *supra* note 383, at 2014 TENURE, OWNERSHIP AND TRANSITION OF AGRICULTURAL LAND (TOTAL) SURVEY, <https://data.nal.usda.gov/dataset/nass-quick-stats>.

428. *Id.*

429. BIGELOW ET AL., *supra* note 183, at iv.

430. ECON. RSCH. SERV., USDA, *Visualizing U.S. Farmland Ownership, Tenure, and Transition*, USDA, “Expected land transfers” for the Midwest (Nov. 13, 2020), <https://www.ers.usda.gov/data-products/data-visualizations/other-visualizations/visualizing-us-farmland-ownership-tenure-and-transition/>.

431. Calculated by the authors using 2012 CENSUS OF AGRICULTURE, *supra* note 383, at 2014 TENURE, OWNERSHIP AND TRANSITION OF AGRICULTURAL LAND (TOTAL) SURVEY, <https://data.nal.usda.gov/dataset/nass-quick-stats>.

432. *Id.*

433. Bruce J. Sherrick, *Farmland Turnover in Illinois*, 2 FARMDOC DAILY 1, (2012); Donnelle Eller, *Nearly 60 Percent of Iowa Farmland Owners don't Farm; One-Third Have No AG Experience*, DES MOINES REG. (June 28, 2018), <https://www.desmoinesregister.com/story/money/agriculture/2018/06/28/iowa-state-isu-farmland-farm-facts-ownership-tenure-survey-owners-debt-land-rent-family-income/742159002/>; BIGELOW ET AL., *supra* note 183, at 33 (discussing difficulty of obtaining land on the open market).

434. NAT'L AGRIC. STAT. SERV., USDA, LAND VALUES: 2022 SUMMARY (2022) (expensive); Bruce J. Sherrick et al., *What's the Ticker Symbol for Farmland?*, 73 Agric. Fin. Rev. 6, (2013) (returns).

435. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 11.

436. JAMES A. LEWIS, ECON. RSCH. SERV., USDA, LANDOWNERSHIP IN THE UNITED STATES, 1978 56 (1980), <https://web.archive.org/web/20220801173746/https://naldc.nal.usda.gov/download/CAT87210033/PDF>.

437. CENSUS OF AGRIC., USDA, 1999 AGRICULTURAL ECONOMICS AND LAND OWNERSHIP SURVEY tbl. 5.

acreage from 55% to 41% between 1982 and 2002, although steady through 2012.<sup>438</sup> A 2014 USDA study put the rented share at between 55% and 60% for Illinois, Indiana, and Iowa, the highest rates in the country.<sup>439</sup> In Illinois, grain farms in certain parts of the state have rented land at rates between 75% and 85% since the late 1990s.<sup>440</sup> These farms likely show higher rental rates than the average because they are grain farms, and grain areas have a higher share of rented land, likely in part because returns are strong and the owners often do not want to sell.<sup>441</sup>

Since farmers have to rent so much land, the most common “tenure” for farmers on farms with at least moderate sales is a “part owner,” a farmer who owns and rents land. About two-thirds of farms with at least moderate sales are part-owner farms and around a tenth are tenant farms.<sup>442</sup> Tenants rent all of their land. Part-owners and tenants operate over 80% of all Midwest cropland.<sup>443</sup> They produce almost 90% of corn and soy.<sup>444</sup> They also hold most of the beef cow, dairy cow, and hog inventories in their farms.<sup>445</sup> Rent makes up a significant share of farmer expenses. Among farms with at least moderate sales, cash rent for land, buildings, and grazing fees constituted 12% of total production

expenses as of the last census.<sup>446</sup> The remaining farmers are full owners, who own all their operation’s land. A little over a quarter of farms with at least moderate sales are full-owner farms.<sup>447</sup>

On a somewhat regular basis, the press, politicians, and the public become concerned that corporations, financial speculators, or foreign entities are buying an excessive amount of farmland. These worries are not totally misplaced because corporations, wealthy individuals, and foreign investors do sometimes purchase large tracts of land.<sup>448</sup> The financial industry has also shown interest in developing investment vehicles to buy and sell farmland.<sup>449</sup> Furthermore, as just discussed, non-operator landlords, which could include investors, own a significant amount of land and do not often put it up for sale, especially not to people outside of their families. Corporations have also attacked the laws that many states have enacted to prohibit or restrict corporate ownership of farmland.<sup>450</sup> Even so, USDA’s most recent landowner study found that very little Midwest land is owned by corporations.<sup>451</sup> In addition to barriers to the expansion of landownership already discussed, corporations would also have to compete with farmers, who

438. FARMLAND OWNERSHIP AND TENURE IN IOWA 2012, IOWA ST. U. EXTENSION AND OUTREACH 11 tbl. 3.3 (last updated Feb. 2014).

439. BIGELOW, *supra* note 183, at 16 tbl. 1.

440. Schnitkey, *supra* note 183.

441. *Id.*

442. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT TYPOLOGY.

443. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT STATE LEVEL DATA tbl 76.

444. *Id.* Note that “almost 90% of corn and soy” is measured in bushels.

445. *Id.*

446. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT TYPOLOGY.

447. *Id.*

448. *E.g.*, Darren Orf, *The Truth About Why Bill Gates Keeps Buying Up So Much Farmland*, POPULAR MECHANICS (Jan. 18, 2023), <https://www.popularmechanics.com/science/environment/a42543527/why-is-bill-gates-buying-so-much-farmland/>.

449. *E.g.*, NUVEEN, *Investing in Farmland*, <https://www.nuveen.com/global/insights/alternatives/investing-in-farmland> (last visited Nov. 4, 2023).

450. NAT’L AGRIC. LAW CTR., *Corporate Farming & Land Owning Law—An Overview*, <https://nationalaglawcenter.org/overview/corporatefarminglaws/#:~:text=Eighteen%20states%20have%20statutes%20or,Utah%2C%20Virginia%2C%20and%20Wisconsin>

451. See *supra* note 427. Note that this study is almost a decade old.

tend to overbid on farmland.<sup>452</sup> Farmers may do this because land sales are rare and farmers have to buy near where they live, whereas investors can buy land in any part of the country.<sup>453</sup> In other words, farmers may see the supply of land as more limited than investors do. According to the latest data from USDA, foreign owners control 3.1% of private agricultural land and 1.8% of all land in the country.<sup>454</sup> Canadian owners have by far the most land of any single country, with two Canadian lumber companies owning a substantial amount of acreage in Maine.<sup>455</sup> Investors in the Netherlands have the second-most land among foreign owners.<sup>456</sup> China is not in the top 10 and owns less than half as much land as investors in Luxembourg.<sup>457</sup> Many states, including most of the states under study, have bans on foreign land ownership.<sup>458</sup> A caveat to this discussion is that USDA's data on foreign ownership are known to

be incomplete and to include inaccuracies.<sup>459</sup> Even so, there does not seem to be enough evidence to conclude that foreign ownership is many times greater than reported here.

## Young and Beginning Farmers

The press and politicians also often raise concerns that the farm industry will collapse if more young farmers do not enter the business.<sup>460</sup> There are a number of problems with this argument. The clearest may be that the average age of principal operators has been over 50 since at least 1982, and, so far, the industry has survived.<sup>461</sup>

Some authors argue that younger farmers cannot get experience when the farm industry is dominated by older operators. But aspiring farmers can study agriculture in college or through extension classes.<sup>462</sup> They can work as hired workers or

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452. Mihaljevich, *supra* note 16.

453. Farmers need to buy near where they live if they intend to regularly work on the land themselves. A farmer could buy land they do not intend to operate themselves, then hire someone to operate it for them or rent the land out. Another reason farmers may overbid is because they may have a much longer time-horizon to achieve their desired returns than investors or corporations might. That is, farmers may intend to own the land for many years and to will it to their family members. These farmers can wait longer for the land to show a return they are comfortable with than investors who want to achieve returns over shorter time horizons. Furthermore, farmers are probably more interested in investing their money in farm assets and farmland than more general investors, who can seek returns across many different types of investments.

454. FARM SERV. AGENCY, USDA, FOREIGN HOLDINGS OF U.S. AGRICULTURAL LAND 17 at Report 1 (July 2023).

455. *Id.* at 17 Report 1, 21 Report 1B.; Neeley, T. (2023) *Cropland leads way in decade's growth in AG Land Foreign Ownership*, *DTN Progressive Farmer*. <https://www.dtnpf.com/agriculture/web/ag/news/article/2023/11/17/cropland-leads-way-decades-growth-ag>.

456. FARM SERV. AGENCY, *supra* note 454, at Report 1B.

457. FARM SERV. AGENCY, *supra* note 454, at Report 4.

458. NAT'L AGRIC. LAW CTR., *supra* note 450; Eva Tesfaye, *Worried About Spying and Tensions with China, Many States Limit Who Can Buy Farmland*, INVESTIGATE MIDWEST (Mar. 14, 2023), <https://investigatamidwest.org/2023/03/14/worried-about-spying-and-tensions-with-china-many-states-limit-who-can-buy-farmland/>.

459. See Jamie Grey et al., *Secret Acres: Foreign-owned Agriculture Land Inaccurately Tracked by Government*, INVESTIGATE MIDWEST (Jan. 26, 2022), <https://investigatamidwest.org/2022/01/26/secret-acres-foreign-owned-agricultural-land-inaccurately-tracked-by-government/> (finding significant gaps and inaccurate entries in USDA's foreign ownership database)

460. Nathan Rosenberg & Bryce Stucki, *Sorry, Pretty Much Everyone: Young Farmers are the Least Diverse—And Smallest—Group of Farmers in the Country*, COUNTER (Mar. 20, 2018, 12:14 PM), <https://thecounterorg.wpengine.com/debunk-rise-young-farmer-myth/> (responding to the idea that we need more young farmers in the article).

461. 2012 CENSUS OF AGRICULTURE, *supra* note 383, at NATIONAL LEVEL DATA tbl. 1 (1982-2012); 2017 CENSUS OF AGRICULTURE, *supra* note 7, at NATIONAL LEVEL DATA tbl. 52 (2017).

462. *E.g.*, Paul Rusnak, *2024 Ranking for the Top 25 U.S. Colleges in Agricultural Sciences*, GROWING PRODUCE, <https://www.growingproduce.com/vegetables/25-colleges-that-make-the-grade-in-agricultural-sciences/> (last updated Oct. 25, 2023) (listing agricultural programs).

managers. About 9% of “young farmers”—farmers under 35, according to USDA—are hired managers.<sup>463</sup> Farmers can also operate land as tenants. Almost 30% of tenant farms have a principal producer who is young, whereas only 7% of all principal producers are young.<sup>464</sup> Farmers who come from farm families can gain experience on the family operation. Young people who inherit land can also rent out acreage to a tenant and learn from them.

The people who replace older farmers do not need to be young. Farmers can find success in the business as they grow older. Farmers need many white-collar and managerial skills, like planning for the season, purchasing supplies, and hiring and supervising workers. Some farmers even trade in commodity futures markets. Farmers can perform these tasks and others like them as they age. Older farmers can perform blue-collar work too. They can operate some machines, like combines, as they get older.<sup>465</sup> Few people worry that Fortune 500 companies will go out of business even though the average age of their CEOs is 57.7, almost exactly the same as the average age of farmers.<sup>466</sup>

Only 30% of “beginning farmers,” which USDA defines as those with 10 or fewer years of experience on any farm, are under 35, and almost 50% are over 45.<sup>467</sup> Across the states under study, beginning principal producers have average ages between 44 and 47.<sup>468</sup> These beginning farmers are more likely to operate smaller farms, as well as about twice as likely to be tenants, as are farmers in general.<sup>469</sup> Beginning principal operators also make up about 15% of hired managers.<sup>470</sup> This may be a way for them to break into the industry. Beginning farmers tend to have fewer resources than more experienced farmers. Beginning farmers have about 47% of the median farm wealth and 70% of the median non-farm wealth of non-beginning farmers.<sup>471</sup>

Beginning farmers may be somewhat older because older people tend to have more money, and aspiring farmers need access to large amounts of money to compete with existing farm businesses. Farmers need to make a certain minimum investment before they can generate a middle-class income. Even though corn farm businesses in Illinois tend to bring in high incomes at the farm level, the average net cash income per acre was only \$340 in 2021.<sup>472</sup> At that rate, a prospective farmer would need around 150 acres for a net cash

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463. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 68.

464. *Id.* at STATE LEVEL DATA tbl. 67.

465. See KCCI, *90-Year-Old Farmer Spends Birthday in Combine*, YouTube (Oct. 20, 2011), <https://www.youtube.com/watch?v=exWYy-5Chhf4> (showing a 90-year-old farmer, “who harvests all his family’s corn” operating a combine).

466. Chloe Berger, *Meet the Typical Fortune 500 CEO: A Total Gen Xer. Basically Keanu Reeves*, FORTUNE (June 8, 2023, 7:00 AM), <https://fortune.com/2023/06/08/how-old-fortune-500-ceo-gen-x-keanu-reeves-musk/>; NAT’L AGRIC. STAT. SERV., USDA, 2017 CENSUS OF AGRICULTURE HIGHLIGHTS: FARM PRODUCERS 1 (2019).

467. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 70.

468. *Id.*

469. *Id.* at STATE LEVEL DATA tbl. 69 (for tenure of beginning principal producer farms), 71 (for acre distribution for beginning and all farms, and tenure for all farms).

470. *Id.* at STATE LEVEL DATA tbl. 52 (for total hired managers), 70 (for beginning producer manager counts).

471. Calculated by the authors using Special Tabulation Request from USDA to Nathan Rosenberg (Apr. 14, 2023) (on file with authors).

472. ECON. RSCH. SERV., *supra* note 12. The farmer could rent land. The average rent and lease payments for Illinois corn farms was \$125,000 in 2021.

income of \$50,000. This would cost \$1.6 million at current prices.<sup>473</sup> Even if they could come up with the money for the land, the farmer would still need to purchase or rent machines, pay for inputs like seed and fertilizer, and cover any other expenses. The beginning farmer category may include a significant number of people who had to save for a long time in order to afford such large expenses. At the same time, the category may also include a significant number of people who inherited or started to operate their inherited farms after they reached their 40s.

Even if some farmers only acquire the resources necessary to farm later in life, this does not imply that young farmers are necessarily struggling. In fact, young producers are slightly overrepresented on farms with over \$100,000 in sales and government payments combined (Table 17).<sup>474</sup> These young farmers may have been the children of farmers; they may have inherited wealth; they may have earned high incomes in another line of work. Whatever the case may be, if they have a high farm income, they likely have access to substantial resources.

**Table 17. Share of age group by economic class categories in the Midwest, 2017**

Economic class	Age category						Overall
	Under 35	35-44	45-54	55-64	65-74	75 or older	
Less than \$1,000	12.0%	13.1%	14.4%	13.3%	13.2%	9.9%	13.0%
\$1,000 to \$2,499	8.2%	9.4%	9.7%	9.0%	9.6%	10.3%	9.4%
\$2,500 to \$4,999	8.4%	8.9%	9.6%	8.9%	10.2%	10.5%	9.4%
\$5,000 to \$9,999	9.1%	9.6%	10.0%	9.5%	10.4%	11.6%	10.0%
\$10,000 to \$24,999	11.0%	10.4%	10.3%	10.6%	12.3%	14.1%	11.3%
\$25,000 to \$49,999	8.3%	7.1%	6.8%	7.2%	8.5%	10.6%	7.8%
\$50,000 to \$99,999	9.1%	7.8%	7.2%	7.7%	9.1%	10.4%	8.3%
\$100,000 to \$249,999	10.8%	10.0%	9.4%	10.5%	10.7%	10.9%	10.3%
\$250,000 to \$499,999	8.4%	8.2%	7.6%	8.6%	6.9%	5.3%	7.7%
\$500,000 to \$999,999	7.2%	7.1%	7.3%	7.6%	4.9%	3.5%	6.5%
\$1,000,000 or more	7.5%	8.5%	7.7%	7.0%	4.1%	2.9%	6.3%

Source: 2017 Census of Agriculture, supra note 7, at State Level Data tbl. 73.

All farmers, whether beginning and young, or experienced and older, need significant resources to own and operate a viable farm business. Even though beginning farmers might be able to gain

473. German Mandrini et al., *Illinois Farmland Values – Winter 2022*, FARMER’S BUS. NETWORK (Mar. 1, 2023), <https://www.fbn.com/community/author/fbn-data-science> (\$10,300 an acre).

474. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, supra note 7, at STATE LEVEL Data tbl. 73.



experience through courses or hired work, they will not be able to become farm owners unless they can save or inherit a substantial amount of money (or a farm). People who have the necessary resources, young or old, have a chance to earn

high incomes in the farm industry. Those who lack these resources, whatever their age or experience, might struggle to purchase even a very small operation. We will further develop this theme in the next section.



# BIPOC FARMERS

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## HISTORICAL CONTEXT

There are very few BIPOC farmers in the Midwest. White people make up 99.3% of all farmers and 99.6% of farmers on farms with at least moderate sales.<sup>475</sup> This has not always been the case. Before white settlers arrived, the Midwest was inhabited, cultivated, and managed by Native Americans. Furthermore, BIPOC farmers have and still play critical roles in the Midwest farm system.

Before white settlers colonized it, the Midwest was home to Native Americans. After the Revolutionary War, United States armies invaded these areas. Native soldiers handed the invaders two significant defeats in the early 1790s, but by 1810, there were already so many white settlers in the region that they outnumbered the Indigenous people. The British backed some tribes against the Americans in the War of 1812, but the British withdrew their support after they lost to the U.S. The Native Americans were then forced to cede much of their land in the region.<sup>476</sup>

According to data from the decennial census, the Midwest was 99% white by 1850, and the share stayed above 95% until after 1950.<sup>477</sup> Over

this stretch, the region's farmers saw the rise of the modern farm system. The farm population was over 99% white in this entire period.<sup>478</sup> As discussed in the history section, these years saw the development of the region's major farm industries: corn and soy, hogs, and cattle. The late 20th and early 21<sup>st</sup> centuries saw the consolidation of animal farms and continued concentration of corn and soy operations. Throughout all this change, almost all Midwest farmers were white. Since wealthy families tend to maintain their wealth over time, and farm families tend to keep the farm, or at least the land, in the family, then we should not be surprised that Midwest farmers have long been and are still almost all white. Furthermore, almost all rural people in the region have long been and still are white—the figure was still over 90% as recently as 2020.<sup>479</sup> White families tend to have far more wealth than BIPOC families.<sup>480</sup> Aspiring farmers often say a lack of wealth is the main barrier that keeps them out of the industry.<sup>481</sup> BIPOC farmers have also faced widespread discrimination by USDA agents.<sup>482</sup> For these and other reasons, the region's farmers have always been almost all white.

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475. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at FARM TYPOLOGY.

476. EDMUNDS, *supra* note 24, at 2-3.

477. Ruggles et al., *supra* note 116.

478. *Id.*

479. *Id.*

480. Aditya Aladangady et al., *Greater Wealth, Greater Uncertainty: Changes in Racial Inequality in the Survey of Consumer Finances*, Bd. Gov FED. RESRV. SYS. (Oct. 18, 2023), <https://www.federalreserve.gov/econres/notes/feds-notes/greater-wealth-greater-uncertainty-changes-in-racial-inequality-in-the-survey-of-consumer-finances-20231018.html#:~:text=The%20typical%20White%20family%20had,more%20than%20for%20White%20families>.

481. *E.g.*, *One Million Acres for the Future*, NAT'L YOUNG FARMERS, <https://www.youngfarmers.org/land/> (last visited Nov. 1, 2023).

