



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



## Food System Research Collaborative

at the University of Vermont Center for Rural Studies

### *Economic Opportunity in Local Food Systems: Baselines and Targets*

David Conner

Community Development and Applied Economics, University of Vermont

Ellen Kahler

Vermont Sustainable Jobs Fund

Linda Berlin

Center for Sustainable Agriculture, University of Vermont

Doug Hoffer

Independent Policy Analyst

#### ABSTRACT

Numerous studies have measured the economic impact of increased consumption of locally grown foods. As many advocates have set goals for increasing consumption of locally grown foods to a specific percentage, the missing piece of information is, what is the current percentage of locally grown food being consumed in a given city, state or region. To date, no credible set of methods has been used to measure the percentage of food consumption that is locally grown. In this paper, we apply previously developed methods to measure how much food is currently eaten and would be eaten if USDA Dietary Guidelines were followed. We also propose a set of methods to measure how much of current food consumption currently comes from Vermont. The methods include a set of interviews and surveys of major food buyers and distributors, triangulated with USDA data to scale up results to statewide levels. The methods will be vetted by a team of national experts and be tested in a Vermont pilot study, refined, and finally made available to scholars nationwide for replication. Results will inform changes to current systems which will facilitate future efforts to track local food consumption.



#### KEY FINDINGS

- A local seasonal diet based on USDA Dietary Guidelines would create more revenue than a local seasonal diet based on current consumption patterns.
- Despite wide interest in the results, we know of no credible method to measure current consumption of local food on a statewide level. We intend to develop and implement such a study with the guidance of a nationwide team of experts.

## Introduction

Eating locally grown food has become quite popular in recent years. In 2007, the word “locavore” was named the “Oxford Word of the Year,” (Oxford University Press USA, 2007). The cause of eating locally is championed by several well-known authors in the popular press (Pollan, 2008; Kingsolver, 2007). Scholars have also expressed interest in the potential benefits of eating locally, as part of a sustainable or community-based food system. Among the purported benefits of increasing consumption of locally grown foods are improved farm profitability and viability, farmland conservation, increased public health and closer social ties between farmers and consumers (Conner et al., 2010; Conner & Levine, 2006; Andreatta & Wickliffe, 2002). Selling locally grown food is a strategy that allows small and medium sized farms to differentiate their products in the marketplace. Small and medium sized farms contribute to a broad array of indicators of social, economic and environmental well-being (Lyson & Welsh, 2005; Lobao, 1990; Kirschenmann, et al., no date). Developing community-based food systems can engage diverse stakeholders with many different motivations, although some scholars caution that associating local with all things virtuous is misguided, particularly perceived environmental benefits (Conner, et al., 2008; Wright, et al, 2008; Bellows & Hamm, 2001; Born & Purcell, 2006; Oglethorpe, 2008).

Many studies of local food have focused on the demand side of the equation, identifying drivers of demand for local food, and demographic, psychographic and behavioral attributes of local food consumers (Bean Smith & Sharp, 2008; Conner et al, 2010; Ostrom, 2005; Thilmany, et al., 2008; Zepeda & Leviten-Reid, 2004; Zepeda & Li, 2006; Brown, 2003).

Local food in Vermont is seen as an important driver of economic prosperity and job creation. The current food system in Vermont is estimated to include 55,581

jobs at 6,984 farms and 3,990 food related businesses (VSJF, 2011). Total output from food production in the state is \$2.7 billion.<sup>1</sup> The Farm to Plate Strategic Plan executive summary (VSJF, 2011) conducted an economic impact analysis using Regional Economic Models, Inc. (REMI), and estimated that increasing instate production by 5% over 10 years would result in the creation of 1,500 new private sector jobs in the food system, along with \$135 million in economic output annually (VSJF, 2011).

Given the magnitude of the global agrifood system, some observers bemoan the lost opportunity of community economic development when food production and consumption is disconnected (Meter & Rosales, 2001). In light of this, a number of studies have looked at the capacity of a given region or state to supply its own food and potential economic impacts of increased consumption of local food under different dietary scenarios. A series of studies from Cornell University finds that New York State could provide 34% of its total food needs within an average distance of 49 km (30.4 miles), and that dietary intake influences the acreage needed to meet human consumption needs (Peters, et al. 2009; 2009a).

Other studies look at the economic impact of meeting local food consumption targets. Using the Impact analysis for Planning economic impact modeling system (IMPLAN) input-output model, Dave Swenson of Iowa State University modeled the impact of meeting United States Department of Agriculture (USDA) dietary guidelines with Iowa-grown fresh produce for one-quarter of the calendar year, finding that this change would sustain, either directly or indirectly, \$462.7 million in total economic output, \$170 million in total labor income, and 6,046 total jobs in Iowa (Swenson, 2006). A similar study which looked at potential impacts of increased fruit and vegetable production for local consumption in a six-state region of the upper Midwest found more than a billion dollars in income and nearly 10,000 jobs would result (Swenson, 2010). A study in Michigan used the IMPLAN model to measure job and income impacts of meeting

Local food in Vermont is seen as an important driver of economic prosperity and job creation.

public health dietary recommendations with locally grown fruits and vegetables (Conner, et al. 2008). In all cases, the models suggest large increases in income and job creation, even accounting for opportunity costs of transitioning field crop acreage into produce production.

