

MAPPING LOCAL FOOD INDICATORS FOR THE NORTH CENTRAL STATES

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A picture is worth a thousand words.

When attempting to better understand the structure of the elements that influence local food systems, it is important to think about how the local system fits into the larger regional system. This can be done any number of ways. In using the county food systems profiles, comparing the county values for each indicator to the statewide and/or North Central regional averages provides an important benchmark. Seeing how a given county compares to the state allows profile users to better understand the strengths and weaknesses of the local food system.



Food Systems Profile Dane County, Wisconsin

The production, consumption, distribution, and disposal of food are critical parts of our economy, community well-being, and family health in the Midwest. This Food Systems Profile provides an overview of existing data across a broad scope of food systems activities, documents how key indicators are changing over time, and serves as a baseline for community leaders and educators to identify opportunities for growth or expansion in regional food systems. Data for this profile was accessed from existing secondary data sources including the US Census of Agriculture and the United States Department of Agriculture. The regional average includes: Indiana, Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin.

	Dane County	State Average	Regional Average
Food Access			
Percent of Households with no Car & More than 10 Miles to a Grocery Store, 2006 (%)	0.00	0.41	0.93
Percent of Low Income Households More than 10 Miles to a Grocery Store, 2006 (%)	0.00	2.83	7.42
Number of Grocery Stores Per 1K Population, 2008	0.14	0.22	0.32
Number of Convenience Stores (no gas) Per 1K Population, 2008	0.02	0.02	0.04
Number of Convenience Stores with Gas Per 1K Population, 2008	0.31	0.55	0.56
Number of SNAP-Authorized Stores per 1K Population 2009	0.46	0.56	0.81
Number of WIC-Authorized Stores per 1K Population, 2009	0.13	0.21	0.30
Number of Fast-Food Restaurants per 1K Population, 2008	0.76	1.13	0.89
Number of Full-Service Restaurants per 1K Population, 2008	0.79	0.49	0.53
Food Assistance			
Percent of Low-income Receiving SNAP 2007 (%)	26.85	25.70	28.82
Percent of Students Free-Lunch Eligible, 2008 (%)	21.35	25.07	29.51
Health			
Adult Obesity Rate, 2008, (%)	25.20	28.40	29.18
Low Income Pre-School Obesity Rate, 2009 (%)	11.80	13.62	13.80
Adult Diabetes Rate, 2008 (%)	6.30	8.45	9.22
Local and Direct Markets			
Number of Farms with Direct Sales per 10K Population, 1997	4.95	17.28	12.80
Number of Farms with Direct Sales per 10K Population, 2002	4.15	16.84	13.91
Number of Farms with Direct Sales per 10K Population, 2007	5.17	22.12	16.20
Farm Direct Sales Per Capita 1997 (\$)	3.77	7.25	3.98
Farm Direct Sales Per Capita 2002 (\$)	4.33	8.84	6.22
Farm Direct Sales Per Capita 2007 (\$)	5.64	14.25	8.75
Number of Farmers' Markets, 2009	12	2.60	1.37
Number of Farmers' Markets, 2010	15	2.93	1.78
Percent Change in Number of Farmers' Markets, 2009-2010 (%)	25.00	21.14	12.93
Number Farmers' Markets per 10K Population, 2010	0.31	0.55	0.59
Number of Farm to School Programs, 2009	1	0.07	0.04
Number of Farms Selling Directly through CSA, 2007	32	6.07	3.50

The Food Systems Profile tool was developed by the University of Wisconsin-Extension with a grant from the North Central Regional Center for Rural Development. Regional maps and worksheets for understanding and using this profile may be found at: <http://www.foodsystems.wisc.edu>