482. *E.g.*, Jessica Robinson, *Women, Hispanic Farmers Say Discrimination Continues Settlement*, NPR (Nov. 9, 2012), <https://www.npr.org/templates/story/story.php?storyId=164833428> (Hispanic farmers); Michel Martin, *USDA Awards Native Americans Millions in Discrimination Suit*, NPR (Oct. 21, 2010), <https://www.npr.org/templates/story/story.php?storyId=130723950> (Native American farmers); Rosenberg & Stucki, *supra* note 19 (Black farmers).

Despite this legacy of unjust, accumulated disadvantage, BIPOC farmers have made notable contributions to Midwest agriculture. Indigenous people bred corn from a type of wild grass and grew it in the region before it was called the “Corn Belt.”<sup>483</sup> Indigenous people also intentionally cleared trees in the Midwest, creating the plains that white settlers encountered there.<sup>484</sup>

Black people have lived in the Midwest since at least 1720, when a French explorer forced enslaved people to work in his mines and farms.<sup>485</sup> Some of these enslaved people may have escaped.<sup>486</sup> Many free Black people lived in the Midwest by the late 1700s, speaking French, English, and Indigenous languages. Many of them lived near Native Americans.<sup>487</sup> The historian Anna-Lisa Cox reports 338 “African American farming settlements” in Illinois, Indiana, Ohio, Michigan, and Wisconsin between 1800 and 1860.<sup>488</sup> Many free Black people fled to the region to escape racist persecution, including the threat of re-enslavement, in the South. Some even came to live in multi-racial communities.<sup>489</sup>

The Northwest Ordinance, which set down rules for creating states out of the Northwest Territory, an area that encompasses most of the region under study, prohibited slavery before the Civil War.<sup>490</sup> Yet wealthy and powerful whites still instituted a *de facto* slavery in parts of the territory. Future president William Henry Harrison, when he was governor of the Indiana Territory—which encompassed a significant portion of what is now the Midwest—helped pass a law that allowed people to keep their indentured servants in bondage indefinitely.<sup>491</sup> African Americans faced other onerous restrictions on their freedom. Between the early 1800s and the 1850s, Illinois, Indiana, Ohio, and Iowa all passed laws that either banned African Americans from entering the state or required them to provide proof of their freedom and to post a bond that could range from \$500 to \$1,000.<sup>492</sup> White mobs attacked and ethnically cleansed Black populations in Detroit—then a frontier town—and Cincinnati in the early 1800s.<sup>493</sup>

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483. HUDSON, *supra* note 29, at 58.

484. *Id.* at 58-59.

485. ANNA-LISA COX, *THE BONE AND SINEW OF THE LAND: AMERICA’S FORGOTTEN BLACK PIONEERS AND THE STRUGGLE FOR EQUALITY* 22 (Public Affairs 2018).

486. *Id.* at 22.

487. *Id.* at 23.

488. *Id.* at ix-xvi.

489. Lorraine Boissoneault, *The Unheralded Pioneers of 19th-Century America were Free African-American Families*, SMITHSONIAN MAG. (June 19, 2018), <https://www.smithsonianmag.com/history/unheralded-pioneers-19th-century-america-were-free-african-american-families-180969400/>.

490. *Northwest Ordinance: Primary Documents in American History*, LIBR. CONG., <https://guides.loc.gov/northwest-ordinance> (last updated Mar. 20, 2020).

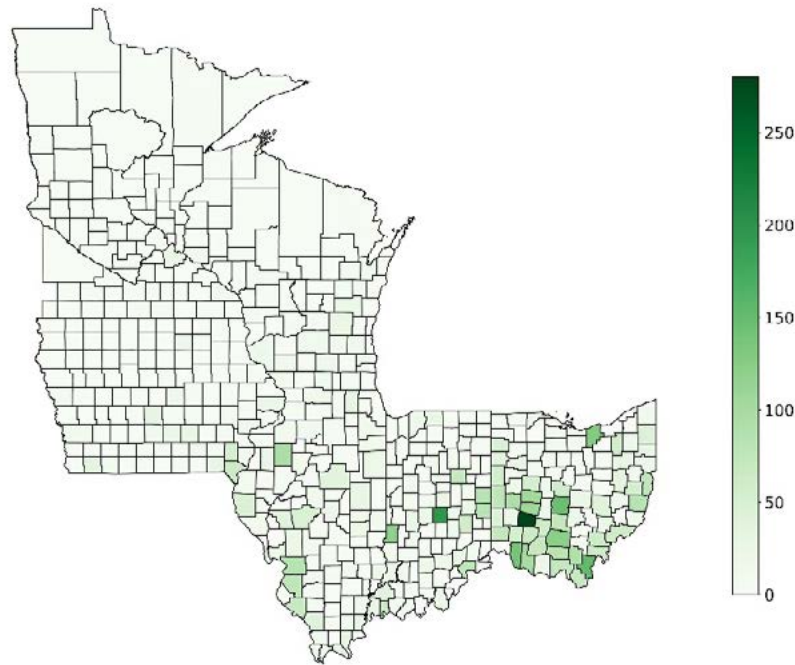
491. Cox, *supra* note 485, at 49.

492. LEON F. LITWACK, *NORTH OF SLAVERY* 70 (U. Chicago Press 1965). Note that the authorities did not always enforce the requirement for a bond. However, whites could still selectively enforce or threaten to enforce these laws to coerce African Americans. See *Id.* 72 for an example of white authorities in Cincinnati threatening Black residents with enforcement of the requirement for a bond.

493. Cox, *supra* note 487, at 111-114; LITWACK, *supra* note 492, at 72-73.



**Figure 12. African American rural property owners by county in the Midwest, 1870**



Source: Calculated by the authors from Ruggles et al., *supra* note 116 (African Americans with non-missing, reported property greater than zero in rural areas from 1870 Census data); Steven Manson et al., *IPUMS National Historical Geographic Information System: Version 18.0 1870 County Dataset* (map boundaries).

Still, Black people persisted in their struggle for civil rights and economic independence. The prosperous farm owner John Langston, a great-uncle of the poet Langston Hughes, became the first person of African descent to win public office in the United States in 1855.<sup>494</sup> He did so in Ohio, a state where he was not even allowed to vote.<sup>495</sup> Many families in Black communities in Illinois, Ohio, and Indiana offered their properties as stops to Black people escaping the South as part of the

Underground Railroad.<sup>496</sup> By 1870, there were about 7,000 Black rural owners of real estate in the Midwest, over half of them in Ohio (see Figure 12).<sup>497</sup>

The rural Black population peaked around 1900 and did not regain its previous level until after the start of this century.<sup>498</sup> There were about 2,700 Black farmers who owned and operated their own farms in 1900.<sup>499</sup> There were numerous Black settlements in the Midwest in this period,

494. Yvonne G. Fowler, *History's House*, OBERLIN MAG. (Fall 2003), [https://www2.oberlin.edu/alummag/fall2003/feat\\_history.html](https://www2.oberlin.edu/alummag/fall2003/feat_history.html); Cox, *supra* note 485, at 193-95.

495. Cox, *supra* note 485, at 193-95.

496. CHERYL J. LAROCHE, *FREE BLACK COMMUNITIES AND THE UNDERGROUND RAILROAD 19-21* (U. Ill. Press 2013).

497. Calculated by the authors using 1870 U.S. census data from Ruggles et al., *supra* note 116.

498. Calculated by the authors using U.S. census data from Ruggles et al., *supra* note 116.

499. Calculated by the authors from REID, *BEYOND FORTY ACRES AND A MULE: AFRICAN AMERICAN LANDOWNING FAMILIES SINCE RECONSTRUCTION 160-61 tbl. 7.1* (U. Press of Fl. 2012).

including some multi-racial ones like Pleasant Ridge in Wisconsin.<sup>500</sup> Black farmers throughout the country saw steep declines after the turn of the century.<sup>501</sup> Older farmers died and many of their children sought careers in cities, away from the farm.<sup>502</sup> Given evidence that USDA systematically discriminated against Black farmers in the South,

it is likely Midwestern Black farmers faced similar treatment, a contention supported by some preliminary evidence.<sup>503</sup> By the 1950s, Pleasant Ridge no longer existed.<sup>504</sup> At that time, there were 2,247 Black farmers in the Midwest, down from 3,267 in 1920 (Table 18).<sup>505</sup>

**Table 18. African American farmers in the Midwest, 1920-1954**

State	1920	1930	1940	1950	1954
Illinois	892	893	783	822	683
Indiana	570	461	373	310	270
Iowa	109	118	88	79	67
Ohio	1,616	1,229	1,092	920	965
Minnesota	33	27	29	50	50
Wisconsin	47	55	44	66	63
Midwest	3,267	2,783	2,409	2,247	2,098

Note: These counts include all African American operators, not just owners.

Source: 1954 Census of Agriculture, Vol. 1: Counties and State Economic Areas, at tbl. 5.

Sugar beet investors gave the impetus for the migration of Japanese, Mexican, and Mexican-American laborers to the region. Sugar beet companies started to hire Japanese farmworkers in the 1890s.<sup>506</sup> Some of these Japanese farmers would go on to buy and operate beet farms in

states farther west.<sup>507</sup> Michigan sugar beet companies recruited Mexican-Americans from the Rio Grande Valley, starting in the 1910s.<sup>508</sup> Many Mexicans entered South Texas during the Mexican Revolution in the 1910s. Between 1915 and 1919, in a racist and unjust conflict, the Texas Rangers, a

500. STEPHEN A. VINCENT, *SOUTHERN SEED, NORTHERN SOIL: AFRICAN-AMERICAN FARM COMMUNITIES IN THE MIDWEST, 1765-1990* xiv (Ind. U. Press 2002); REID, *supra* note 499, at 163.

501. See Dania V. Francis et al., *Black Land Loss: 1920: 1997*, 112 AEA PAPERS AND PROCEEDINGS 38, 38-42 (2022).

502. Reid, *supra* note 499, at 173.

503. See Valerie Grim talking about racism in this article: <https://indianapublicmedia.org/earthbeats/why-are-there-so-few-black-farmers-in-the-midwest.php>; Interview by Anna-Lisa Cox with Barbara Norman, Van Buren County, Mich. <https://www.loc.gov/item/2021655316/> (Jan. 15, 2020). See 29-30 of second part of interview transcript for discussion of USDA racism.

504. Reid, *supra* note 499, at 173.

505. Calculated by the authors, 1954 CENSUS OF AGRICULTURE, USDA, tbl. 5, [https://agcensus.library.cornell.edu/census\\_year/1954-census/](https://agcensus.library.cornell.edu/census_year/1954-census/).

506. Valdés, *supra* note 27, at 111.

507. *Id.* at 112.

508. Villagrán, *supra* note 140, at 39-40.



state police agency, and other whites killed “hundreds if not thousands” of Mexicans in a “border war.”<sup>509</sup> Investors set up an irrigation system and railways in the Rio Grande Valley and “subjugate[d] Mexicans into an exploited labor class” for their farms.<sup>510</sup> Michigan sugar beet farmers, in need of cheap labor, began to hire South Texan farmworkers in the 1910s. This marked the origin of a still ongoing “Midwest stream” of migrant workers

from Texas to Michigan and nearby Midwestern states.<sup>511</sup> These workers faced racist discrimination and hard labor.<sup>512</sup> As commercial farms rose in the Midwest, they came to hire Hispanic farmworkers on a broader scale, especially after the start of the massive bracero guest worker program.<sup>513</sup> The Corn Belt is now the main destination for the Midwest stream of migrant farmworkers out of the Rio Grande Valley in Texas.<sup>514</sup>

## BIPOC FARMERS TODAY

### Overview

There are very few BIPOC farmers in the Midwest today. The region’s farmers are over 99% white and every state’s farmers are also over 99% white. Only 0.7% of farmers are not white and roughly the same share of farmers are Hispanic.<sup>515</sup> Out of around 700,000 total producers, there are around 5,000 producers who are not white and 5,000 producers who are Hispanic. A producer is anyone involved in decision-making on a farm.<sup>516</sup> About 1,800 of the producers who are not white are multi-racial, 1,500 Asian, 850 Native American, 750

Black, and about 130 Hawaiian or Pacific Islander. The reader should be aware that, throughout this section, we analyze very small populations with estimates subject to considerable statistical errors, among other issues, so the results should be taken as suggestive and not overly literally.<sup>517</sup>

Almost all BIPOC farmers in the Midwest are on low sales farms (family farms with a GCFI less than \$150,000). This is true of 85% of farmers who are not white and 75% of Hispanic farmers.<sup>518</sup> This

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509. *Id.* at 33-34.

510. *Id.* at 36.

511. *Id.* at 40-41.

512. *Id.* at 41.

513. *Id.* at 46-53.

514. *Id.* at 125.

515. Calculated by the authors, 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. USDA reports race and Latino or Hispanic status separately. Most Hispanic people report their race as white.

516. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at APPENDIX B 19.

517. Because this section deals with estimates for small populations, the reader should review the results with caution. Although it is called a census, the figures reported in the census of agriculture are actually estimates produced by statistical techniques, not raw counts. See Rosenberg & Stucki, *supra* note 19 (discussing census estimates). Therefore, these figures are subject to error. In fact, USDA publishes these errors for selected statistics. The census has higher standard errors for estimates of BIPOC populations. See 2017 CENSUS OF AGRICULTURE, *supra* note 7, at APPENDIX A tbl. A. Partitioning BIPOC farmers into even smaller categories, such as crossing race and farm size, will make the errors larger. See Douglas G. Altman & J. Martin Bland, *Standard Deviations and Standard Errors*, 331 *BMJ* 903, 903 (2005) (noting in general “the standard error falls as the sample size increases” and vice versa). Furthermore, Rosenberg and Stucki found in an investigative report that the census overcounts Black farmers. Rosenberg & Stucki, *supra* note 19. In all likelihood, the census also overcounts other minority farmers. Setting aside its problems with overcounts, we also believe the census likely reports inaccurate counts of BIPOC and other farmers at the county level in many cases. Given these issues, the reader should not take the results in this section overly literally.

518. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY.

compares with only 70% of white farmers on low sales farms.<sup>519</sup> In 2012, the most recent year for which the relevant data are available, about two-thirds of non-white farmers and two-thirds of

Hispanic farmers were on retirement or lifestyle farms.<sup>520</sup> These are farms where the primary producer is either retired or has a primary occupation other than farming.

**Table 19. Non-white and Hispanic producers on farms with at least moderate sales in the Midwest, 2017**

Farm size	Native American or Alaska Native	Asian	Black	Native Hawaiian and Pacific Islander	Multi-race	Hispanic, Latino, or Spanish Origin
Moderate	32	78	31	6	96	356
Midsized	29	41	12	1	70	376
Large	9	25	13	0	29	172
Very large	0	5	1	1	4	20
Nonfamily	84	58	44	9	66	239
Total	154	207	101	17	265	1,163

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7.

This leaves 15% of non-white operators and 25% of Hispanic operators on farms with at least moderate sales. This is about 750 non-white and 1,200 Hispanic farmers (Table 19). A third of the non-white farmers are multi-racial, a quarter are Asian, a fifth Native American, an eighth African American, and a small number Native Hawaiian or Pacific Islander. Even though Hispanic farmers are more likely to be on larger farms than non-white farmers, Hispanic farmers still only make up 0.2%

of producers on farms with at least moderate sales.<sup>521</sup>

As we have mentioned, non-white and Hispanic farmers tend to be on smaller operations than white farmers. Smaller farms tend to have fewer resources. Data we received in a special tabulation from USDA shows that non-white and Hispanic farmers, collectively, have 1.2% of the combined farm and non-farm wealth of white farmers in the Midwest.<sup>522</sup> Almost 1.4% of producers are

519. *Id.*

520. Calculated by the authors using 2012 CENSUS OF AGRICULTURE, *supra* note 383, at TYPOLOGY.

521. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, TYPOLOGY. Note that the numbers of farms with at least moderate sales somewhat overstate the case because they include nonfamily farms, and nonfamily farms include a significant number of operations with low sales. For example, over half of nonfamily farms in the Midwest have less than \$100,000 in combined sales and government payments. Calculated by the authors from *id.*

522. Data from a special request received from Jeffrey Hopkins at ECON. RSCH. SERV., USDA, on April 10, 2023. USDA defined the Midwest as the six states under study plus Missouri. The data USDA provided do not permit us to separate Hispanic and non-white farmers, or to analyze non-white farmers by reported race.

non-white or Hispanic.<sup>523</sup> This means non-white and Hispanic farmers have a disproportionately smaller share of total wealth than their share of the farmer population. At the median, non-white and Hispanic farmers, collectively, have only 72% as much farm wealth and 55% as much non-farm wealth as white farmers.<sup>524</sup> Non-white and Hispanic farmers own no more than 1.3% of all acreage in farms (Table 20).<sup>525</sup> USDA collected data in 2014 on landownership by race for non-operator landlords who owned land as individuals or in partnerships and rented to others. This study found white landlords owned over 99% of this land in the Midwest.<sup>526</sup>

**Table 20. Owned land in farms by reported race and Hispanic status in the Midwest, 2017**

Reported race (alone or combined with other races) and Hispanic status	Acres	Share of total
American Indian or Alaska Native	185,202	0.3%
Asian	70,798	0.1%
Black	58,356	0.1%
Multi-race	151,965	0.2%
Native Hawaiian or Other Pacific Islander	5,485	0.0%
Hispanic, Latino, Spanish	415,530	0.6%
White alone	64,376,717	98.6%

*Note: Hispanic is not mutually exclusive with reported race.*

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at Typology.

Farms with fewer resources tend to have fewer sales. Since non-white and Hispanic farmers tend to have less wealth than white farmers, we should expect non-white and Hispanic farmers to have lower sales than white farmers. This is the case for all non-white farmers by reported race and for Hispanic farmers. However, Hispanic farmers have a cumulative sales distribution somewhat similar to white farmers (see Figure 13). This suggests Hispanic farmers have had somewhat more success acquiring and operating relatively larger farms in the Midwest than other BIPOC farmers. To observe this, see that in the chart below, the purple line, for Hispanic farmers, is the closest to the dark blue line, for white farmers, among the BIPOC groups. Hispanic farmers also have an operated acreage distribution somewhat similar to white farmers.<sup>527</sup>

523. 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT STATE LEVEL DATA tbls. 60 & 63. Note that almost all (around 95%) Hispanic producers identify as white. Since non-white and Hispanic producers each make up about 0.7% of the producer population, and there is little overlap between the two groups, collectively these groups make up around 1.4% of the producer population.