As interest in the social, health, environmental and, in particular, farm and community-based economic benefits of local food consumption has grown, many advocates have set goals for increasing consumption of locally grown foods to a given percentage: e.g., the Farm to Plate Initiative estimates that 5% of total food purchases are produced within the state and calls for that to be doubled in the next 10 years (Vermont Sustainable Jobs Fund, 2011). Despite estimates, we still lack credible methods for determining the current percentage of locally grown food being consumed in a given city, state or region. Timmons et al., provide methods for estimating upper bounds on this figure using USDA data sets (Timmons, et al., 2008) but the available data are not sufficiently robust. Developing the proposed methodology would generate the baseline against which progress can be measured. It would also be useful regionally, providing a common methodology from which to annually assess regional food consumption.

In this paper, we apply previously developed methods to measure how many servings of fruit, vegetables, grains, proteins and dairy are currently eaten and would be eaten if 2005 USDA Dietary Guidelines were followed. We estimate the types and quantities of food eaten at home and away from home and how much of this consumption could be produced in Vermont, given current capacity, climate and land use patterns, and the economic returns to Vermont farmers. Finally, we justify, develop and outline a set of methods to measure how much of current food consumption currently comes from Vermont (in dollar terms). The methods include a set of interviews and surveys of a sample of major food buyers and distributors, triangulated with USDA National Agriculture Statistics Service Census of Agriculture and USDA Economic Research

Service consumption data to scale up results to statewide levels. The methods will be vetted by a team of national experts, then tested in a Vermont pilot study, refined, and finally made available to scholars nationwide for replication. Results will inform changes to current systems which will facilitate future efforts to track local food consumption.

## Estimation of current and target consumption patterns in Vermont

This section uses methods developed by and found in Conner et al. (2009) and Abate et al. (2009) to measure the current consumption of fruits, vegetables, dairy and meats in Vermont, as well as the levels of consumption if USDA Dietary Guidelines were followed. For products which can be grown in Vermont, yield and price<sup>2</sup> data are used to calculate the number of acres which would be needed and the revenue farmers would receive. The basic steps of the analysis are as follows:

- 1 How many cups or ounces of fruits, vegetables, proteins and dairy should Vermonters consume according to 2005 USDA Dietary Guidelines? This is heretofore called the “should” diet.

- 2 Assuming Vermonters’ consumption patterns mirror those of the United States as a whole, how many servings of each do they actually eat? This is heretofore called the “do” diet.

- 3 If Vermonters met these two diets with locally grown foods, as much as is practical given climate and availability, how many acres would be required to produce them and, given prevailing prices, how much revenue would this generate for Vermont farmers?

The daily per capita consumption figures for vegetables, fruits, dairy and proteins compiled by the USDA Economic Research Service is multiplied by Vermont’s population and 365 days to calculate the state annual





consumption (Table 1). The key assumption here is that Vermonters' consumption patterns mirror those of the nation as a whole. Then, using age-sex population figures and the recommended amount of food in each category for each age-sex group, we calculated the recommended amount of food per year (Table 1). It is assumed that two-thirds of Vermonters are sedentary and one-third are active according to the USDA definition, an assumption previously used by Conner et al. (2008). Finally we calculated the ratios of "should" to "do". Consistent with previous research (Abate et al., 2009), Vermonters should eat roughly twice as many fruits, half again as many vegetables and about 16% less proteins than they currently do (Table 1).

Next, we calculated current annual consumption of individual fruit, vegetable, protein items, as well as dairy products (per capita times state populations) for the "do" diet. These figures are multiplied by the "should/do ratio" in Table 1 for these figures in the "should" diet. It is assumed

that all meat (beef, pork and chicken), 20 vegetables and 12 fruits can be grown in Vermont. Following methods developed by Conner et al. (2008) and Abate et al. (2009), the seasonal availability of fruits and vegetables is taken from a Michigan State University Extension publication; it is assumed that locally grown fruits and vegetables are only available at these times. Given Vermont's short growing season, we assume Vermont's seasonal availability of vegetables is 80% that of Michigan's. We use price data and yield data from Conner et al. (2008) and Abate et al. (2009) to calculate the revenues generated and acres needed if current and recommended consumption levels are met, when available, with Vermont grown foods (Table 2). Note that these are total acres needed, not additional acres of production. Note also that, as assumed in Conner et al. (2008), if fruit and vegetable consumption is increased to 'should' levels, Vermonters would increase consumption proportionally. Specifically, for the example of fruit, in aggregate, Vermonters eat 2.23