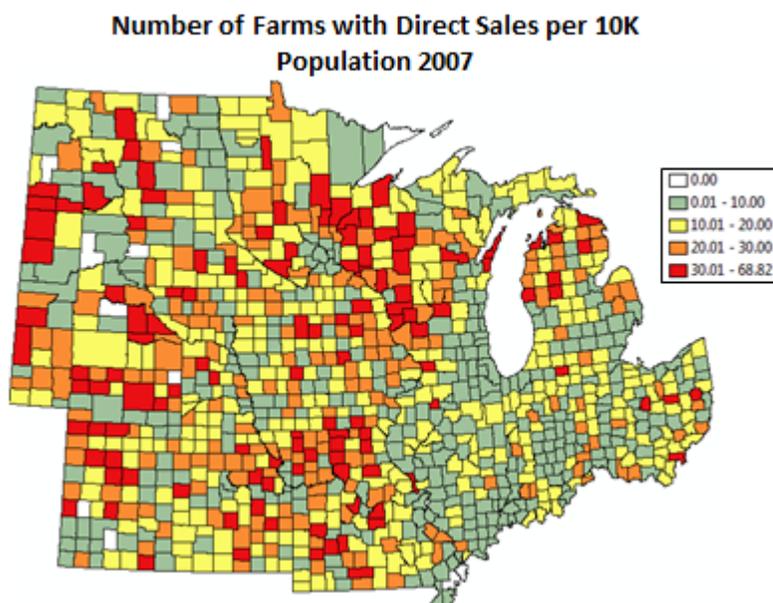
	Dane County	State Average	Regional Average
Processing and Distribution			
Number of Food Proprietors	67	13.17	6.19
Number of Fruit and Vegetable Preserving and Specialty Food Mfg	3	1.17	0.40
Number of Fruit and Vegetable Canning, Pickling, and Drying Mfg	3	0.75	0.22
Number of Cheese Mfg	2	2.43	0.26
Number of Animal Slaughtering and Processing Mfg	10	1.93	1.21
Number of Perishable Prepared Food Mfg	3	0.22	0.14
Number of Breweries	1	0.35	0.09
Number of Wineries	1	0.40	0.29
Production Agriculture General Characteristics			
Number of Farms 2007	3,331	1,089.76	764.89
Land in Farms (acres), 2007	555,756.0	210,983.4	325,034.8
Percent of County Land Area in Farming, 2007 (%)	69.92	46.87	70.24
Average Size of Farm (acres), 2007	161.0	193.1	574.7
Number of Vegetable, Melon, Potato Farms per 10K Population, 2002	2.57	9.43	4.84
Number of Vegetable, Melon, Potato Farms per 10K Population, 2007	3.76	10.50	5.47
Sales Per Capita, Vegetable, Melon, Potato Farms 2002 (\$)	5.52	159.38	62.32
Sales Per Capita, Vegetable, Melon, Potato Farms, 2007 (\$)	8.25	188.75	77.96
Number of Fruit, Nuts and Berry Farms per 10K Population, 2002	1.20	4.96	2.78
Number of Fruit, Nuts and Berry Farms per 10K Population, 2007	1.53	6.60	3.21
Sales Per Capita Fruit, Nuts and Berry Farms, 2002 (\$)	1.28	91.40	17.25
Sales Per Capita Fruit, Nuts and Berry Farms, 2007 (\$)	2.33	111.91	21.05
Number of Farm Proprietors, 2010	2,927	971.07	647.32
Share of Total Proprietorships that are Farms, 2010 (%)	4.40	17.42	23.30
Farm Employment Share of Total Employment, 2010 (%)	1.02	6.31	9.73
Average Farm Compensation per job, 2010 (\$)	12,380	9,914	7,055
County Wide Average Compensation per job, 2010 (\$)	54,325	43,137	42,302
Cash Receipts per Farm Proprietor, 2010 (\$)	7,803	20,912	63,862
Percent of Farms by Value of Sales \ Less than \$9,999, 2007 (%)	57.67	57.24	48.86
Percent of Farms by Value of Sales \ \$10,000 to \$99,999, 2007 (%)	23.21	23.88	25.76
Percent of Farms by Value of Sales \ \$100,000 or more, 2007 (%)	19.12	19.15	25.50
Percent of Gross Cash Receipts (Inclusive of Federal Payments) from Livestock and Products, 2010 (%)	66.51	60.31	38.80
Percent of Gross Cash Receipts (Inclusive of Federal Payments) from Crops, 2010 (%)	30.15	36.98	56.41
Percent of Gross Cash Receipts from Federal Payments, 2010 (%)	3.31	2.70	4.70
Number of Farms with Agri-tourism and Recreational Activity, 2002	25	8.72	6.00
Number of Farms with Agri-tourism and Recreational Activity, 2007	17	7.89	5.57
Average Gross Revenue per Farm from Agri-Tourism & Recreational Activity, 2002 (\$)	2,520	2,645	4,306
Average Gross Revenue per Farm from Agri-Tourism & Recreational Activity, 2007 (\$)	24,000	12,785	11,886
Number of Farms with Organic Production, 2007	50	17.79	4.70
Number of Farms Selling Value Added Products, 2007	85	39.73	22.67



While such a comparison is insightful, looking at the indicators of a county and its neighboring counties perhaps offers a superior comparison. Within the County Food Systems Profiles Portal, one could find the individual profiles for the neighboring counties and then compare and contrast multiple counties. However, the process would be cumbersome and might result in more confusion than insight. An alternative approach is to view maps of the individual indicators included in the profile and then visually examine how the county of interest “fits” into the larger region. A map of each individual local food system indicator is provided to facilitate such comparisons.