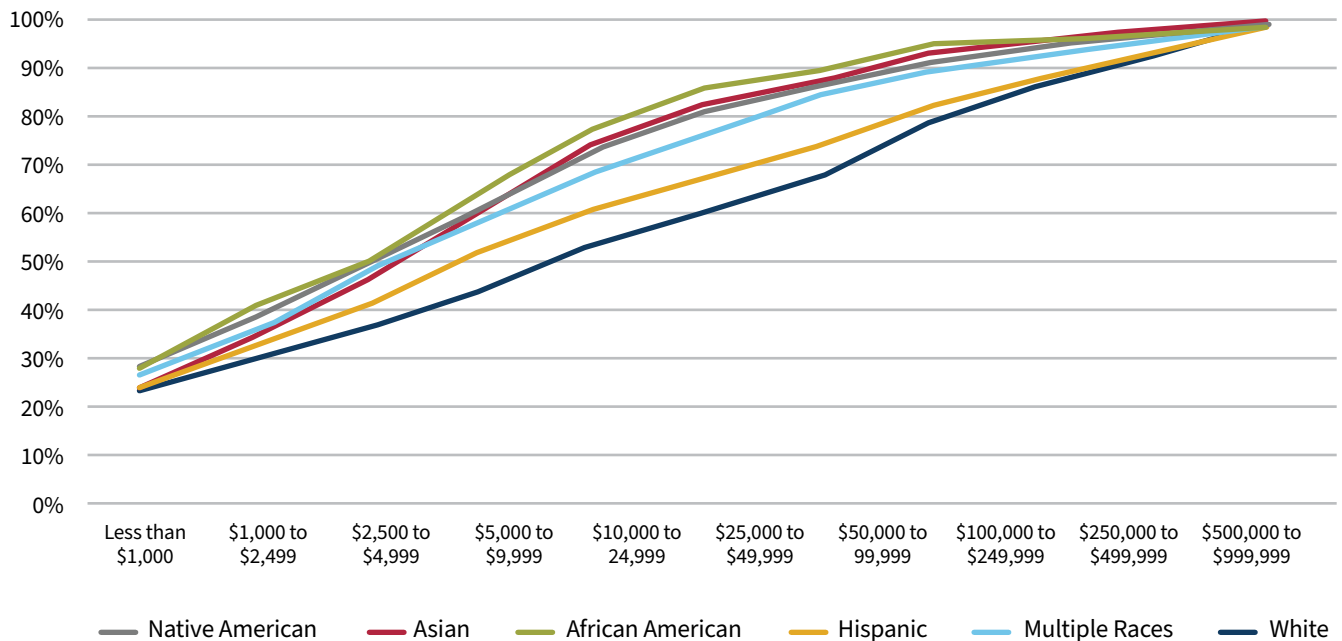
524. Hopkins, *supra* note 522.

525. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT TYPOLOGY.

526. Calculated by the authors NAT'L AGRIC. STAT. SERV., USDA, QUICK STATS, <https://data.nal.usda.gov/dataset/nass-quick-stats> (lasted visited Nov. 2023 ,6).

527. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT STATE LEVEL DATA tbl. 72.

**Figure 13. Cumulative share of farms by sales category, for reported race and Hispanic status, in the Midwest, 2017**



Note: This graph shows the cumulative share of farmers as farm sales increase, by BIPOC group. As we proceed to the right, the lines rise by the share of farmers in each successive sales category. For example, the dark blue line, for white farmers, starts at around 25% because roughly that share of white farmers have less than \$1,000 in sales. The dark blue line reaches 50% by the \$10,000-\$24,999 sales category because about 50% of white farmers have \$24,999 or less in sales. Lines that rise more slowly have relatively more farmers in higher sales groups.

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7.

Non-white and Hispanic farmers tend to specialize in non-mainstream forms of production at higher rates than white farmers. One reason for this may be that a large share are lifestyle and retirement farmers, who may want to pursue alternative types of production. Another could be because these groups do not have as much access to the resources necessary for large-scale conventional farming.<sup>528</sup> Hispanic farmers—whose farms tend to have more sales and who tend to operate relatively more acreage than other BIPOC groups—have specializations similar to white farmers, with rates

of specialization in oilseeds and grains (likely corn and soy), hogs, dairy, cattle farming and ranching, and cattle feedlots close to white farmers. Other BIPOC farmers tend to be less represented in these businesses.<sup>529</sup>

A notable result from our analysis of farm specialization data is that Asian farmers specialize in “vegetable and melon” farms at very high rates. Their rate of specialization in this type of farming is over 20 times as high as the rate of vegetable specialization among farmers in general. Among farmers

528. See discussion of organic farms in “Farmer Economic Conditions.”

529. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.

are known for their sales at farmers markets in Minnesota and Wisconsin.<sup>530</sup> These farmers make up around 50% of farmers in the Twin Cities metro area.<sup>531</sup> These farmers are likely contributing to the high rates of vegetable specialization among Asian farmers, since virtually all Asian farmers specializing in vegetables and melons are in Minnesota or Wisconsin.<sup>532</sup>

All groups of BIPOC farmers are more likely than white farmers to be full owners of the land they operate and less likely to be part owners. BIPOC farmers show no clear patterns in rates of tenancy as compared with white farmers (see Appendix Table 32). While a naive analysis may suggest that BIPOC farmers must be better off than white farmers because they are more likely to be full owners, this may instead reflect the difficulties BIPOC farmers face in breaking into commercial production. As discussed in “Farmer Economic Conditions,” part owners are better represented than full owners among operations with at least moderate sales. Furthermore, farmers often rent in the corn- and soy-growing areas of the Midwest. BIPOC farmers may be less likely to rent than white

farmers because they have had trouble getting a foothold in the corn and soy industry.

We find some interesting patterns when we analyze BIPOC tenant farms. As also discussed in “Farmer Economic Conditions,” young and beginning farmers appear to use tenancy as a way to break into the industry. Native American and multi-racial farmers have low rates of tenancy. This could be due to issues they face starting off in farming, such as problems getting loans or a tenancy contract.<sup>533</sup> Black farmers are about two-thirds more likely to be tenants than white farmers.<sup>534</sup> Black farmers are also more likely to be young farmers and much more likely to be beginning farmers than white farmers, so it is possible their elevated rate of tenancy reflects both their lack of access to wealth and the efforts of young and beginning Black farmers to enter into farming.<sup>535</sup> Almost 30% of Asian farmers operate as tenants—about four times the rate of whites—on an average of 18 acres.<sup>536</sup> Hmong farmers have long rented land in Dakota County, Minnesota, and the Hmong American Farmers Association recently purchased 155 acres in the county to lease out to farmers.<sup>537</sup> The Fondy Farm Project in Wisconsin also leases land to Hmong

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530. Florence Steinberger, *For Hmong Families, Growing Food – and Selling it at Markets – is a Proud Tradition*, MILWAUKEE J. SENTINEL (Sept. 18, 2018), <https://www.jsonline.com/story/life/food/2018/09/18/hmong-families-milwaukee-make-most-land-farmers-markets/1277906002/> (Wisconsin); Cinnamon Janzer, *The Hmong Farmers who Feed the Twin Cities’ Farmers Markets*, SALON (Aug. 26, 2022), [https://www.salon.com/2022/08/26/the-hmong-farmers-feed-the-twin-cities-farmers-markets\\_partner/](https://www.salon.com/2022/08/26/the-hmong-farmers-feed-the-twin-cities-farmers-markets_partner/). Note that farmers at farmers markets often sell vegetables.

531. Janzer, *supra* note 530.

532. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT STATE LEVEL Data tbl. 72.

533. Calculated by the authors using *id.*

534. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT STATE LEVEL Data tbl. 76.

535. For rate of young and beginning farmers calculations, authors used 2017 CENSUS OF AGRICULTURE, *supra* note 7. See *supra* “Historical context” (discussing lack of wealth).

536. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, AT STATE LEVEL Data tbl. 62.

537. Kiya Edwards, *Hmong Farmers Purchase Farmland for First Time in U.S. History*, KARE 11 (Oct. 6, 2022, 6:56 PM), [https://www.hmongfarmers.com/story/](https://www.kare11.com/article/news/local/breaking-the-news/hmong-farmers-purchase-farmland-for-first-time-in-us-history/89-83bb4440-7d44-40d4-99b2-7f3ba6011383#:~:text=%E2%80%94%20For%20years%2C%20Hmong%20farmers%20have,Minnesota...%20but%20nationwide; HMONG AM. FARMERS ASS’N, <i>Our Story</i>, <a href=) (last visited Nov. 5, 2023).



farmers.<sup>538</sup> Activities like these would contribute to the high tenancy rate for Asian farmers. About half of Asian farmers are beginning farmers, who

may be renting land on tenant farms.<sup>539</sup> (Note that detailed tables of various characteristics of BIPOC farmers and farms are available in the appendix.)

## Discussion of BIPOC farmers by group

### NATIVE AMERICAN FARMERS

USDA published data for 21 American Indian Reservations in the Midwest in 2019.<sup>540</sup> For the vast majority of reservations, USDA suppressed a great deal of information, for privacy reasons, on Native American farmers on the reservations. Among reservations in the Midwest with published data for Native and non-Native producers, the study found that the vast majority of land was operated by non-Native farmers.<sup>541</sup> This is consistent with national trends.<sup>542</sup> Three reservations that did not suppress statistics on land operated by Native Americans had at least 10,000 acres of land in farms on the reservation. These were Leech Lake in Minnesota (23,600 acres), Oneida Tribe of Wisconsin (16,145 acres), and White Earth of Minnesota (167,982 acres). A little less than 1% of all agricultural sales by farms that operated on these reservations were captured by Native American-operated farms.<sup>543</sup> At the national level, Native American operators capture around 10% of sales, so the situation for the reservations just

mentioned is extreme.<sup>544</sup> The farms that operate on these reservations appear to be engaged primarily in ranching on the Leech Lake and Oneida lands, and crop and soy production on the White Earth lands.<sup>545</sup> As we discuss later, Native American farmers engage in other styles of production as well.

Native Americans do not profit off the farming on their land as much as one might expect. Native Americans who own land on reservations often face a variety of issues related to how their land ownership is legally structured. Due to a variety of changes in policy, land on reservations is often held in a “checkerboard” of different title arrangements.<sup>546</sup> Sometimes the federal government holds land on behalf of a tribe, sometimes the land is owned as restricted Indian land, and sometimes it is held in fee simple form.<sup>547</sup> The government restricts how land held in certain tribal trusts can be partitioned, which has caused many parcels to be held by a large number of heirs, sometimes

538. Jeff Rumage, *There are No Off Days for Hmong Farmers who Grow Vegetables at Mequon Nature Preserve. But it's All Worth it*, MILWAUKEE J. SENTINEL (July 25, 2018, 8:26 AM), <https://www.jsonline.com/story/communities/northshore/news/mequon/2018/07/25/hmong-farmers-grow-vegetables-mequon-nature-preserve/819406002/>.

539. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 64.

540. 2017 CENSUS OF AGRICULTURE, AMERICAN INDIAN RESERVATIONS (2019), [https://www.nass.usda.gov/Publications/AgCensus/2017/Online\\_Resources/American\\_Indian\\_Reservations/AMINDIAN.pdf](https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/American_Indian_Reservations/AMINDIAN.pdf).

541. Calculations by authors using *id.* at 5-129 tbl. 1.

542. NATIVE LAND INFO. SYS., *Non-Natives Control Majority of Harvested Cropland on Native American Reservations* (Feb. 24, 2021), <https://nativeland.info/uncategorized/non-natives-control-majority-of-harvested-cropland-on-native-indian-reservations/>.

543. Calculations by authors using AMERICAN INDIAN RESERVATIONS, *supra* note 540, at 5-129 tbl. 1.

544. NATIVE LAND INFO. SYS., *supra* note 544.

545. Calculations by authors using AMERICAN INDIAN RESERVATIONS, *supra* note 540, at 5-129 tbl. 1.

546. JESSICA A. SHOEMAKER, FARM AND RANCH ISSUES IN INDIAN COUNTRY, 1, 8 (June 2006).

547. *Id.* at 16

numbering in the hundreds.<sup>548</sup> This can make the income from leasing those lands negligible for the owners.<sup>549</sup> Furthermore, the government manages these parcels in a way that makes it hard for owners to lease them, post them as collateral, or otherwise use them as they wish.<sup>550</sup> Many developers are deterred from pursuing projects on reservation land with checkerboard ownership because of the many legal structures, as well as owners and government entities, that they might have to deal with in order to pursue a project.<sup>551</sup> The Indian Land Tenure Foundation also writes that the government often leases tribal ranch land, usually to non-Native ranchers, at below market value.<sup>552</sup> On top of this, some Native Americans allege that commercial lenders discriminate against them.<sup>553</sup> For these and other reasons, Native Americans often receive less benefit than they could from land in reservations.<sup>554</sup> But perhaps the largest land ownership problem Native Americans face is that the

federal government deprived them of much of the land they once used. As one example, the federal allotment program and similar programs caused Native Americans to lose roughly 90 million acres from 1887 to 1934.<sup>555</sup> Native Americans lost most of this land after the government deemed it “surplus” and took control of it.<sup>556</sup> Native Americans also lost a substantial portion of land to whites who took advantage of new landowners and got them to sell their land for below-market prices.<sup>557</sup>

Despite these problems, Native Americans are making efforts to farm on their own terms. Ho-Chunk people of the Winnebago Tribe, whose reservation is mostly in Nebraska but has a small area in Iowa, recently purchased 231 acres from a non-Native American owner through a tribal company and plan to buy more of their reservation’s acreage.<sup>558</sup> The White Earth Nation recently implemented a moratorium on the construction of large

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548. *Id.* at 7.

549. *Id.* at 5.

550. Evelyn Iritani, *Ownership Structure of Tribal Land Exact a Multibillion-Dollar Penalty*, ULCA ANDERSON REV. (Aug. 26, 2020), <https://anderson-review.ucla.edu/native-american-land/>. For more information on problems owners of tribal land face in getting credit, see U.S. GOV’T ACCOUNTABILITY OFF., GAO-19-464, INDIAN ISSUES, AGRICULTURAL CREDIT NEEDS AND BARRIERS TO LENDING ON TRIBAL LAND (2019).

551. *Id.*

552. INDIAN LAND TENURE FOUNDATION, *Land Tenure Issues*, <https://iltf.org/land-issues/issues/> (last visited Nov. 5, 2023).

553. U.S. GOV’T ACCOUNTABILITY OFF., *supra* note 550, at 19-20.

554. Note that some Midwest reservations appear to have these sorts of problems. *E.g.*, Dan Gunderson, *Feds Begin Process to Clear Titles on Indian-Owned Lands*, MPR NEWS (Dec. 19, 2012, 4:04 PM), <https://www.mprnews.org/story/2012/12/19/feds-begin-process-to-clear-titles-on-indian-owned-lands>; Div. OF RES. MGMT., *Land Department*, <https://www.llojibwe.org/drm/land/land.html> (last visited Nov. 5, 2023); Lina Tran, *An Insider’s View of the Legal Battle Between Oneida Nation and Village of Hobart*, WUWM 89.7 FM (Mar. 1, 2023), <https://www.wuwm.com/2023-03-01/an-insiders-view-of-the-legal-battle-between-oneida-nation-and-village-of-hobart>.

555. SHOEMAKER, *supra* note 546, at 8; KATHELEEN R. GUZMAN, GIVE OR TAKE AN ACRE: PROPERTY NORMS AND THE INDIAN LAND CONSOLIDATION ACT, 73 Agric. 85 Iowa. L. Rev. 595, 603-605 (Jan. 2000)

556. JANET A. McDONNELL, THE DISPOSSESSION OF THE AMERICAN INDIAN: 1887-1934, 121 (explaining that 60 million acres out of 86 million were declared surplus) (Ind. Univ. Press 1991)

557. *Id.* at 90-93 (discussing whites swindling Native Americans out of “fee patented land” on various reservations in the early 1900s), 121 (discussing that Native Americans lost 22 million acres of fee patented land. This was land the government turned over to Native Americans for them to dispose with as they wished. See Ch. 7 for a discussion of the failures of the government’s push to increase the amount of fee patented land. McConnell notes on 113 that “reports from the field clearly indicated that too many patents were still being issued too quickly, with devastating results. A staggering number of Indians lost their land and became paupers, as many as 75 to 100 percent of the patentees on most reservations.”)

558. Kevin Abourezk, *It’s a Pretty Monumental Step: Tribal Farm Reclaims Land on Winnebago Reservation*, INDIANZ.COM (Jan. 17, 2020), <https://indianz.com/News/2020/01/17/its-a-pretty-monumental-step-tribal-farm.asp>.

farm projects on reservation lands so they could develop regulations for these operations. A leader of the White Earth Nation explained, to Minnesota Public Radio, that a livestock project could pollute water the band uses to grow wild rice.<sup>559</sup> The Red Cliff Band of Lake Superior Chippewa operates a processing center for freshwater fish.<sup>560</sup> The Shakopee Mdewakanton Sioux Community launched a \$10 million, multi-year effort to promote Indigenous nutrition in Minnesota, through research and community grants.<sup>561</sup> In early 2023,

## ASIAN FARMERS

Many Asian farmers have their operations in Wisconsin and Minnesota (see Figure 14). Hmong people started to immigrate to the Midwest in significant numbers in the 1970s. The United States had backed the Hmong people of Laos and other parts of southeast Asia in the Vietnam War. The Hmong people were subsistence farmers and were very poor when they arrived in the United States. Few could write in even their own native language,

the Leech Lake Band successfully pressed for an environmental study of an engineered wood factory proposed to be built near wetlands the band uses to raise wild rice.<sup>562</sup> The Oneida Nation in Wisconsin have used funds from casinos, banks, and commercial leases to aggressively buy back land. Now they force farmers that rent from them to follow strict environmental regulations.<sup>563</sup> The tribe operates a cattle and bison ranch, organic farm, feedlot, orchard, cannery, and food store.<sup>564</sup>

much less speak English.<sup>565</sup> A reporter who recently interviewed Hmong farmers found that they often rent land and lack irrigation on their farms, suggesting they still do not have access to the capital needed to run larger farms.<sup>566</sup>

Even so, Hmong farmers play an important role in the Upper Midwest food system. Hmong farmers have worked on commercial ginseng farms in Wisconsin for many decades.<sup>567</sup> Hmong farmers

559. Dan Gunderson, *White Earth Nation Imposes Moratorium on Large Livestock Farms*, MPR News (Dec. 8, 2022, 8:35 AM), <https://www.mprnews.org/story/2022/12/08/white-earth-nation-imposes-moratorium-on-large-livestock-farms>.

560. Erin Peot, *Tribal Food Sovereignty Resources*, U. Wis. MADISON, <https://foodsystems.extension.wisc.edu/articles/tribal-and-native-food-sovereignty/> (last visited Nov. 5, 2023).

561. Kelly Smith, *In Tribes Across Minnesota, Indigenous Food Movement Takes Root*, STARTRIB. (July 22, 2018, 11:03 PM), <https://www.startribune.com/from-gardens-to-cooking-classes-minnesota-s-american-indian-communities-are-boosting-healthy-food-initiatives/488849781/?refresh=true>.

562. Michael Chosa, *Press Release: Minnesota Court of Appeals Delivers Significant Victory to Leech Lake Band of Ojibwe in Case Opposing Huber Engineered Woods Factory*, LEECH LAKE NEWS (Feb. 7, 2023), <https://www.leechlakenews.com/2023/02/07/press-release-minnesota-court-of-appeals-delivers-significant-victory-to-leech-lake-band-of-ojibwe-in-case-opposing-huber-engineered-woods-factor/>.

563. Frank Vaisvilas, *Land is Life: The Oneida Nation Reclaims its Identity*, GROUNDTRUTH PROJECT (Oct. 5, 2020), <https://thegroundtruth-project.org/land-is-life-how-one-indigenous-nation-is-reclaiming-its-land-and-its-identity-in-wisconsin/>.

564. Patrick Pelky, Div. Director, Env't, Health, Safety, Land & Agric. Div., Governor's Task Force on Climate Change-Virtual Listening Session #4: Oneida Nation's Agriculture and Food Sovereignty, slide 7 (June 9, 2020); FIRST NATIONS DEVELOPMENT INST., *Oneida Nation Trains More Butchers to Fortify its Protein Supply Chain*, <https://www.firstnations.org/stories/oneida-nation-trains-more-butchers-to-fortify-its-protein-supply-chain/> (last visited Nov. 5, 2023); U. Wis. MADISON, *Oneida Cannery*, <https://fyi.extension.wisc.edu/foodbin/oneida-cannery/> (last visited Nov. 5, 2023).