**Table 1 : Annual consumption for Vermont: current and recommended**

Food category	Consumption per day per person	Vermont consumption per year ("Do" eat)	Recommended consumption per year ("Should eat")	Should/Do
Fruit (cups)	0.84	190,416,042	425,576,008	2.23
Vegetables (cups)	1.67	379,790,725	606,848,270	1.60
Protein (oz. equivalent)	6.6	1,498,126,462	1,259,701,809	0.84
Dairy (cups)	1.68	382,372,493	656,543,993	1.72

**Table 2 : Revenues and acreage required for current and recommended diets**

Food category	Revenue ("Do" diet), \$	Acres needed ("Do" diet)	Revenue ("Should" diet), \$	Acres needed ("Should" diet)	Current Acres
Fruit	\$ 2,718,031	932	\$ 6,074,743	2,083	4,252
Vegetables	\$10,503,248	2,301	\$16,782,605	3,677	2,855
Protein	\$ 103,872,147	348,397	\$87,341,045	292,950	153,132
Dairy	\$22,273,582	72,111	\$ 38,244,347	123,816	539,371
Sum	\$139,367,007	423,741	\$148,442,741	422,526	708,239

times as many items that grow in Vermont - like apples - as well as items which do not - like bananas. This assumes consumer tastes remain consistent: people who like apples eat more apples, and so on.

## Methods for determining current consumption of local food

This builds on the work of Timmons et al., who demonstrated a method for calculating the upper bound of proportion of locally grown food in a given state or region (Timmons, et al. 2008). Their research measured the ratio of per capita consumption (disappearance) of a given crop or crop category and per capita production. Their results from Vermont show that for some categories, most notably dairy, production far exceeds consumption, while for fruits and vegetables, Vermont can only produce a fraction (25% and 36% respectively) of what is consumed in state. This figure also omits the proportion of food that is grown in Vermont and consumed elsewhere (likely to be relatively small for produce, but very large for dairy).

A reasonable lower bound for the proportion of local food is the USDA NASS figure of food sold directly to consumers, which is available in the Census of Agriculture. This figure counts sales by Vermont farms to consumers from other states (likely a small number); at least one study suggests the NASS undercounts the true value of direct food purchases (Conner et al., 2010).

We begin with the assumption that local food is purchased and consumed in three broad ways. Note that food which is not sold (e.g., grown in home/community gardens, donated, bartered) is not included in this estimation.

- a) Purchased direct from the farmer, including through farmers markets, farm stands, Community Supported Agriculture programs, U-pick, etc.
- b) Purchased from retailers, who source through brokers, their own distribution channels, directly from local producers and from wholesalers/distributors.

c) Purchased in prepared (e.g., cooked) form, from various food service institutions including schools, hospitals, prisons and senior centers, and from restaurants, cafes and similar eateries.

Our project will develop, compare and contrast several figures using a variety of methods.

- 1 Identify the upper and lower bounds, discussed above;
- 2 Develop questionnaires and administer them to all known Vermont farmers' market managers, CSA farmers, farm stands and U-picks. We will begin with an on-line survey, and after four weeks, switch to administration by telephone until sufficient numbers are present to credibly extrapolate. Questions will include total sales, proportion of sales of grown-in-Vermont items (likely to be the vast majority). The firmographic attributes of respondents (particularly location and scale) will be compared to local food directories to measure representativeness of our sample. The mean, median and mode (central tendency, CT) responses will be calculated and scaled up using directory information, Census of Agriculture and other available data sources.

3 We will develop questionnaires and administer to a sample of Vermont retailers and distributors, asking for total sales and estimated proportion of sales which come from locally produced food by month and for a complete year, and compare with Food Marketing Institute aggregate data collected for Vermont retailers. Again, firmographic attributes of respondents (particularly location and scale) will be compared using available databases of Vermont retailers. CT responses will be calculated and scaled up to reflect Vermont at home food expenditure data.

4 Working with the (i) Vermont Fresh Network and (ii) Vermont FEED, we will develop and administer a survey to (i) Vermont restaurants and (ii) institutions such as schools, universities and hospitals, asking for total sales and estimated

Local food is purchased and consumed in three broad ways: direct from the farmer, from retailers, and in prepared form.

proportion of sales which come from locally produced food by month and for a complete year. Again, firmographic attributes of respondents (particularly location and scale) will be compared with available databases of Vermont restaurants and institutions. CT responses will be calculated and scaled up to reflect Vermont away from home food expenditure data.