Consider, for example, the map below showing the number of farms with direct sales of products for human consumption, adjusted to the size of the county by showing the number of farms per 10,000 county residents. Here one can see that there are more farms with direct sales in certain parts of the North Central region, including much of central and western Wisconsin, northern Michigan, and much of Missouri. One can also see that in much of the corn belt of Illinois and Indiana, there are fewer farms with direct sales. This pattern makes intuitive sense because of the region’s strong comparative

advantage in corn and soybean production.

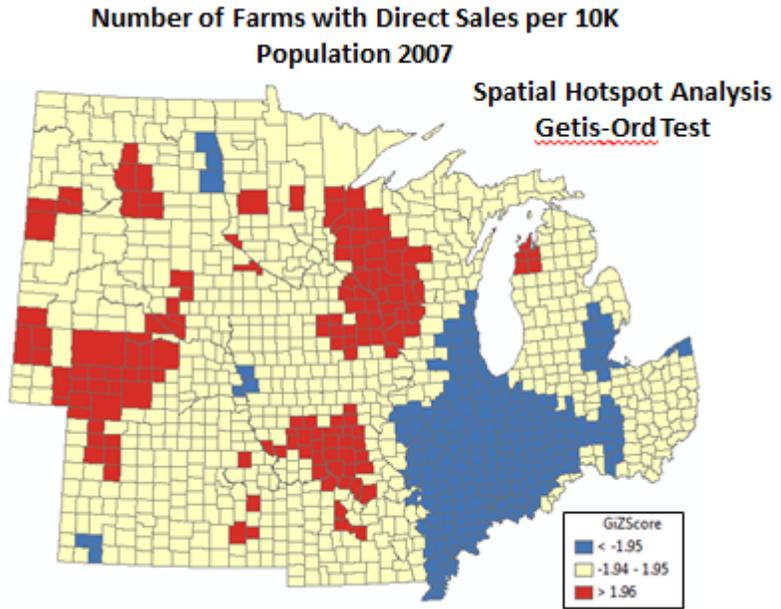


This simple map suggests that there may be a spatial cluster of economic activity of a particular type, which economists call an *economic cluster*. While there are as many definitions of an economic cluster as there are researchers studying the phenomenon, there are many common themes. One such theme is *agglomeration economies*, which speaks to the presence of internal and external economies of scale for firms of a

given industry, critical levels of input suppliers such as specialized labor, and geographic proximity of firms in related industries. Mapping the individual indicators of the local food profiles cannot address all of the elements that together constitute an economic cluster, but it can shed light on the idea of geographic concentrations. The information shown in the simple map of farms with direct sales allows users to make inferences about patterns of higher and lower concentrations.

To test whether the patterns observed in the simple mapping are “statistically significant” as opposed to random, we use what economic geographers refer to as *hotspot analysis*. While there are numerous tools for hot spot analysis, the one that is perhaps most widely used is the Getis-Ord spatial statistic (G_i^*)[‡]. This tool places the observed pattern in one of three possible categories: (1) a statistically significant positive relationship, which constitutes a “hot spot”; (2) a statistically significant negative relationship, which constitutes a “cold spot”; or (3) a statistically insignificant pattern.

The map of the Getis-Ord spatial statistic reveals that there are several “hot spots” of farms with direct sales to consumers (shown in red), as well as “cold spots” (in blue). Two of the hot spots include the Upper Mississippi River Valley from the Wisconsin–Illinois border north to the Duluth, Minnesota, area, as well as a large part of central and northern Missouri. The cold spot covering much of Illinois and Indiana is not surprising given the predominance of large-scale corn and soybean production in the area.



While hot spot analysis offers insight into the significance of the geographic pattern of a given indicator, one must take some care when interpreting these types of analyses. For example, the “hot spots” in western Nebraska and parts of Kansas are more likely a function of the low population densities than a strong presence of farms with direct sales.

This potential for misinterpretation highlights two needs: to rely on local knowledge of the region and to recognize the limitations of individual indicators. Rather than rely on a single local food system indicator, one must look at a variety of indicators to gain a stronger understanding of the local food system.

‡The Getis-Ord spatial statistic (G_i^*)

The Getis-Ord (G_i^*) is computed as $G_i^* = \frac{\sum_{j=1}^n w_{ij} X_j - \bar{X} \sum_{j=1}^n w_{ij}}{S \sqrt{\frac{n \sum_{j=1}^n w_{ij}^2 - \left(\sum_{j=1}^n w_{ij} \right)^2}{n-1}}}$ where $S = \sqrt{\frac{\sum_{j=1}^n X_j^2}{n} - (\bar{X})^2}$, X_i is the

food system indicator for county i , and w_{ij} consists of spatial weight matrix elements identifying adjacent counties. Here, if two counties are adjacent, then w_{ij} takes a value of one. If two counties are not adjacent, then w_{ij} takes a value of zero.