565. Sasha Aslanian, *'We are Hmong Minnesota': A 40-Year Journey, Remembered*, MPR News (Mar. 2, 2015), <https://www.mprnews.org/story/2015/03/02/we-are-hmong-minnesota>.

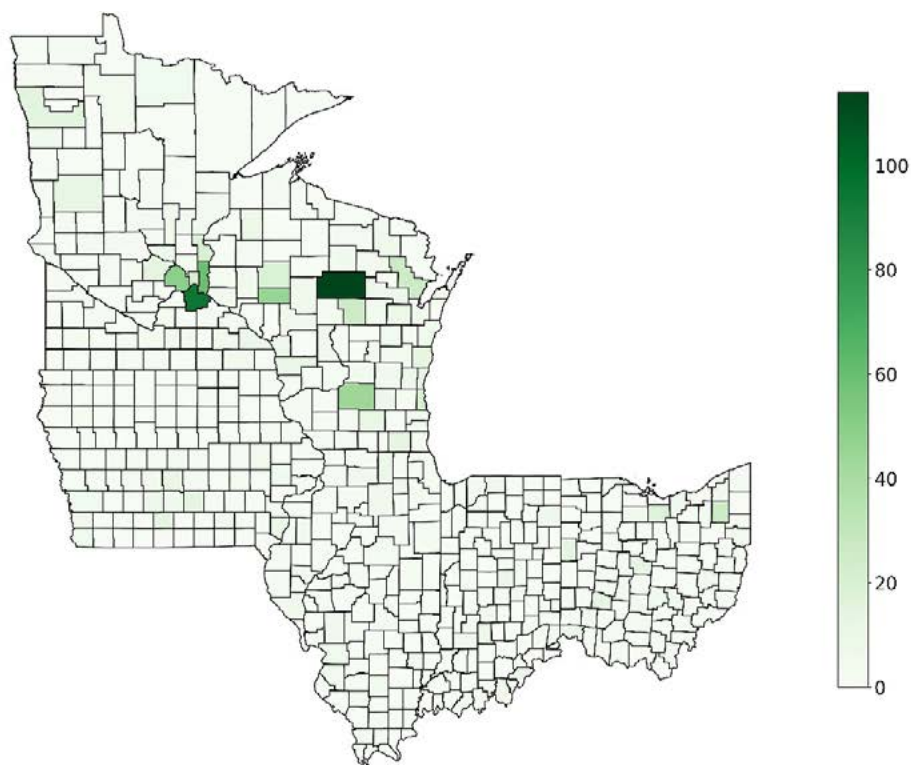
566. Janzer, *supra* note 530.

567. Davis Moore, *The Story of a People and a Plant: American Ginseng and the Hmong People*, SMITHSONIAN FOLKLIFE FESTIVAL (June 21, 2019), <https://festival.si.edu/blog/american-ginseng-hmong-people>.

also make up a substantial, sometimes a majority, share of sellers in farmers markets in the Twin Cities, Milwaukee, and in other towns and cities across Wisconsin.<sup>568</sup> Even though Hmong farmers have grown for farmers markets for decades, a director at a Hmong farmer organization told a news

outlet his group’s new 155-acre farm was the first Hmong-owned-and-operated farm in the country.<sup>569</sup> While this may be up for debate—for example *Civil Eats* reported on a Hmong family who owns a farm they have operated since 2007—there is no doubt Hmong farmers have struggled to purchase land.<sup>570</sup>

**Figure 14. Asian producers by county in the Midwest, 2017**



Source: 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 45; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

568. Aslanian, *supra* note 565; Steinberger, *supra* note 530; Young Kim, *Why Hmong-Grown Produce is Different?*, URBAN MILWAUKEE (Dec. 5, 2021, 12:09 PM), <https://urbanmilwaukee.com/2012/12/05/urban-foodie-why-hmong-grown-produce-is-different/>.  
 569. HMONG AM. FARMERS ASSOC., <https://www.hmongfarmers.com/#> (last visited Nov. 5, 2023); Edwards, *supra* note 537.  
 570. Lauren Koshere, *Immigrant Farmers Help Grow Organic Ag in Wisconsin and Beyond*, CIV. EATS (July 25, 2018), <https://civileats.com/2018/07/25/immigrant-farmers-help-grow-organic-ag-in-wisconsin-and-beyond/>.

## AFRICAN AMERICAN FARMERS

The Western family of Iowa owns a farm in Mahaska County, one of 1,700 “heritage farms” in the state that are at least 150 years old. Theirs is likely the only heritage farm owned by a Black family.<sup>571</sup> The Western family includes many college graduates and professionals. Family members still own and operate Iowa farmland.<sup>572</sup> The Westerns’ story is not a typical one for African American farmers in the Midwest. Like other parts of the country, the Midwest has seen a steep decline in the number of African American farm owners since the early 20th century. Some of those who remain report that they still experience discrimination. *Investigate Midwest* recently interviewed an African American farmer in his mid-30s who alleged a USDA agent had discriminated against him.<sup>573</sup> A woman who said she experiences discrimination when she applies for federal loans told the news outlet

*MinnPost* that she raises hemp because “that’s the way to make money without USDA help.”<sup>574</sup>

Still, African American farmers continue to produce. Angela Dawson and her daughter both run small operations in Minnesota.<sup>575</sup> Henry Mitchell, who endured racial slurs and threats of violence against his family in his younger years, told Minnesota Public Radio he plans to help his daughter run a tree farm on their family’s property.<sup>576</sup> The *Yellow Springs News* interviewed a farmer in Ohio who operates over 100 acres that has been in his family since the early 1900s.<sup>577</sup> In fact, Illinois, Indiana, and Ohio still have many of the region’s Black farmers today, as they did in the late 1800s (see Figure 12 for Black rural property owners in 1870 and Figure 15 for Black producers in 2017). The Midwest is also home to Black immigrant farmers. Some Somali immigrants in Minnesota have started small farms in the state.<sup>578</sup>

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571. Erin Jordan, ‘Immense Sense of Pride’: Iowa Farm Owned by Black Family for 158 Years, *INVESTIGATE MIDWEST* (Dec. 19, 2022), <https://investigatemidwest.org/2022/12/19/immense-sense-of-pride-iowa-farm-owned-by-black-family-for-158-years/>.

572. *Id.*

573. Amanda P. Pintado, *An Illinois Bill Aims to Counteract a Decades-Long Trend: The Decline of the Black Farmer*, *INVESTIGATE MIDWEST* (Feb. 15, 2022), <https://investigatemidwest.org/2022/02/15/an-illinois-bill-aims-to-counteract-a-decades-long-trend-the-decline-of-the-black-farmer/>.

574. Jon Collins, *Minnesota’s Black Farmers Working to Reconnect to Land*, *MPR NEWS* (May 3, 2022), <https://www.mprnews.org/story/2022/05/03/mn-black-farmers-working-to-reconnect-to-land> (discussing Angela Dawson saying she experiences discrimination); Ana Radelat, *USDA Struggles to Help Minority Farmers, Even as their Footprint Grows in Minnesota*, *MINNPOST* (Mar. 16, 2023), <https://www.minnpost.com/greater-minnesota/2023/03/usda-struggles-to-help-minority-farmers-even-as-their-footprint-grows-in-minnesota/> (quoting Dawson saying she raises hemp).

575. Justine Jones, *Black Farmers Take Root in Minnesota*, *MPLS ST. PAUL* (Apr. 18, 2021), <https://mspmag.com/arts-and-culture/black-farmers-take-root-in-minnesota/>.

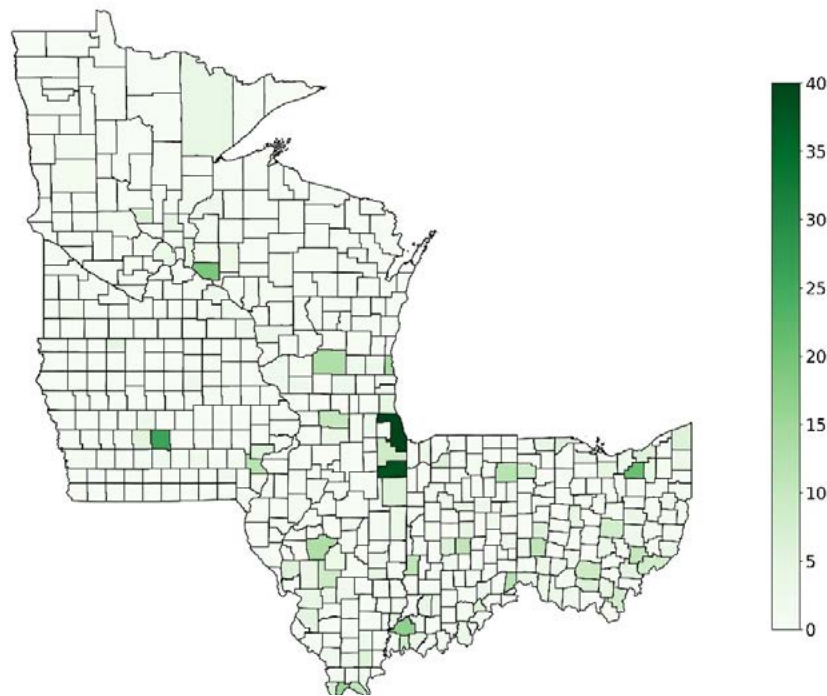
576. Collins, *supra* note 574.

577. Carol Simmons, *On the History, Future of Black Farming*, *YSNEWS.COM* (Sept. 17, 2020), <https://ysnews.com/news/2020/09/on-the-history-future-of-black-farming>.

578. Ibrahim Hirsi, *With Help from Farmer-Training Programs, More Minnesota Somalis are Putting Down Rooms – literally*, *MINNPOST* (June 26, 2018), <https://www.minnpost.com/new-americans/2018/06/help-farmer-training-programs-more-minnesota-somalis-are-putting-down-roots-li/>.



**Figure 15. African American producers by county in the Midwest, 2017**



Source: 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 45; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

## HISPANIC FARMERS

Even though Hispanic farmworkers often receive low wages and face prejudice from white neighbors and employers, some have succeeded in purchasing farms. A recent report from Minnesota Public Radio discussed three small, diversified, Hispanic-owned farms in the Upper Midwest (see Figure 16 for Hispanic producers by county in the Midwest).<sup>579</sup> The people who ran these farms had saved money they made as farmworkers or working other jobs to purchase their operations. Two of the farms were operated by multiple family members. All of the

owners still had off-farm jobs to supplement their farm income.<sup>580</sup> Jorge Guereca of Harvard, Illinois, told a local historical society that, for many years, he saved wages from his farmworker job to start a small vegetable operation.<sup>581</sup> His sister-in-law helps him with the farm.<sup>582</sup> Experiences like these seem typical for Hispanic farmworkers and other workers who purchase farms.

A revealing study of Hispanic farmworkers who purchased land in a Michigan county found that

579. Vicki Adame, *Number of Latino Farmers Small, but Growing*, MPR News (July 15, 2022), <https://www.mprnews.org/story/2022/07/12/number-of-latino-farmers-small-but-growing>.

580. *Id.*

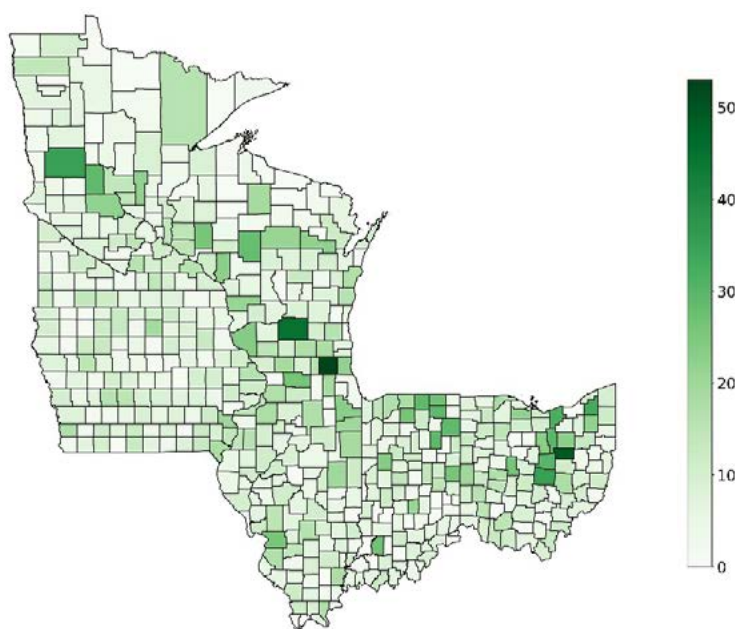
581. MCHENRY COUNTY HISTORICAL SOC'Y AND MUSEUM, *Latino Farm Owner Plants Roots*, <https://mchenrycountyhistory.org/news%3A-latino-farm-owner-plants-roots> (last visited Nov. 5, 2023).

582. *Id.*

these farmers purchased the land to bring in extra income and to be a home where they could practice a “traditional way of life.”<sup>583</sup> The study found that these farmers said they faced discrimination from some white locals; were distrustful of and did not interact with USDA; and tended to believe their immigration status made them ineligible to participate in federal programs.<sup>584</sup> The participants also cited the language barrier as an obstacle.<sup>585</sup> These farmers relied on their social networks to get loans and to find labor at harvest time.<sup>586</sup> The authors of the study also noted certain influential

farmers are at the center of social networks that help farmworkers obtain farms.<sup>587</sup> An apparent example of such an influential farmer is Rodrigo Cala, who farms in western Wisconsin. Cala worked in a shoe factory before he purchased his operation, which is certified organic. He works with two cooperatives that help Hispanic farmers and he is a consultant for a Latino economic center.<sup>588</sup> A future study could identify how often leaders like Cala help other Hispanic farmers obtain farms in the Midwest.

**Figure 16. Hispanic producers by county in the Midwest, 2017**



Source: 2017 Census of Agriculture, *supra* note 7, at County Level Data tbl. 45; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

583. JUAN MARINEZ & VICTOR GARCÍA, MICH. S. U., *NEW LATINO FARMERS IN THE MIDWEST: THE CASE OF SOUTHWEST MICHIGAN* 34 (2004).

584. *Id.* at 35.

585. *Id.* For more on language and cultural barriers, see Brittney J. Miller, *Lost in Translation: How USDA Barriers Leave Immigrant Farmers and Ranchers Behind*, THE GAZETTE (May 22, 2023), <https://investigatamidwest.org/2023/05/22/lost-in-translation-how-usda-barriers-leave-immigrant-farmers-and-ranchers-behind/>.

586. MARINEZ & GARCÍA, *supra* note 583, at 36-37.

587. *Id.* at 36.

588. Amanda Mosborg, *Local Food Leaders you Need to Know: Rodrigo Cala*, <https://www.slowfoodmn.org/news/rodrigo-cala> (Feb. 8, 2021).

## FARMWORKERS

Farmworkers play a critical role in Midwest agriculture. Farmworkers likely work more hours than principal operators on farms with at least moderate sales. Based on our calculations, farmworkers provided around 334 million work hours, while primary operators contributed around 237 million work hours in 2017.<sup>589</sup> This works out to a share of 58% of hours for farmworkers and 42% for primary operators. Non-primary operators, spouses, and unpaid workers also contribute to total work hours. At the national level, these groups collectively contribute about 60% as many hours as primary operators.<sup>590</sup> If we assume this relationship in the Midwest, then farmworkers contribute about 47% of total hours, while all operators, spouses, and unpaid workers contribute about 53% of total hours.

Data and reporting on farmworkers are patchy, incomplete, and filled with ambiguities. In spite of this, many experts have settled on certain consensus approaches to estimating farmworker numbers, demographics, pay, and other characteristics. The reader should be aware that the

statistics that follow probably understate the share of workers who are Hispanic, immigrants, or undocumented because survey staff have trouble reaching these populations. Even so, we will proceed with an analysis of commonly used farmworker statistics to give a brief overview of the status of farmworkers in the region.

The National Center for Farmworker Health (NCFH) provides estimates of the number of farmworkers in the Midwest. For the most recent year, 2017, the center estimates there were 408,000 total farmworkers in the region, about 35% in animal production, 56% in crop production, and 9% with an unknown classification (see Table 21 for counts by state).<sup>591</sup> The Legal Services Corporation provides data that allow us to estimate annual pay of animal workers by state.<sup>592</sup> Using these data, we find annual pay for animal workers ranging from \$24,345 in Indiana to \$28,275 in Wisconsin.<sup>593</sup> The National Agricultural Workers Survey (NAWS) provides various economic and demographic indicators for crop workers. NAWS provides data

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589. Calculated by the authors 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY (farms); USDA, FARM LABOR, APRIL HIRED WORKERS DOWN 4 PERCENT, WAGE RATE INCREASES 4 PERCENT FROM PREVIOUS YEAR (2017), <https://downloads.usda.library.cornell.edu/usda-esmis/files/x920fw89s/2r36v036d/dz010r796/FarmLabo-05-18-2017.pdf>; USDA, FARM LABOR, OCTOBER HIRED WORKERS INCREASE 5 PERCENT, WAGE RATES INCREASE 1 PERCENT FROM PREVIOUS YEAR (2017), <https://downloads.usda.library.cornell.edu/usda-esmis/files/x920fw89s/m613n0170/db78td76w/FarmLabo-11-16-2017.pdf> (for wage rates). Based on reported wage rates, we assume farmworkers were paid \$14 an hour. We divided total pay to hired farm labor and contract labor by \$14 to get farmworker labor hours. We assumed each farm had one primary operator and multiplied the total count by 2,000 hours to get primary operator labor hours.
590. Calculated by the authors from data from a special request received from Jeffrey Hopkins at ECON. RSCH. SERV., USDA, on Dec. 13, 2019. These data provide hours worked by primary operators, spouses, other operators, unpaid workers, hired labor, and contract labor for farms with at least moderate sales at the national level in 2018. We used these data to determine that spouses, other operators, and unpaid workers worked about 60% as many hours as primary operators.
591. Calculated by the authors from NAT'L CTR. FOR FARMWORKER HEALTH, INC., FARM LABOR DATA DASHBOARD, <https://www.ncfh.org/dashboard.html> (last visited Nov. 6, 2023). Some estimates of crop and animal workers are suppressed, for privacy reasons, at the country level, so the state-level totals of crop workers and animal workers do not always sum to the total of all farm workers. We say that workers not identified as either crop or animal workers have an "unknown classification."
592. LEGAL SERVICES CORPORATION, *Agricultural Worker Population Estimate—2021 Update*, <https://www.lsc.gov/grants/basic-field-grant/lsc-service-areas/agricultural-worker-population-estimate-2021-update> (last visited Nov. 5, 2023).
593. Calculated by the authors from *Id.*

by region. The Midwest region includes our six states and six others.<sup>594</sup> In the Midwest region, the median reported income from farm work was between \$17,500 and \$19,999 for survey years 2017-2020.<sup>595</sup> About 15% of respondents said they

were migrants, meaning they relocate to work, and about 30% said they were Hispanic.<sup>596</sup> See Figure 17 for estimated number of farmworkers by county in 2017.

**Table 21. Estimated number of farmworkers by specialization and H-2A workers in the Midwest, 2017 and 2022**

State	Total workers, 2017	Crop workers, 2017*	Animal workers, 2017*	H-2A workers, 2022
Illinois	57,857	36,215	9,647	4,346
Indiana	48,053	28,113	14,395	4,606
Iowa	84,530	47,755	34,864	5,132
Minnesota	77,785	46,706	26,783	3,349
Ohio	65,136	36,881	21,021	4,193
Wisconsin	74,634	31,878	35,905	2,610

\* Some estimates of crop workers and animal workers are suppressed at the county level, so state-level sums of crop and animal workers do not always equal total workers.

Source: Nat'l Ctr. for Farmworker Health, Inc., *supra* note 591.

Midwest farms with an oilseed and grain specialization, which are mostly corn and soy farms, spend more than any other farm specialization on hired labor, with 33% of the total expenditure, followed by dairy production at 22%, and a tie

between greenhouse, nursery, and floriculture farms and hog farms at around 10% each.<sup>597</sup> As discussed in the “Corn and Soy” section, corn and soy farmers hire workers to operate machines and perform various tasks around the farm, and corn

594. U.S. DEP'T OF LAB., EMPLOYMENT AND TRAINING ADMINISTRATION, *Sample Sizes by Region and Fiscal Year*, (n.d.), <https://www.dol.gov/agencies/eta/national-agricultural-workers-survey/data/sample-sizes-region-fiscal-year> (defining the regions available in public NAWS data). The six other states are Missouri, Kansas, Nebraska, North Dakota, South Dakota, and Michigan.

595. Calculated by the authors using the NATIONAL AGRICULTURAL WORKERS SURVEY PUBLIC ACCESS DATA (2023), U.S. DEPT. OF LABOR (2022), <https://www.dol.gov/agencies/eta/national-agricultural-workers-survey/data/files-sas>. We used the SAS dataset NAWS\_ALL. The Department of Labor advises using multiple years of data (U.S. Department of Labor, *An Introduction to Analyzing the NAWS Public Access Data*, U.S. DEPT. OF LABOR (March 2018), [https://www.dol.gov/sites/dolgov/files/ETA/news/pdfs/Intro\\_Analyzing\\_NAWSPAD.pdf](https://www.dol.gov/sites/dolgov/files/ETA/news/pdfs/Intro_Analyzing_NAWSPAD.pdf) at 6). We subset the data to keep four years of data (2017-2020) and to keep records for the Midwest region. We adapted the department's instructions to compute weighted proportions in Excel for Python to compute proportions of income from agricultural employment categories, migrant status, and ethnicity (*Id.* at 10-19). We used the variable G02 for income from agricultural employment. We excluded records where there was no response, the respondent said they did not work, or the respondent said they did not know or refused to answer (U.S. Department of Labor, *National Agricultural Workers Survey Codebook for Public Access Data Federal Fiscal Years 1989-2020*, U.S. DEPT. OF LABOR (May 2020), [https://www.dol.gov/sites/dolgov/files/ETA/news/pdfs/NAWSPAD\\_CodeBook\\_1989\\_2020.pdf](https://www.dol.gov/sites/dolgov/files/ETA/news/pdfs/NAWSPAD_CodeBook_1989_2020.pdf) at 112).

596. *Id.* See *National Agricultural Workers Survey Codebook for Public Access Data*, *supra* note 595, at 15 (for MIGRANT variable that indicates migrant status) and at 45 (for B01 variable that indicates ethnicity).

597. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7 at State Level Data tbl. 75.

seed producers hire farm laborers to detassel and sort seed corn.<sup>598</sup> Many farmworkers report problems from agribusiness companies that hire workers to help with seed corn production.<sup>599</sup> In one case, Syngenta provided workers who had come from the Rio Grande Valley to Iowa with less than half the work the company had promised.<sup>600</sup> An academic reported that, rather than immediately settle, an attorney representing Syngenta “drove a hard bargain and fought to delay the entire process” despite the “blatant ... breach of contract.”<sup>601</sup> A survey from over a decade ago found that immigrants made up over 40% of the dairy workforce in Wisconsin.<sup>602</sup> Workers told the *Milwaukee Journal-Sentinel* in 2019 they thought the current share was higher.<sup>603</sup> Farmworkers also play important roles on nurseries and organic

farms. People who sell seedlings, flowers, fruit, and vegetables must provide products that customers find attractive, which often requires workers to harvest and prepare these products by hand. A policy brief on Midwest farmers’ reliance on immigrant labor mentions a nursery owner in Minnesota who planned to hire up to 350 seasonal workers but had to turn to the H-2A guest worker program when he was unable to attract enough employees.<sup>604</sup> The H-2A program provides temporary visas to foreign workers so they can work on farms.<sup>605</sup> An Ohio farmer, who operates a farm with 800 acres of corn and soy, told an immigrant rights organization that he depends on H-2A laborers to harvest tomatoes, sweet corn, and other produce on 290 acres of his family’s property.<sup>606</sup> We discuss H-2A workers more later.

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598. See also Donnelle Eller, *Iowa, U.S. Farm Workers Could See Dramatic Drop in Wages with USDA Move, Lawsuit Says*, DES MOINES REG. (Oct. 14, 2020, 5:04 PM), <https://www.desmoinesregister.com/story/money/agriculture/2020/10/14/iowa-us-farm-workers-could-see-wages-slashed-usda-move-lawsuit-says/3652064001/>.

599. Villagrán, *supra* note 140, at 132-135.

600. *Id.* at 134-135.

601. *Id.* at 135.

602. Maria Perez, *Wisconsin’s Dairy Industry Would Collapse Without the Work of Latino Immigrants—Many of Them Undocumented*, MILWAUKEE J. SENTINEL (Nov. 12, 2019), <https://www.jsonline.com/in-depth/news/special-reports/dairy-crisis/2019/11/12/wisconsin-dairy-farms-rely-immigrant-workers-undocumented-laborers/2570288001/>.

603. *Id.*

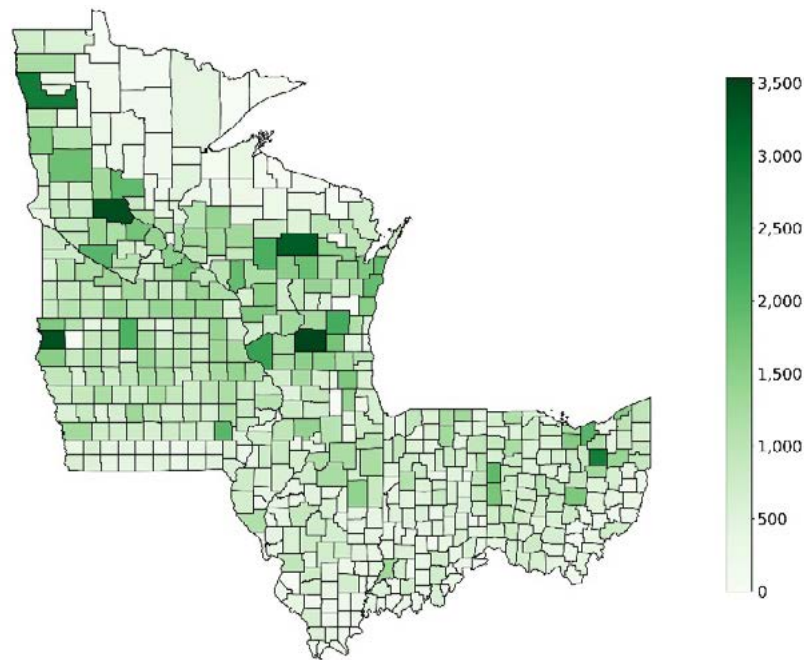
604. Stephanie Mercier, *Employing Agriculture: How the Midwest Farm and Food Sector Relies on Immigrant Labor*, CHICAGO COUNCIL ON GLOB. AFF., 3-4 (2019).

605. U.S. DEP’T OF LAB., EMPLOYMENT AND TRAINING ADMINISTRATION, *H-2A Temporary Agricultural Program*, <https://www.dol.gov/agencies/eta/foreign-labor/programs/h-2a> (last visited Nov. 5, 2023).

606. *Ohio’s Largest Industry Depends on Migrant Labor, Says Farmer*, NEW AM. Econ. (Mar. 22, 2017), <https://www.newamericaneconomy.org/feature/ohios-largest-industry-depends-on-migrant-labor-says-farmer/>.



**Figure 17. Estimated number of farmworkers by county in the Midwest, 2017**



Source: Nat'l Ctr. for Farmworker Health, Inc., *supra* note 591; Steven Manson et al., IPUMS National Historical Geographic Information System: Version 18.0 2017 County Dataset (map boundaries).

Farmworkers lack the autonomy and social power of white farmers and are often subject to exploitation and abuse. As mentioned in the “Hispanic farmers” section, Hispanic farmers and farmworkers say that language, cultural, and racial barriers make it difficult for them to start businesses and to participate in local activities and organizations.<sup>607</sup> Only 38% of crop workers report they can speak English “somewhat” or “well.”<sup>608</sup> Only 47% have health insurance and only 18% own their own

home.<sup>609</sup> Many farmworkers are exposed to dangerous levels of pesticides, at higher levels than farmers.<sup>610</sup> The scholar of farm labor, Philip Martin, writes that agriculture is the closest the U.S. has to an apartheid industry.<sup>611</sup>

Middlemen known as farm labor contractors have taken on an increasing role in connecting farmworkers to farmers.<sup>612</sup> Many of these contractors are unscrupulous: they charge farmworkers illegal

607. MARINEZ & GARCÍA, *supra* note 583, at 35.

608. Trish Hernandez and Susan Gabbard. *Findings from the National Agricultural Workers Survey (NAWS) 2015-16*, UNITED STATES DEPARTMENT OF LABOR (January 2018), [https://www.dol.gov/sites/dolgov/files/ETA/naws/pdfs/NAWS\\_Research\\_Report\\_13.pdf](https://www.dol.gov/sites/dolgov/files/ETA/naws/pdfs/NAWS_Research_Report_13.pdf) at 11.

609. *Id.* at 38 (home), 68 (health insurance).

610. Geoffrey M. Calvert, *Acute Pesticide Poisoning Among Agricultural Workers in the United States, 1998-2005*, AM. J. IND. MED. 883 (2008).

611. PHILIP L. MARTIN, U. CALI. AGRIC. AND NAT. RES., IMMIGRATION AND FARM LABOR: CHALLENGES AND OPPORTUNITIES 26 (2017).

612. Maria Perez, *What Led to a Migrant Worker's Death from Heatstroke?*, USA TODAY (Dec. 17, 2021), <https://www.usatoday.com/in-depth/news/investigations/2021/12/17/migrant-guest-workers-risks-farm-labor-contractors/8808652002/>.

recruitment fees, threaten workers with deportation, and take other unethical measures to drive down wages and control workers.<sup>613</sup> An analysis by the Economic Policy Institute found farm labor contractors account for a share of labor violations disproportionate to their share of agricultural employment.<sup>614</sup> Farmers have hired a rapidly increasing number of H-2A guest workers in recent years.<sup>615</sup> The number of H-2A workers in the Midwest more than doubled between 2020 and 2022 (Table 22).<sup>616</sup> Many farmworkers and labor organizers compare the H-2A program to slavery because employers can coerce workers with the threat of deportation.<sup>617</sup> A recent analysis of interviews with 100 Mexican H-2A workers found that 94% of these workers reported three or more “serious legal violations,” including verbal threats and significant wage theft.<sup>618</sup>

**Table 22. Number of H-2A workers in the Midwest, 2020 and 2022**

	2020 H-2A workers	2022 H-2A workers
Illinois	1,542	4,346
Indiana	2,226	4,606
Iowa	1,910	5,132
Minnesota	1,725	3,349
Ohio	2,710	4,193
Wisconsin	1,404	2,610
Midwest	11,517	24,236

Source: Nat’l Ctr. for Farmworker Health, Inc., *supra* note 591.

613. *Id.*

614. DANIEL COSTA ET AL., ECON. POL’Y INST., FEDERAL LABOR STANDARDS ENFORCEMENT IN AGRICULTURE 6 (2020).

615. ECON. RSCH. SERV., USDA, *Farm Labor, H-2A Temporary Agricultural Program*, <https://www.ers.usda.gov/topics/farm-economy/farm-labor/#h2a> (last updated Aug. 7, 2023).

616. Calculated by the authors from U.S. DEP’T OF LABOR, *supra* note 595.

617. Patricia Clarembaux & Almudena Toral, *Potato Slaves: The Cost of an H-2A Visa in Texas*, UNIVISION NOTICIAS (Aug. 6, 2020), <https://www.univision.com/especiales/noticias/2020/potato-slaves/index.html>; Mary Bauer & Meredith Stewart, *Close to Slavery: Guestworker Programs in the United States*, SPLC (Feb. 19, 2013), <https://www.splcenter.org/20130218/close-slavery-guestworker-programs-united-states>; Jessica Garrison et al., *The New American Slavery: Invited to the U.S., Foreign Workers Find a Nightmare*, BUZZFEED NEWS (July 24, 2015, 10:47 AM), <https://www.buzzfeednews.com/article/jessicagarrison/the-new-american-slavery-invited-to-the-us-foreign-workers-f>.

618. CENTRO DE LOS DERECHOS DEL MIGRANTE, INC., RIPE FOR REFORM: ABUSES OF AGRICULTURAL WORKERS IN THE H-2A VISA PROGRAM 4 (n.d.).







# ENVIRONMENTAL PROBLEMS AND ALTERNATIVE APPROACHES

## PROBLEMS OF CONVENTIONAL AGRICULTURE

Farms in the Midwest contribute significant greenhouse gas emissions. The region has some of the highest levels of agricultural emissions in the country, and Iowa has by far the most emissions of any state (see Table 23 for agricultural emissions in the Midwest).<sup>619</sup> Together, the six Midwest states emitted an estimated 158 million metric tons (MMT) carbon dioxide (CO<sub>2</sub>) equivalent in 2014—more than the emissions produced by 35 million gasoline-powered passenger cars or Argentina’s national emissions in 2020.<sup>620</sup>

**Table 23. Agricultural greenhouse gas emissions in the Midwest, 2014**

State	Agricultural emissions (MMT CO <sub>2</sub> equivalent)
Illinois	24.285
Indiana	16.493
Iowa	63.329
Minnesota	26.468
Ohio	12.648
Wisconsin	14.591

Note: MMT=Million Metric Tons; CO<sub>2</sub>=carbon dioxide

Source: Lehner & Rosenberg, *supra* note 44, at 47 fig. 8.

The largest single source of national agricultural greenhouse gas emissions is soil management, responsible for about half of U.S. agricultural emissions.<sup>621</sup> Soil management includes fertilizer applications and the breakdown of organic soil matter. The next largest source of agricultural emissions is enteric fermentation, responsible for about a third of agricultural emissions. Enteric fermentation results from the digestive process of ruminants, mostly cattle and sheep.<sup>622</sup> The third major source of emissions is manure management, responsible for about a seventh of emissions. Large animal facilities, like hog CAFOs, dairy CAFOs, or cattle feedlots, generate most of these emissions.<sup>623</sup>

We can use metrics that serve as proxies for emissions-related activities to assess the extent of concentration of emissions among the largest farms in the Midwest (see Table 24). We use crop land and fertilizer expenses for proxies of soil management emissions. Farms with midsize sales or more, about 18% of farms, operate 69% of cropland and are responsible for 75% of fertilizer expenses. We use sales of cattle not on feed—meaning not from feedlots—and milk cow inventory as proxies for enteric fermentation emissions. The roughly 18% of farms with midsize sales or more sold about 64% of cattle not on feed and had 78% of milk

619. See LEHNER & ROSENBERG, *supra* note 44, at 47 fig. 8.

620. See *id.*; EPA, *Greenhouse Gas Equivalencies Calculator*, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> (last updated July 2023); <https://data.worldbank.org/indicator/EN.ATM.CO2E.KT?locations=AR>

621. LEHNER & ROSENBERG, *supra* note 44, at 41.

622. *Id.* at 41-42.

623. *Id.* at 42.

cow inventories. We use hog inventories, milk cow inventories, and head of cattle on feed—meaning, from feedlots—as proxies for emissions from manure management. The 18% of farms with at least midsize sales have 84% of hog inventories, 78% of milk cow inventories, and 88% of cattle on feed sold. This suggests manure management emissions are very concentrated.<sup>624</sup> Dairy and hog facilities produce 90% of manure management emissions at the national level.<sup>625</sup> These farms

often use liquid systems, where they mix manure with water to store it. These systems can produce emissions at rates up to 90 times those of dry manure systems.<sup>626</sup> A survey of Wisconsin dairy farms found the vast majority of farms with 1,000 or more “animal units” used liquid systems.<sup>627</sup> A USDA study from 2011 stated that hog farms that used pits to store manure—the most common approach in the Midwest—typically mixed hog waste with water to create a “slurry.”<sup>628</sup>

**Table 24. Distributions of proxies for greenhouse gas emissions in the Midwest, 2017**

Farm size	Farms	Crop land	Fertilizer expenses	Head of cattle not on feed sold	Milk cow inventory	Hog inventory	Head of cattle on feed sold
Low sales	72.3%	16.4%	10.4%	21.6%	3.9%	5.8%	4.2%
Moderate sales	10.3%	14.9%	14.3%	14.2%	11.0%	10.4%	7.7%
Midsize	9.2%	30.6%	32.2%	23.5%	22.0%	21.2%	20.4%
Large	3.5%	26.7%	30.0%	19.7%	28.1%	27.4%	37.3%
Very large	0.3%	3.0%	4.2%	12.9%	18.1%	21.7%	21.8%
Nonfamily	4.5%	8.4%	9.0%	8.0%	9.6%	13.4%	8.7%

Note: “Head of cattle not on feed sold” is calculated as the difference of “Cattle and calves sold – head” and “Cattle on feed” from the 2017 COA typology report. Note that hog inventory is an estimate because USDA suppressed some information for Wisconsin for privacy reasons. The sum of the suppressed numbers makes up a small share of the overall total in Wisconsin, so the effect of the suppressions on the distribution presented here is small. Similarly, the milk cow inventory distribution is an estimate because USDA suppressed some information for Indiana and Ohio for privacy reasons. This information was for very large and nonfamily farms, so the concentration presented here is understated (and milk cow inventory does not add to 100%).

Source: Calculated by the authors from 2017 Census of Agriculture, *supra* note 7, Typology.

Midwest crop farmers use various conventional practices that harm humans and the environment.

Farmers have adopted genetically engineered (GE) corn and soy on the vast majority of their acreage.<sup>629</sup>

624. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, TYPOLOGY.

625. LEHNER & ROSENBERG, *supra* note 44, at 99.

626. *Id.* at 99.

627. HORACIO A. AGUIRRE-VILLEGAS & REBECCA A. LARSON, *Evaluating greenhouse gas emissions from dairy manure management practices using survey data and lifecycle tools*, 143 J. CLEAN. PROD. Fig. 2 (Feb. 2017).

628. NIGEL KEY ET AL., ECON. RSCH. SERV., USDA, TRENDS AND DEVELOPMENTS IN HOG MANURE MANAGEMENT: 1998-2009, 81 Econ. Info. Bull. 11 (Courtney Kanuth ed., Sept. 2011).

629. ECON. RSCH. SERV., USDA, *Recent Trends in GE Adoption*, <https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-u-s/recent-trends-in-ge-adoption/> (last updated Oct. 4, 2023).



After Midwest farmers adopted GE crops with resistance to glyphosate (an herbicide that is an ingredient in Roundup), they started to spray the herbicide so often that some weeds developed glyphosate resistance.<sup>630</sup> Agribusiness companies then developed GE crops with resistance to different herbicides, so farmers could spray glyphosate-resistant weeds with other chemicals.<sup>631</sup> Corn and soy farmers increased their use of seeds with resistance to herbicides such as 2,4-D and dicamba.<sup>632</sup> Dicamba can “drift” to other fields and damage crops and plants.<sup>633</sup> A recent study found an association between high levels of dicamba exposure and certain types of cancers.<sup>634</sup> Many studies have linked 2,4-D with thyroid disorders.<sup>635</sup> The Natural Resources Defense Council (NRDC), in

a 2010 study, documented widespread contamination of drinking water systems in the Midwest by the herbicide atrazine.<sup>636</sup> Farmers use atrazine when growing corn because it does not damage the crop.<sup>637</sup> The NRDC study noted that atrazine “impairs the immune system, and is associated with birth defects.”<sup>638</sup>

The largest farms tend to use more pesticides and are therefore responsible for more pesticide damage than smaller farms. The 18% of farms with midsize sales or more account for 75% of expenses on agrochemicals in the region (Table 25). These chemicals include pesticides, herbicides, and nematicides. Note that chemical expenses also include payments for applications of chemicals.<sup>639</sup>

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630. SETH J. WECHSLER, ECON. RES. SERV., USDA, TRENDS IN THE ADOPTION OF GENETICALLY ENGINEERED CORN, COTTON, AND SOYBEANS (Dec. 2018), <https://www.ers.usda.gov/amber-waves/2018/december/trends-in-the-adoption-of-genetically-engineered-corn-cotton-and-soybeans/>; SETH J. WECHSLER ET AL., ECON. RES. SERV., USDA, THE USE OF GENETICALLY ENGINEERED DICAMBA-TOLERANT SOYBEAN SEEDS HAS INCREASED QUICKLY, BENEFITING ADOPTERS BUT DAMAGING CROPS IN SOME FIELDS (Oct. 2019), <https://www.ers.usda.gov/amber-waves/2019/october/the-use-of-genetically-engineered-dicamba-tolerant-soybean-seeds-has-increased-quickly-benefiting-adopters-but-damaging-crops-in-some-fields/>.
631. *Id.*
632. Bart Elmore, *The herbicide dicamba creates problems for some farmers*, OHIO STATE NEWS (JAN. 2022), <https://news.osu.edu/the-herbicide-dicamba-creates-problems-for-some-farmers/>.
633. JORGE FERNANDEZ-CORNEJO ET AL., ECON. RSCH. SERV., USDA, GENETICALLY ENGINEERED CROPS IN THE UNITED STATES (Dale Simms ed., 2014); Andy McGlashen, *The Weedkiller Dicamba is Poisoning Wildlife Habitat. Will the EPA Finally Act?*, AUDUBON MAG. (2022), <https://www.audubon.org/magazine/winter-2022/the-weedkiller-dicamba-poisoning-wildlife-habitat>
634. Catherine C. Lerro et al., *Dicamba Use and Cancer Incidence in the Agricultural Health Study: An Updated Analysis*, 49 INT’L J. EPIDEMIOLOGY 1326 (2020).
635. Danielle Sedbrook, *2,4-D: The Most Dangerous Pesticide You’ve Never Heard Of*, NRDC (Mar. 15, 2016), <https://www.nrdc.org/stories/24-d-most-dangerous-pesticide-youve-never-heard>.
636. MAE WU ET AL., *supra* note 47, at iii.
637. WECHSLER, *supra* NOTE 630.
638. MAE WU ET AL., *supra* note 47, At iii.
639. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, TYPOLOGY REPORT.

**Table 25. Chemical expenses by farm size in the Midwest, 2017**

Farm size	Farms	Chemical expenses
Low sales	72.3%	9.9%
Moderate sales	10.3%	15.1%
Midsize	9.2%	32.6%
Large	3.5%	29.1%
Very large	0.3%	4.3%
Nonfamily	4.5%	9.0%

Source: Calculated by the authors from 2017 Census of Agriculture, *supra* note 7, Typology.

Often described as safe, a recent scholarly review reported that “glyphosate exposure and concentrations in urine” have been associated with intestinal diseases, and neurological and endocrine problems in humans.<sup>640</sup> A meta-analysis found “high cumulative exposure” to glyphosate-based herbicides was associated with increased risk of non-Hodgkin lymphoma.<sup>641</sup> In June 2023, a legal settlement in New York required the agribusiness company Bayer to stop advertising Roundup as safe and non-toxic.<sup>642</sup>

Many farmers also use fertilizers in ways that pollute the environment. The production of synthetic nitrogen fertilizers and their over-application to soils contribute to nitrous oxide emissions.<sup>643</sup> Farmers who apply nitrogen fertilizer also pollute the air with ammonia. A team of scientists recently estimated that air pollution from all stages of corn production—driven by ammonia pollution from fertilizer applications—is responsible for about 4,300 premature deaths a year.<sup>644</sup> Farmers also use animal manure as fertilizer. While manure production has lower emissions than synthetic fertilizer production, manure production still contributes to nitrous oxide pollution.<sup>645</sup> Farmers who apply more manure than their land can absorb pollute local waterways with nitrates and phosphorus.<sup>646</sup> A study by the Environmental Working Group (EWG) found that various Midwest water systems, serving a total of over 2.8 million people, registered dangerous levels of nitrate pollution at least once over a period of eight years. (Note that these nitrates come from both synthetic fertilizers and manure.) These nitrate levels appear to increase the risk of certain cancers, thyroid disease, and neural tube birth defects.<sup>647</sup> Another EWG study of data from three Midwest states found that communities

640. A. H. C. van Bruggen et al., *Indirect Effects of the Herbicide Glyphosate on Plant, Animal and Human Health Through its Effects on Microbial Communities*, 9 FRONTIERS ENV'T SCI. 1 (2021).

641. Luoping Zhang et al., *Exposure to Glyphosate-based Herbicides and Risk for Non-Hodgkin Lymphoma: A Meta-Analysis and Supporting Evidence*, 781 MUTATION RSCH.-REV. IN MUTATION RSCH. 186, 7 (2019).

642. Jonathan Stempel, *Bayer Reaches \$6.9 Million Settlement with New York over Roundup Safety Claims*, REUTERS (June 15, 2023, 12:42 PM), <https://www.reuters.com/legal/government/bayer-reaches-69-mln-settlement-with-new-york-over-roundup-safety-claims-2023-06-15/>.

643. Lehner & Rosenberg, *supra* note 44, at 84 (over-application of fertilizer), 220-221 (production of fertilizer).

644. Jason Hill, *Air-Quality-Related Health Damages of Maize*, 2 NATURE SUSTAINABILITY 397, abstract (2019).

645. LEHNER & ROSENBERG, *supra* note 44, at 41 (nitrous oxide emissions), 82 (reduce emissions compared with synthetic fertilizer production).

646. Porter, *supra* note 47; Sarah Porter & Adam Voskuil, *Double Trouble: Wisconsin's Land and Water are Inundated with Pollution from Animal Manure and Excess Farm Fertilizer*, ENV'T WORKING GROUP (Feb. 2, 2022), <https://www.ewg.org/research/double-trouble-wisconsins-land-and-water-are-inundated-pollution-animal-manure-and-excess>; LEHNER & ROSENBERG, *supra* note 44, at 85.

647. Sarah Grady, *EWG Water Atlas Links Water Pollution to Heavy Fertilizer use in Illinois, Iowa, Minnesota and Wisconsin*, ENV'T WORKING GROUP (Aug. 31, 2021), <https://www.ewg.org/news-insights/news-release/2021/08/ewg-water-atlas-links-water-pollution-heavy-fertilizer-use>.

whose drinking water has elevated nitrate levels are disproportionately likely to be low-income.<sup>648</sup> Nitrogen runoff can also induce algae to grow in such large masses that the algae deplete the water of oxygen and cause other aquatic animals in the nearby area to perish.<sup>649</sup> Midwest nitrogen runoff is a principal cause of an enormous, annually recurring “dead zone” in the Gulf of Mexico, responsible for up to \$2.4 billion in damages to fish stocks and habitats each year since 1980.<sup>650</sup>

Farmers also contribute to phosphorus pollution of waterways when they over-apply and do not prevent runoff of synthetic fertilizer and manure.<sup>651</sup> Algae growth induced by phosphorus runoff can be poisonous to humans who swim in or are otherwise exposed to the affected water.<sup>652</sup> Additionally, farmers in the Midwest have likely introduced PFAS “forever chemicals” into their cropland by fertilizing with sewage sludge.<sup>653</sup> Since 2011, Ohio

farmers have fertilized an estimated 5% of the state’s cropland with this substance.<sup>654</sup>

Many animal farmers also pollute their surroundings. Researchers recently connected a surge in ammonia emissions in the Midwest to the expansion of livestock CAFOs.<sup>655</sup> Ammonia is a gas that can damage the lungs of workers, may influence the early onset of asthma in children, and contributes to fine particulate matter in the air that can cause chronic illnesses and lung cancer.<sup>656</sup> Industrial hog farmers store waste from their animals in underground pits, then blow the fumes into surrounding communities, which pollutes the air.<sup>657</sup> When something disturbs the manure in these pits, hydrogen sulfide can escape.<sup>658</sup> This is a toxic gas that can cause unconsciousness or death.<sup>659</sup> The *Des Moines Register* reported that two different pairs of fathers and sons in the Midwest died from fumes emitted from manure pits in 2015.<sup>660</sup>

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648. Anne Schechinger, *In Midwest Farm States, Nitrate Pollution of Tap Water is More Likely in Lower-Income Communities*, ENV’T WORKING GROUP (June 23, 2021), <https://www.ewg.org/news-insights/news/midwest-farm-states-nitrate-pollution-tap-water-more-likely-lower-income>.

649. UNION OF CONCERNED SCIENTISTS, *Reviving the Dead Zone Solutions to Benefit Both Gulf Coast Fishers and Midwest Farmers*, 2 (June 2020), <https://www.ucsusa.org/sites/default/files/2020-06/reviving-the-dead-zone.pdf>.

650. *Nitrogen Washing Off Midwest Farms Cause Billions in Annual Damage to Gulf of Mexico Fisheries and Marine Habitat, New Study Finds*, UNION OF CONCERNED SCIENTISTS (June 1, 2020), <https://www.ucsusa.org/about/news/nitrogen-farms-cause-24-billion-gulf-dead-zone-damage>.

651. Porter, *supra* note 47.

652. Porter, *supra* note 47.

653. Jared Hayes, *EWG: ‘Forever Chemicals’ May Taint Nearly 20 Millions Cropland Acres*, ENV’T WORKING GROUP (APR. 14, 2022); Michael Hawthorne, *Sewage Sludge Contaminated with Toxic Forever Chemicals Spread on Thousands of Acres of Chicago-Area Farmland*, CHICAGO TRIB. (July 31, 2022), <https://www.chicagotribune.com/news/environment/ct-pfas-sludge-illinois-farmland-20220731-7xqjjchadfhilbvkut3ndw5uja-story.html>.

654. *Id.*

655. Grace van Deelen, *Midwest Livestock Operations Linked to Rise in Ammonia Pollution*, EOS (Dec. 14, 2021), <https://eos.org/articles/midwest-livestock-operations-linked-to-rise-in-ammonia-pollution>.

656. Katie E. Wyer et al., *Ammonia Emissions from Agriculture and their Contribution to Fine Particulate Matter: A Review of Implications for Human Health*, 323 J. ENV’T MANAGEMENT 1 (2022).

657. Christina Cooke, *Iowa Residents to Sue the State over Air Emissions from Industrial Hog Farms*, CIV. EATS (May 16, 2018), <https://civileats.com/2018/05/16/iowa-residents-to-sue-state-over-air-emissions-from-industrial-hog-farms/>.

658. Grant Rodgers & Donnelle Eller, *Iowa Father, Son Die from Manure Pit Fumes*, DES MOINES REG. (July 28, 2015), <https://www.desmoinesregister.com/story/money/agriculture/2015/07/28/iowa-father-son-die-manure-pit-fumes/30809037/>.

659. *Id.*

660. *Id.*

## ALTERNATIVE PRACTICES ON CONVENTIONAL FARMS

There are various, well-known practices conventional crop farmers can adopt to reduce the environmental damage they cause. A report from EWG found that if farmers in the Corn Belt (in our six states plus five others) widely used better tillage practices, cover crops, crop rotation, and planted filter strips of grasses and trees, they could reduce nitrous oxide emissions by an amount that would have the same climate benefit as taking almost one million gasoline-powered cars off the road.<sup>661</sup>

USDA does not offer detailed information on all of these practices. Even so, an agency study of ARMS survey data found that around two-thirds of corn acres and three-quarters of soy acres in the “Heartland” (which includes southern Minnesota, Iowa, Illinois, Indiana, and eastern Ohio) were under reduced- or no-till practices in the early to mid-2010s.<sup>662</sup> USDA’s census of agriculture does not provide statistics for corn and soy farms in particular but does provide statistics for “oilseed and grain” specialization farms. This category approximates corn and soy farms in the Midwest.<sup>663</sup> In this category, among acres that received such a classification, roughly 30% were no-till, 40% reduced till, and 30% conventional till in 2017.<sup>664</sup> Reduced

tilling can preserve topsoil and prevent fertilizer runoff.<sup>665</sup> Since tilling accelerates the breakdown of organic matter in soil and thereby releases carbon dioxide, reduced tillage can decrease emissions.<sup>666</sup> However, if a farmer performs even a single till of a no-till area, the benefits will be undone. Many commercial farmers who report they are no-till actually till occasionally, so the number of no-till farms is likely lower than reported.<sup>667</sup>

EWG also advocated that farmers use cover crops, crop rotation, and installation of filter strips of grasses and trees. Rather than harvest them for sale, farmers plant cover crops because they are easy to grow and have beneficial effects on soil. They can improve soil health, sequester carbon, prevent runoff, and suppress weeds.<sup>668</sup> On the other hand, farmers may choose not to plant cover crops so they can avoid taking on the costs and time required to cultivate them.<sup>669</sup> Oilseed and grain farmers, approximating corn and soy farmers, had very few acres in cover crops or left idle (and not in pasture) in the Midwest in 2017. Less than 3% of their acreage had cover crops or was left idle.<sup>670</sup> The next census of agriculture may

661. Jared Hayes, *Corn Belt Farmers Could Dramatically Reduce Nitrous Oxide Emissions with a Handful of Conservation Practices*, ENV’T WORKING GROUP (July 26, 2023), <https://www.ewg.org/news-insights/news/2023/07/corn-belt-farmers-could-dramatically-reduce-nitrous-oxide-emissions>.

662. ROGER CLAASSEN ET AL., ECON. RSCH. SERV., USDA, TILLAGE INTENSITY AND CONSERVATION CROPPING IN THE UNITED STATES 7 fig. 2 (Dale Simms & Cynthia Ray eds., 2018).

663. Almost all sales in this category come from corn or soy, and almost all sales of corn and soy come from farms in this specialization. In the Midwest, 95.6% of sales in the category come from corn and soy; furthermore, 87.9% of all corn sales and 91.5% of all soy sales come from this category. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

664. Calculated by the authors using *id.*

665. David R. Huggins & John P. Reganold, *No-Till: How Farmers are Saving the Soil by Parking their Plows*, Sci. Am. (July 1, 2008), <https://www.scientificamerican.com/article/no-till/>.

666. LEHNER & ROSENBERG, *supra* note 44, at 77.

667. *Id.* at 78-80.

668. STEVEN WALLANDER ET AL., ECON. RSCH. SERV., USDA, COVER CROP TRENDS, PROGRAMS, AND PRACTICES IN THE UNITED STATES iii (Melanie Scarborough ed., 2021).

669. *Id.* at 5.

670. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.

show a slight increase in this figure.<sup>671</sup> Farmers rotate crops, that is, plant different crops one after another in the same location, to improve soil health and prevent the reproduction of pests that prey on the crop that was rotated out.<sup>672</sup> USDA data—over a decade old—show that the vast majority of Corn Belt farmers who rotated crops, rotated almost exclusively between corn and soy.<sup>673</sup> In Illinois, among acres planted in corn in 2010, approximately 33% had been planted in corn and 64% in soy the previous season.<sup>674</sup> A corn and soy rotation can improve yields because, among other reasons, soy replenishes nitrogen and corn crop residues that decompose on fields restore nutrients to the soil.<sup>675</sup> Even so, USDA has determined that this rotation does not provide sufficient crop residues to count as a “conservation rotation.”<sup>676</sup> Furthermore, some studies have found that a corn and soy rotation leaves less organic matter in the soil than continuous corn production or a rotation with an additional crop or crops.<sup>677</sup>

USDA pays farmers to take or keep land out of production and use it for some environmentally beneficial purpose, like as a buffer.<sup>678</sup> A riparian buffer is a strip of trees, grass, and other vegetation along river borders meant to mitigate runoff.<sup>679</sup> The Conservation Reserve Program (CRP) pays farmers to take land out of production for 10-15 years, so they can cultivate plants, like trees and grasses, to improve the ecosystem.<sup>680</sup> This can include trees to prevent erosion and river buffers to mitigate runoff. Corn and soy farms in the Midwest had about 1.4 million acres—equal to about 2% of total cropland—in a conservation or wetlands preservation program in 2017.<sup>681</sup> About two-thirds of CRP acreage in the Midwest is in farms with low sales.<sup>682</sup> Many farmers who enroll in the CRP put their land in production after the contract ends, which likely undoes carbon sequestration from the CRP period.<sup>683</sup>

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671. Jennifer Marston, *Brief: Cover Crop Usage Steady but Still ‘Only a Fraction’ of Total Acreage in the US, says Purdue’s Latest Farmer Survey*, AGFUNDERNEWS (Aug. 2, 2023), <https://agfundernews.com/cover-crop-usage-steady-but-still-only-a-fraction-of-total-acreage-in-the-us-says-purdues-farmer-survey>. Michael Langemeier, co-author of a study on a recent national farmer survey, states that cover crop acreage will “likely be at least few percentage points higher” in 2022. If this trend holds in the Midwest, then it, too, will show a slight increase.
672. ECON. RSCH. SERV., USDA, *Soil Tillage and Crop Rotation*, <https://www.ers.usda.gov/topics/farm-practices-management/crop-live-stock-practices/soil-tillage-and-crop-rotation/> (last updated Apr. 28, 2020).
673. ECON. RSCH. SERV., USDA, ARMS DATA TOOL FOR PESTICIDE Use, [https://data.ers.usda.gov/reports.aspx?ID=17883#P78cf138cd0941a6957e8180180d66fc\\_7\\_65iT0R0T0R0x2](https://data.ers.usda.gov/reports.aspx?ID=17883#P78cf138cd0941a6957e8180180d66fc_7_65iT0R0T0R0x2) (last visited Nov. 6, 2023).
674. *Id.*
675. SOUTH DAKOTA STATE EXTENSION, *Crop Rotations Can Increase Corn Profitability and Reduce Pests*, iGrow Corn, Ch. 9 3, <https://extension.sdstate.edu/sites/default/files/2019-09/S-0003-09-Corn.pdf> (corn residues can build soil organic matter, soybeans replenish nitrogen); Joe Lauer et al., U. Wis., *Corn and Soybean Rotation Effect* (Apr. 1997), <http://corn.agronomy.wisc.edu/AA/A014.aspx> (a corn and soy rotation improves yields).
676. WALLANDER, *supra* note 668, at 23.
677. *Corn and Soybean Rotation Could Pose Long-Term Tradeoffs for Soil Health*, IOWA ST. U. (Oct. 2, 2019), <https://www.news.iastate.edu/news/2019/10/02/croprotation#:~:text=However%2C%20studies%20have%20noted%20corn,along%20with%20corn%20and%20soybeans>.
678. FARM SERV. AGENCY, USDA, *Conservation Reserve Program – Continuous Enrollment Period, 1-2* (May 2022), <https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdfiles/FactSheets/crp-continuous-enrollment-period-factsheet.pdf>.
679. NAT. RES. CON. CORP., USDA, *Riparian Buffer Program, 1-2* (2023), <https://www.nrcs.usda.gov/sites/default/files/2023-01/FY23-NRCSW-Riparian-Buffer-Program.pdf>.
680. FARM SERV. AGENCY, USDA, *Conservation Reserve Program*, <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index> (last visited Nov. 5, 2023).
681. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 75.
682. *Id.* at TYPOLOGY.
683. LEHNER & ROSENBERG, *supra* note 44, at 145-146.



## ORGANIC PRODUCTION

Secretary of Agriculture Tom Vilsack once suggested that small-scale producers should focus on organic markets.<sup>684</sup> Many studies have found organic farms are more profitable per acre than conventional farms, including corn and soy farms.<sup>685</sup> The Midwest's organic sales are growing—about 220% since 2011—and there is much more income organic producers could capture.<sup>686</sup> One analyst argues organic production is not limited because of demand but because of supply.<sup>687</sup> For example, the U.S. imported 50% of all organic corn and 80% of organic soy in 2016, suggesting there is a demand domestic producers could meet.<sup>688</sup> While the pitch for small producers is exciting, the reality is that large producers dominate domestic organic production. Large organic producers are more likely to use capital-intensive methods than smaller producers, which suggests they will likely achieve higher profit rates and expand at the expense of their competitors, similar to most other industries in the Midwest.<sup>689</sup>

USDA's organic standards are meant to force farmers to use “natural” approaches to managing their

crops and animals. USDA bars organic crop farms from using synthetic fertilizers or pesticides (with some exceptions); it requires them to manage soil health through crop rotation, tillage practices, and similar strategies; and prohibits the use of GE seeds or sewage sludge.<sup>690</sup> Organic animal producers must give their livestock and poultry year-round outdoor access, and they must give their livestock organic feed.<sup>691</sup> Researchers have consistently found that organic farm practices increase soil fertility, while reducing energy use and pollution.<sup>692</sup>

Organic production is a small part of Midwest agriculture. Certified and exempt organic producers made \$680 million in sales, against \$96.2 billion in total agricultural sales, or less than 1% of the total, in 2017.<sup>693</sup> In 2016, Midwest farmers operated 508,000 acres of certified organic cropland, against 106,000,000 total acres in 2017, for a share of about 0.5%.<sup>694</sup> Production in the region is growing. In 2017, about 1,100 farms were transitioning to organic, a small number relative to all farms, but large relative to the total number of organic certified farms (about 4,500).<sup>695</sup> By 2021, the number

684. Rosenberg & Stucki, *supra* note 19.

685. Michael Langemeier & Michael O'Donnel, *Conventional and Organic Enterprise Net Returns*, 10 *FARMDOC DAILY* 1 (2020).

686. *Compare* NAT'L AGRIC. STAT. SERV., USDA, 2011 CERTIFIED ORGANIC SURVEY 7-15 tbl. 1 (2012) (total sales), *with* NAT'L AGRIC. STAT. SERV., USDA, 2022 CERTIFIED ORGANIC SURVEY 2021 SUMMARY 1-8 tbl. 1 (2022).

687. Joe Fassler, *While Demand Soars, Less than 1 Percent of U.S. Farmland is Certified Organic. So Why Don't Farmers Switch*, *THE COUNTER* (Feb. 28, 2017), <https://thecounter.org/kashi-certified-transitional-organic/>.

688. *Id.*

689. See Caitlin Hayes, *Sustainable Practices Linked to Farm Size in Organic Farming*, *CORNELL CHRONICLE* (July 21, 2022), <https://news.cornell.edu/stories/2022/07/sustainable-practices-linked-farm-size-organic-farming>.

690. AGRIC. MKTG. SERV., USDA, *About the Organic Standards*, <https://www.ams.usda.gov/grades-standards/organic-standards#Crop> (last visited Nov. 5, 2023); LEHNER & ROSENBERG, *supra* note 44, at 73.

691. AGRIC. MKTG. SERV., USDA, *supra* note 690.

692. LEHNER & ROSENBERG, *supra* note 44, at 74.

693. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, State Level Data tbl. 1, 41 Illinois, Indiana, Iowa, Minnesota, Ohio, Wisconsin. An exempt organic farm has sales below \$5,000. USDA, *What Farms and Businesses are Exempt from Organic Certification* 1 (n.d.), <https://www.ams.usda.gov/sites/default/files/media/2%20Exempt%20Producers%20FINAL%20RGK%20V2.pdf>.

694. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 1; NAT'L AGRIC. STAT. SERV., USDA, 2016 CERTIFIED ORGANIC SURVEY, at tbl. 1 (2017).

695. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL Data tbl. 51.

of organic farms had increased by 26.7% and total sales by 60%.<sup>696</sup>

The Midwest states vary in their organic production. Wisconsin had the most organic sales of any Midwestern state at around \$256 million. The most important product, across states, was milk, responsible for about a third of all organic sales, about half of which were captured by Wisconsin. Wisconsin also had about twice as much in organic sales as the next closest Midwest state. About 12% of Midwest organic receipts came from eggs—with Iowa and Ohio as the biggest producers—then corn for grain at 11%, soy at 6%, and vegetables grown in the open at 6%. Midwest farms also produced significant amounts of various other products, such as broilers in Iowa, “other poultry”—possibly turkey or ducks (see the “Minor Industries” section)—in Indiana, and assorted vegetables, like onions, squash, sweet potatoes, and cabbage

in Wisconsin.<sup>697</sup> In 2021, Wisconsin was still the leader in organic production, and it still derived a plurality of its sales from dairy.<sup>698</sup>

Organic production tends to be very concentrated. No more than 592 out of 4,496 organic farms were responsible for 75% of sales in the region in 2017.<sup>699</sup> As of the last agricultural census, organic farms averaged from \$131,000 in sales in Indiana to \$202,000 in Illinois.<sup>700</sup> Organic farms with over \$1 million in sales and government payments, combined, captured about 32% of total sales, and farms with at least \$250,000 in sales and government payments captured about 75% of the total. Larger farms appear more likely to use conventional methods, like applying synthetic pesticides, and less likely to use as many sustainable practices as smaller farms.<sup>701</sup> That is, many large organic farms appear to operate in a similar manner as conventional farms.

## OTHER SUSTAINABLE PRACTICES AND SYSTEMS

Farmers can practice other styles of sustainable agriculture besides organic. Since this report focuses on data available from USDA, we do not discuss all sustainable practices or approaches. Furthermore, USDA has limited data on the alternative practices it does measure.

The 2017 census asked farmers if they practiced various forms of farming with trees, including alley cropping, silvopasture, forest farming, or using trees as riparian or wind buffers.<sup>702</sup> Farmers who alley crop plant rows of crops between trees. These systems can improve yields and they allow farmers to diversify their operations.<sup>703</sup> Farmers

696. Calculated by the authors from NAT'L AGRIC. STAT. SERV., USDA, CERTIFIED ORGANIC SURVEY 2021 SUMMARY 1-8 tbl. 1 (2022).

697. Calculated by the authors from NAT'L AGRIC. STAT. SERV., USDA, CERTIFIED ORGANIC SURVEY 2016 SUMMARY, tbls. 2, 3, 17. (2017).

698. *Id.*

699. This calculation comes from summing to find the minimum number of farms responsible for 75% of sales in each state under study. This means the number of farms responsible for 75% of sales across states is no more than 592. However, this calculation overstates the number because if the data were available, we could analyze farms across all states at once, which would result in a smaller number of farms responsible for 75% of all sales. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 41.

700. Calculated by the authors from 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 41.

701. Hayes, *supra* note 689.

702. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at APPENDIX B 45.

703. FOREST SERV., USDA, *Alley Cropping*, <https://www.fs.usda.gov/nac/practices/alley-cropping.php> (last visited Nov. 5, 2023).

who practice silvopasture raise animals on land that has trees, which sequester carbon. The animals can eat any food that falls from the trees (like nuts or fruit), can shelter in the trees' shade on hot days, and the farmer can sell tree products or the trees themselves at harvest time.<sup>704</sup> Silvopasture practices reduce average annual net emissions by over three times as much as prescribed grazing (a set of practices that includes rotational grazing, a practice discussed below).<sup>705</sup> Forest farmers deliberately grow trees and plants together in forest conditions, and harvest "woodland crops" such as mushrooms or goldenseal.<sup>706</sup> Forest windbreaks can improve air quality and forest buffers can prevent runoff.<sup>707</sup>

Agroforestry systems have a profound potential to sequester carbon and thereby reduce net greenhouse gas emissions from agriculture. If farmers implemented these systems nationwide, they could sequester an amount of carbon equivalent to one-third of all fossil fuel emissions in the U.S. each year.<sup>708</sup> Trees store carbon in their roots and thereby remove it from the atmosphere.<sup>709</sup> Agroforestry systems also help farms make

significant reductions in surface runoff, soil erosion, and nutrient and herbicide losses.<sup>710</sup>

About 5,300 Midwest farmers in the 2017 census said they used an agroforestry practice, with about 1,000 each in Ohio, Wisconsin, and Minnesota. These states ranked 8th, 9th, and 13th in the country, although the top 15 or so states all had about the same number of farms. At the national level, most farmers who implement agroforestry practices use windbreaks or buffers alongside conventionally managed cropland.<sup>711</sup>

Farmers who raise cattle can implement a rotational grazing system, a practice that has the potential to increase carbon sequestration.<sup>712</sup> A rancher who practices rotational grazing rotates their cattle through a series of paddocks, letting the cattle eat the forage in one paddock, while plants in the previous paddock regrow.<sup>713</sup> This practice can reduce feed costs, improve soil quality, decrease erosion, and improve wildlife habitats.<sup>714</sup> A USDA study found that an area called the Northern Plains and Western Corn Belt, which includes Iowa along with several states not in our study, had the highest rate of rotational grazing of any of the areas the researchers examined.<sup>715</sup> The 2017 census asked

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704. FOREST SERV., USDA, *Silvopasture*, <https://www.fs.usda.gov/nac/practices/silvopasture.php#:~:text=Silvopasture%20is%20the%20deliberate%20integration,and%20long%2Dterm%20income%20sources>. (last visited Nov. 5, 2023).

705. LEHNER & ROSENBERG, *supra* note 44, at 65.

706. FOREST SERV., USDA, *Forest Farming*, <https://www.fs.usda.gov/nac/practices/forest-farming.php> (last visited Nov. 5, 2023).

707. LEHNER & ROSENBERG, *supra* note 44, at 69.

708. *Id.* at 68.

709. *Id.* at 58.

710. *Id.* at 68.

711. *Id.*

712. *Id.* at 92.

713. Christine Whitt & Steven Wallander, ECON. RSCH. SERV., USDA, *Study Examines How and Where U.S. Cow-Calf Operations Use Rotational Grazing* (Nov. 21, 2022), <https://www.ers.usda.gov/amber-waves/2022/november/study-examines-how-and-where-u-s-cow-calf-operations-use-rotational-grazing/>.

714. U. MISS., *Grazing and Pasture Management for Cattle*, <https://extension.umn.edu/pasture-based-dairy/grazing-and-pasture-management-cattle#:~:text=The%20different%20grazing%20systems%20include,for%20when%20things%20go%20wrong> (last visited Nov. 5, 2023); LEHNER & ROSENBERG, *supra* note 44, at 92.

715. Whitt & Wallander, *supra* note 713.

respondents if they practiced rotational grazing or other management-intensive styles of grazing.<sup>716</sup> About 8,300 farmers in Ohio and 6,800 farmers in Wisconsin answered in the affirmative, both states in the top ten in the country.<sup>717</sup> Across the Midwest, 36,375 farmers said they practiced rotational grazing.<sup>718</sup> This compares with 57,741 farmers with a cattle ranching specialization in the region.<sup>719</sup>

The Midwest is home to a number of organizations that promote alternative sustainable practices. The Savanna Institute researches, promotes, and runs demonstration farms that incorporate agroforestry practices. The Savanna Institute had 43 farmers enroll in their technical service programs and helped start the transition of 2,288 acres into agroforestry practices in 2022.<sup>720</sup> The Savanna Institute spun off a company, Canopy Farm Management, to help farmers incorporate agroforestry practices on their operations. Canopy planted over 57,000 trees in its first year.<sup>721</sup> The Land Institute researches, develops, and promotes perennial grains in an effort to make them more attractive

to farmers and consumers.<sup>722</sup> Perennial plants sequester substantially more carbon than annuals, and tend to require fewer nutrients, and therefore less fertilizer.<sup>723</sup> Various nonprofits, university-affiliated programs, and companies support other alternative systems, like regenerative agriculture. These include the Delta Institute, the University of Illinois Urbana-Champaign's I-Regen program, and the Midwest Row Crop Collaborative.<sup>724</sup> Iowa State University's STRIPS program has developed a system that integrates strips of land planted with native perennial grasses and flowers with row crop production.<sup>725</sup> Scientists estimate this system sequesters approximately one metric ton of carbon-dioxide per acre, about three times the emissions reduction benefit of no-till farming.<sup>726</sup> The STRIPS program states that they have helped establish over 15,000 acres of prairie strips.<sup>727</sup>

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716. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at APPENDIX B 45.

717. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at COUNTY LEVEL DATA tbl. 43.

718. *Id.*

719. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at STATE LEVEL DATA tbl. 75.

720. SAVANNA INST., PERENNIAL REPORT 17 (2023).

721. *Id.* at 26.

722. LAND INST., PERENNIAL IMPACT 1 (2022).

723. LEHNER & ROSENBERG, *supra* note 44, at 58, 69; Emma I. Scott et al., *Policy Pathways for Perennial Agriculture*, 6 FRONTIERS SUSTAINABLE FOOD SYS. (Dec. 2022); Constance Schmotzer, *Care and Maintenance of Perennials*, PENN ST. (Mar. 14, 2023), <https://extension.psu.edu/care-and-maintenance-of-perennials#:~:text=Most%20perennials%20do%20not%20need,a%20soil%20test%20indicates%20otherwise>.

724. DELTA INST., *What We Do*, <https://delta-institute.org/resilient-agriculture/> (last visited Nov. 5, 2023); INST. FOR SUSTAINABILITY, ENERGY, AND ENV'T, U. ILL. URBANA-CHAMPAIGN, *I-Regen*, <https://sustainability.illinois.edu/research/illinois-regenerative-agriculture-initiative/> (last visited Nov. 5, 2023); MIDWEST ROW CROP COLLABORATIVE, *Featured Projects*, <https://midwestrowcrop.org/our-work/projects/> (last visited Nov. 5, 2023).

725. IOWA ST. U., *What are Prairie Strips*, <https://www.nrem.iastate.edu/research/STRIPS/content/what-are-prairie-strips> (last visited Nov. 5, 2023). See IOWA ST. U., *FAQ: What Kind of Plants are Actually in the Prairie Strips*, <https://www.nrem.iastate.edu/research/STRIPS/content/faq-what-kind-plants-are-actually-prairie-strips> (last visited Nov. 5, 2023), for mention of native, perennial grasses and flowers.

726. LEHNER & ROSENBERG, *supra* note 44, at 71.

727. IOWA ST. U., *Prairie Strips in the Conservation Reserve Program*, <https://www.nrem.iastate.edu/research/STRIPS/> (last visited Nov. 5, 2023).







# CONCLUSION

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This report has demonstrated that Midwest agriculture is dominated by large-scale, conventional production. The region's farmers have practiced a "Corn Belt" system of fattening cattle and hogs on corn since the 1800s. Dairy farmers in Minnesota and Wisconsin have been leaders in dairy products since the latter part of the 1800s. The 1900s saw a dramatic increase in specialization and concentration in corn, soy, and animal production. Almost all Midwest production is now in corn and soy, hogs, dairy, and cattle, on conventional farms.

The region's farms use massive amounts of capital. The average Midwest farm with at least moderate sales owned over \$500,000 in machines and equipment and another \$5 million in land and buildings in 2021. Larger operations also tend to have higher rates of profit, putting them in a strong position to expand at the expense of their smaller competitors. Large farms also dominate organic markets and capture most direct sales. Small producers, therefore, have few good options.

White men have dominated the region's farm system ever since they carried out wars against and mass dispossessions of the Native American inhabitants. BIPOC farmers face the compounding barriers of historic dispossession and prejudice, lack of wealth, and continued discrimination in the

provision of farm services. Native Americans who own land on reservations face myriad legal barriers that make it difficult for them to farm. African American families, who have likely farmed in the region since the 1700s, still report discrimination. Among immigrants to the Upper Midwest, despite decades of experience as producers for farmers markets, struggle to purchase land. Although Hispanic farmworkers contribute a large share of hours on Midwest operations, they own and operate very few farms. The experiences of BIPOC farmers in the Midwest clarify the critical role that political and civil rights, wealth, access to credit, and land ownership play in the farm economy.

The intensive, industrial character of Midwest agriculture also causes significant environmental damage. Crop and animal farms have polluted local waterways, wildlife habitats, and the air their neighbors breathe. Midwest farmers also emit significant amounts of greenhouse gases. There is little Midwest acreage in climate-friendly practices, like organic or agroforestry production.

Those who want to remake this system face a difficult challenge. This report documents the region's problems. Now reformers must find ways to solve them.

## APPENDIX TABLES

**Table 26. Farm size distributions for producers by race and Hispanic status in the Midwest, 2017**

Farm size	Native American	Asian	Black	Native Hawaiian and Pacific Islander	Multi-race	Hispanic	White
Low sales	0.1%	0.3%	0.1%	0.0%	0.3%	0.7%	99.1%
Moderate	0.0%	0.1%	0.0%	0.0%	0.1%	0.5%	99.7%
Midsized	0.0%	0.1%	0.0%	0.0%	0.1%	0.6%	99.8%
Large	0.0%	0.1%	0.0%	0.0%	0.1%	0.6%	99.7%
Very large	0.0%	0.2%	0.0%	0.0%	0.2%	0.8%	99.6%
Nonfamily	0.2%	0.2%	0.1%	0.0%	0.2%	0.6%	99.3%
Total	0.1%	0.2%	0.1%	0.0%	0.3%	0.7%	99.3%

*Note: Denominators in percentages are producers with a reported race. Row totals may not sum to 100 due to rounding and because producers can report both a race and whether they are Hispanic.*

Source: Calculated by the authors from 2017 Census of Agriculture, *supra* note 7, Typology.

**Table 27. Acres operated by beginning principal producers in the Midwest, 2017**

Acres operated	Count	Share of total	Cumulative share
1 to 9	18,073	19.5%	19.5%
10 to 49	31,206	33.7%	53.3%
50 to 179	25,221	27.3%	80.5%
180 to 499	11,241	12.2%	92.7%
500 or more	6,754	7.3%	100.0%

Source: Calculated by the authors from 2017 Census of Agriculture, *supra* note 7, at State Level Data tbl 69.

**Table 28. Economic class of beginning principal producer operations in the Midwest, 2017**

Economic class	Count	Share of total	Cumulative share
Less than \$1,000	16,153	17.5%	17.5%
\$1,000 to \$2,499	11,636	12.6%	30.1%
\$2,500 to \$4,999	10,926	11.8%	41.9%
\$5,000 to \$9,999	11,145	12.0%	53.9%
\$10,000 to \$24,999	11,467	12.4%	66.3%
\$25,000 to \$49,999	7,586	8.2%	74.5%
\$50,000 or more	23,582	25.5%	100.0%

*Note: "Economic class" includes farm income and government payments.*

Source: Calculated by the authors using 2017 Census of Agriculture, *supra* note 7, at state level data tbl 69.

**Table 29. Economic class distributions for BIPOC and white producers in the Midwest, 2017**

<b>Economic class</b>	<b>Native American</b>	<b>Asian</b>	<b>African American</b>	<b>Native Hawaiian or Other Pacific Islander</b>	<b>Multi-race</b>	<b>Hispanic</b>	<b>White</b>
Less than \$1,000	17.9%	17.1%	24.6%	28.1%	18.5%	16.5%	12.9%
\$1,000 to \$2,499	12.4%	11.5%	14.1%	16.4%	11.7%	10.7%	9.3%
\$2,500 to \$4,999	11.6%	14.6%	9.2%	14.1%	14.3%	10.0%	9.4%
\$5,000 to \$9,999	16.9%	15.0%	14.6%	8.6%	12.5%	13.6%	9.9%
\$10,000 to \$24,999	14.4%	16.7%	15.1%	10.9%	12.3%	10.1%	11.3%
\$25,000 to \$49,999	8.1%	8.3%	8.5%	8.6%	7.8%	7.1%	7.8%
\$50,000 to \$99,999	5.3%	4.3%	5.0%	3.9%	8.1%	6.8%	8.3%
\$100,000 to \$249,999	5.2%	6.4%	4.9%	7.0%	5.8%	8.6%	10.4%
\$250,000 to \$499,999	3.4%	2.3%	1.1%	0.8%	3.4%	5.9%	7.7%
\$500,000 to \$999,999	2.9%	1.5%	0.4%	0.0%	3.1%	5.1%	6.5%
\$1,000,000 or more	1.9%	2.3%	2.6%	1.6%	2.6%	5.7%	6.4%

Note: Column totals may not sum to 100% due to rounding. The reported race categories are for the race alone, not in combination with other races, except for white, which is white alone.

Source: Calculated by the authors using 2017 Census of Agriculture, supra note 7, at State Level Data tbl 61.

**Table 30. Acres operated in farms of BIPOC and white principal producers in the Midwest, 2017**

<b>Acres</b>	<b>Native American</b>	<b>Asian</b>	<b>African American</b>	<b>Native Hawaiian or Other Pacific Islander</b>	<b>Multi-race</b>	<b>Hispanic</b>	<b>White</b>
1 to 9	14.5%	41.4%	30.8%	18.6%	16.4%	16.9%	10.7%
10 to 49	35.8%	31.1%	30.1%	45.7%	33.1%	32.8%	26.4%
50 to 179	28.6%	16.3%	24.6%	17.9%	28.1%	23.3%	28.1%
180 to 499	13.1%	5.9%	9.2%	14.3%	14.6%	13.7%	18.7%
500 or more	8.0%	5.3%	5.3%	3.6%	7.9%	13.2%	16.1%

Note: The reported race categories are for the race alone or in combination with other races, except for white, which is white alone.

Source: Calculated by the authors using 2017 Census of Agriculture, supra note 7, at state level data tbl 62.

**Table 31. Specializations of farms by race and Hispanic status for principal producers in the Midwest, 2017**

<b>Farm specialization</b>	<b>Native American</b>	<b>Asian</b>	<b>African American</b>	<b>Hispanic</b>	<b>Multi-race</b>	<b>Native Hawaiian or Other Pacific Islander</b>	<b>White</b>
Oilseed and grain	21.7%	14.4%	24.4%	31.5%	24.8%	29.3%	40.2%
Vegetable and melon	4.8%	38.7%	9.4%	2.9%	5.1%	4.3%	1.4%
Fruit and tree nut	4.0%	5.4%	4.9%	2.6%	3.5%	4.3%	1.3%
Greenhouse, nursery, floriculture	3.0%	6.3%	3.9%	2.6%	3.5%	5.0%	1.5%
Sugarcane, hay, other	27.5%	16.5%	21.6%	22.1%	24.7%	27.1%	23.2%
Beef cattle ranching	17.4%	7.4%	14.4%	13.6%	16.1%	15.0%	13.5%
Cattle feedlots	0.2%	0.5%	0.1%	0.8%	0.3%	0.0%	1.4%
Dairy cattle	2.6%	0.7%	1.4%	3.6%	2.0%	1.4%	3.7%
Hogs	1.1%	0.6%	1.6%	2.0%	1.5%	0.0%	2.2%
Poultry and eggs	1.9%	1.1%	3.1%	3.0%	2.9%	0.7%	1.4%
Sheep and goats	4.8%	2.9%	4.9%	4.0%	5.7%	0.7%	2.7%
Aquaculture and other animal products	11.0%	5.5%	10.3%	11.4%	10.0%	12.1%	7.3%

*Note: Denominator is total number of operations with a principal producer with the reported race. The reported race categories are for the race alone or in combination with other races, except for white, which is white alone.*

Source: Calculated by the authors using 2017 Census of Agriculture, supra note 7, at state level data tbl 62.



**Table 32. Number and percentage distribution of operations and acres operated by tenure and operator’s reported race or Hispanic status, for principal producers, in the Midwest, 2017**

Reported race (alone or with other races)	Full owner		Part owner		Tenant	
	Operations (row share of operations)	Acres (row share of acres)	Operations (row share of operations)	Acres (row share of acres)	Operations (row share of operations)	Acres (row share of acres)
American Indian or Alaska Native	1,253 (78.7%)	115,956 (43.8%)	289 (18.1%)	139,841 (52.8%)	51 (3.2%)	9,154 (3.5%)
Asian	624 (58.1%)	51,493 (59.0%)	129 (12.0%)	29,856 (34.2%)	321 (29.9%)	5,857 (6.7%)
Black	523 (71.0%)	41,180 (41.0%)	132 (17.9%)	52,749 (52.5%)	82 (11.1%)	6,469 (6.4%)
Multi-race	997 (76.5%)	70,575 (35.7%)	261 (20.0%)	112,120 (56.8%)	46 (3.5%)	14,763 (7.5%)
Native Hawaiian or Other Pacific Islander	104 (74.3%)	4,937 (51.9%)	22 (15.7%)	3,992 (41.9%)	14 (10.0%)	590 (6.2%)
Hispanic, Latino, Spanish	2,247 (68.1%)	182,576 (21.1%)	817 (24.8%)	610,732 (70.7%)	235 (7.1%)	69,955 (8.1%)
White	269,773 (63.5%)	29,615,349 (23.5%)	126,371 (29.8%)	86,363,095 (68.5%)	28,369 (6.7%)	10,046,864 (8.0%)

*Note: Row totals for operations and acres, respectively, may not sum to 100% due to rounding. When the operator is a hired manager, the reported tenure is for the farm owner, not the operator. The reported race categories are for the race alone or in combination with other races, except for white, which is white alone. Denominator for percentages is number of operations with a principal producer with the reported race or Hispanic status.*

Source: Calculated by the authors from 2017 Census of Agriculture, supra note 7, at state level data tbl 62.

**Table 33. Number and percentage distribution by reported race and Hispanic status and selected demographic characteristics for principal producers in the Midwest, 2017**

<b>Principal producers</b>	<b>Native American</b> (share of all Native Americans)	<b>Asian</b> (share of all Asians)	<b>African American</b> (share of all African Americans)	<b>Native Hawaiian or Pacific Islanders</b> (share of all Native Hawaiians or Pacific Islanders)	<b>Multi-race</b> (share of all producers who reported multiple races)	<b>Hispanic</b> (share of all Hispanics)	<b>White</b> (share of all whites)
Hispanic principal producers	82 (4.9%)	28 (2.3%)	96 (11.2%)	18 (11.9%)	69 (5.0%)	3,598 (100.0%)	3,396 (0.6%)
Young	132 (7.8%)	131 (10.6%)	115 (13.4%)	14 (9.3%)	136 (9.8%)	443 (12.3%)	49,217 (8.8%)
Beginning	437 (25.9%)	576 (46.4%)	327 (38.1%)	57 (37.7%)	377 (27.3%)	1,106 (30.7%)	116,258 (20.7%)
Total	1,686 (100.0%)	1,241 (100.0%)	859 (100.0%)	151 (100.0%)	1,383 (100.0%)	3,598 (100.0%)	560,661 (100.0%)

*Note: Some farmers reported they are Hispanic and multi-racial, so the reported race and Hispanic shares sum to over 100%. The reported race categories are for the race alone or in combination with other races, except for white, which is white alone.*

Source: Calculated by the authors using 2017 Census of Agriculture, supra note 7, at State Level Data tbl 64.

## GLOSSARY AND ACRONYMS

**Agricultural Resource Management Survey (ARMS):** Annual USDA survey that provides information on production practices, resource use, and economic outcomes for farms and ranches.

**Bt:** An insecticidal bacteria. Many farmers use genetically engineered corn that produces Bt.

**Concentrated animal feeding operation (CAFO):** Facilities that hold large numbers of animals in close quarters. Note that the EPA has a technical definition of “CAFO” that depends on animal type and other factors.

**Cattle on feed:** Cattle being fed a ration of grain, silage, hay and/or protein supplements for the slaughter market that are expected to produce a carcass that will grade “select” or better.

**Census of agriculture (COA):** USDA data counting farms and ranches and their operators, along with their characteristics. USDA defines a farm as any place that produced and sold—or could have produced and sold—at least \$1,000 of agricultural products during a given year. Conducted every five years.

**Direct sales:** Farm products sold directly to consumers, retailers, institutions, and a variety of local food intermediaries such as distributors and wholesalers that market and sell locally branded products.<sup>728</sup>

**Economic class:** Refers to the sum of the market value of agricultural products sold and federal farm program payments.<sup>729</sup> USDA provides some statistics by economic class categories.

**Farm:** USDA’s definition of a farm is any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold that year.<sup>730</sup>

**Farm business:** USDA’s definition is a farm with at least \$350,000 in gross cash farm income or where the principal operator’s primary occupation is farming.

**Farm size:** We tend to measure “farm size,” by which we mean the economic production of a farm, in sales or income, rather than acres. This is because total sales is a more consistent measure of farm production than acreage since animal farms can produce high amounts of product on limited acreage. Even among crop farms, variations in yields, or variations in prices across different kinds of crops, can make sales a better measure of production than acreage. We also use other measures, such as physical production (measured in bushels, pounds of meat, etc.) or acres, depending on the context.

**Farm specialization:** USDA provides two main systems for classifying farms based on specialization: North American Industry Classification System (NAICS) classification and production specialty. The Census of Agriculture assigns NAICS categories to farms based on their primary type of production.<sup>731</sup> This report references NAICS categories such as oilseed and grain farms, hog and pig farms, and dairy cattle and milk farms. The ARMS data analysis tool includes a classification by “production specialty.” Farms are assigned a production specialty based on the product responsible for the majority of the value of their production. Production specialties referenced in this report include corn, soybean, hogs, and dairy. Note that this report sometimes refers to farms with a corn production specialty as “corn farms” or farms with a soybean production specialty as “soy farms.” These designations are somewhat arbitrary because Midwest farms tend to rotate between corn and soy, so a “corn farm” could become a “soy farm” the next year. Furthermore, the same farm could produce corn and soy in the same year. The reader should keep this in mind and not take the designation of “corn farm” or “soy farm” to mean these farms only and always produce corn or soy.

**Forage:** Crops grown to be grazed by livestock.

**Genetically engineered (GE) seeds:** Seeds that have been modified with genetic engineering methods to produce certain traits, commonly resistance to insecticides and herbicides.

**Finishing:** The phase of animal production where the animals are brought to market weight.

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728. NAT’L AGRIC. STAT. SERV., USDA, DIRECT FARM SALES OF FOOD (2016).

729. 2017 CENSUS OF AGRICULTURE, *supra* note 7, at APPENDIX B 7.

730. See 2017 CENSUS OF AGRIC., *supra* note 7, at VII INTRODUCTION, FARM DEFINITION.

731. For a discussion of NAICS classification in the COA, see 2017 CENSUS OF AGRICULTURE, *supra* note 7, at APPENDIX B 8.

**Gross cash farm income (GCFI):** Annual income before expenses. Includes cash receipts, farm-related income (e.g., tourism), and government farm program payments. If we consider sales, production contract receipts, federal payment receipts, and farm-related income, then 92% of the total came from sales in the Midwest in 2017.<sup>732</sup> This report sometimes uses “GCFI” interchangeably with “sales.” (USDA sometimes uses “GCFI” and “sales” interchangeably.<sup>733</sup>)

**H-2A farmworkers:** Foreign nationals who are brought to the US to work as temporary agricultural workers under a federally-regulated program.

**Midwest:** Illinois, Indiana, Iowa, Minnesota, Ohio, and Wisconsin.

**National Historical Geographical Information System (NHGIS):** Includes summary statistics and GIS files for U.S. censuses and other nationwide surveys, covering the period from 1790 to the present.

**Net cash farm income:** USDA states this includes cash receipts from farming as well as cash farm-related income (including government payments) minus cash expenses.

**Nonfamily farm:** USDA farm type defined as farms where an operator and persons related to the operator do not own a majority of the business.

**North American Free Trade Agreement (NAFTA)**

**Producer:** A USDA term for anyone who makes decisions on a farm. This report uses the term “farmer” interchangeably with “producer.”

**Receipts:** USDA defines this as the gross income from sales of crops, livestock, and livestock products during a calendar year.

**United States Department of Agriculture (USDA)**

**USDA Farm Typology:** USDA uses a typology system to classify farms based on ownership (family or nonfamily), operator’s primary occupation (farming or not farming), and gross cash farm income. This report makes extensive use of these classifications.

- **Retirement farms:** Farms where the operator’s primary occupation is retired and with gross cash farm income less than \$350,000.
- **Off-farm occupation farms:** Farms where the operator’s primary occupation is something other than farming and with gross cash farm income less than \$350,000. USDA has also referred to these as “hobby farms” and “lifestyle farms.”
- **Farming occupation/lower-sales farms:** Farms where the operator’s primary occupation is farming and with gross cash farm income less than \$150,000.
- **Farming occupation/moderate-sales farms:** Farms where the operator’s primary occupation is farming and with gross cash farm income from \$150,000 to \$349,999.
- **Midsize farms:** Farms with gross cash farm income from \$350,000 to \$999,999.
- **Large farms:** Farms with gross cash farm income from \$1,000,000 to \$4,999,999.
- **Very large farms:** Farms with gross cash farm income equal to or greater than \$5,000,000.
- **Nonfamily farms:** Farms where the majority of the business is not owned by the operator and individuals related to the operator.

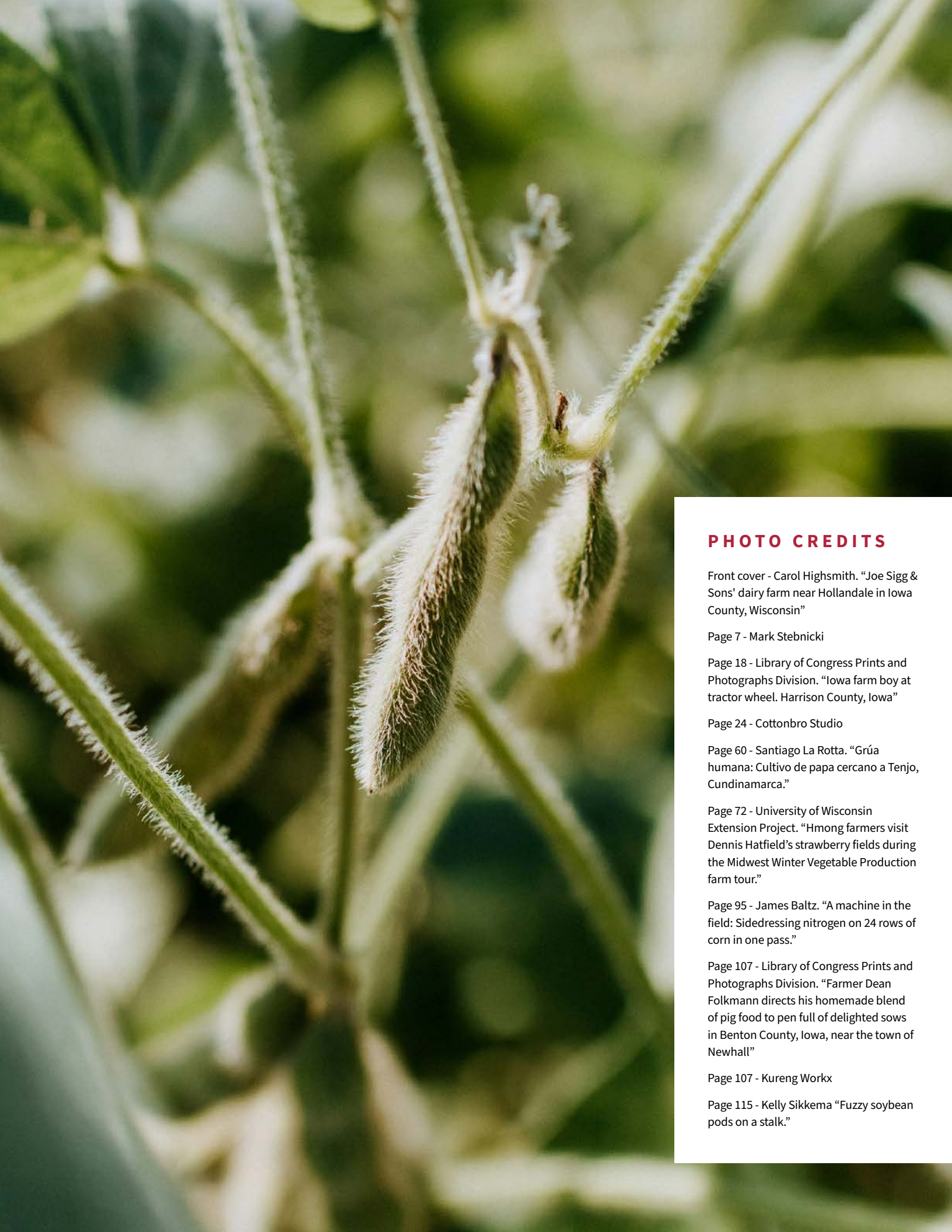
USDA also uses collapsed versions of these categories in some instances, some of which we follow. The 2017 Census of Agriculture Typology report uses the categories above but does not consider operator occupation. Therefore, family farms with GCFI less than \$150,000 are “low sales farms,” whether the operator is retired, has a non-farm occupation, or farms as their primary occupation. Likewise, moderate sales farms include all farms with GCFI from \$150,000 to \$349,999. Where the report uses data from the typology report, it references the collapsed categories. Note that the 2017 COA typology report still includes the nonfamily farm category.

References to farms in a certain category “or more” refer to farms in the specified category, all categories with more sales, and non-family farms. For example, “farms with at least moderate sales” refers to farms with gross cash farm incomes of at least \$150,000 and nonfamily farms.

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732. Calculated by the authors using 2017 CENSUS OF AGRICULTURE, *supra* note 7, at TYPOLOGY. See *supra* note 11 for more details.

733. For example, USDA’s 2017 Typology report defines “low-sales farms” and “moderate-sales farms” on the basis of GCFI, rather than sales, suggesting USDA staff consider these terms somewhat interchangeable.



## PHOTO CREDITS

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