**5** Initial protocols, questionnaires, and preliminary and final results will be shared with a team of scholars nationwide, who will serve a vetting function and suggest improvements throughout the process. This advisory team includes Christian Peters of Tufts University, Mike Hamm of Michigan State University, Rich Pirog of the Leopold Center at Iowa State University and Ken Meter of the Crossroads Resource Center.

As found in previous studies, on the whole, Vermonters eat too much meat and not enough fruit, vegetables or dairy.

**6** Data collection templates will be developed and shared with retail outlets (coops, grocers, CSA owners, farmers' market managers, farm stand owners, chefs, institutional food purchasers, etc.) to facilitate and standardize the data collection process over time – since this will be a yearly activity conducted once the methodology has been finalized.

**7** Initial results will be compiled and reported in a series of reports available through the Farm to Plate Initiative, UVM Center for Sustainable Agriculture and the UVM Food System Research Collaborative. Protocols, including questionnaires, will be made publicly available to any researcher wishing to replicate our study in his or her own region or state. Our experiences will be chronicled for submission to a peer reviewed journal for publication. We will also explore the compatibility of our data with the USDA-ERS Atlas of Agriculture to begin to contribute to national databases on this issue.

The potential economic impact of increased consumption of locally grown food is of interest to scholars, policy makers and other stakeholders, yet to date, little research has been conducted which estimates current consumption, a benchmark against which progress can be measured. This paper began by estimating the quantities of food, potential farmgate income and number of acres needed to supply Vermont's current diet as well as a diet in line with USDA Dietary Guidelines. As found in previous studies, on the whole, Vermonters eat too much meat and not enough fruit, vegetables or dairy. We then proposed a set of methods to measure current consumption of locally grown foods, which will be developed, implemented and shared with an advisory committee of national experts.

## Key Findings

- A local seasonal diet based on USDA Dietary Guidelines would create more revenue than a local seasonal diet based on current consumption patterns.
- Despite wide interest in the results, we know of no credible method to measure current consumption of local food on a statewide level. We intend to develop and implement such a study with the guidance of a nationwide team of experts.

The strengths of the paper and proposed approach are the high degree of interest, its building on prior research and the guidance of a national team of experts. Its weakness is the lack of data, difficulties in access to potential proprietary data and the extrapolation of data from small samples to state or even national figures, with concomitant escalation of even small errors into very large ones. Nonetheless, we believe this work is timely and valuable, and our willingness to share the methods and results broadly will create opportunities for broad collaboration and marked improvement of the methods over time.

## Conclusions

## References

- Abate, G., Conner, D. S., Hamm, Michael W, Smalley, Susan, Thomas, B., & Wright, D. W. (2009). Genesee County Food System Final Report. East Lansing, MI.
- Andreatta, S., & Wickliffe, W. (2002). Managing Farmer and Consumer Expectations: A Study of a North Carolina Farmers Market, 61(2), 167-176.
- Bean Smith, M., & Sharp, J. S. (2008). A Current and Retrospective Look at Local Food Consumption and Support Among Ohians. Columbus OH: The Ohio State University.
- Bellows, A. C., & Hamm, M W. (2001). Local Autonomy and Sustainable Development: Testing Import Substitution in Local Food Systems. *Agriculture and Human Values*, 18(3), 271-284.
- Born, B., & Purcell, M. (2006). Avoiding the Local Trap. *Journal of Planning Education and Research*, 26(2), 195-207.
- Brown, C. (2003). Consumers' preferences for locally produced foods: A study in southeast Missouri. *American Journal of Alternative Agriculture*, 18(4), 213-224.
- Conner, D., Smalley, S., Colasanti, K., & Ross, R. (2010). Increasing Farmers' Markets Patronage: A Michigan Survey. *Journal of Food Distribution Research*, 41(2), 26-35.
- Conner, D. S., Cocciarelli, S., Mutch, B., & Hamm, Michael W. (2008). Community-Based Food Systems in Michigan: Cultivating Diverse Collaborations from the Ground Up. *Journal of Extension*, 46(4). Retrieved from <http://www.joe.org/joe/2008august/iw1.php>.
- Conner, D. S., Colasanti, K. J. A., Ross, R. B., & Smalley, S. B. (2010). Locally Grown Foods and Farmers Markets: Consumer Attitudes and Behaviors. *Sustainability*, 2, 742-756.
- Conner, D. S., Knudson, W. A., Hamm, Michael W, & Peterson, H. C. (2008). The Food System as an Economic Driver: Strategies and Applications for Michigan. *Journal of Hunger and Environmental Nutrition*, 3(4), 371-383.
- Conner, D. S., & Levine, R. L. (2006). Circles of Association: The Connections of Community-Based Food Systems. *Journal of Hunger and Environmental Nutrition*, 3(1), 5-25.
- Kingsolver, B. (2007). *Animal, Vegetable, Miracle: a Year of Food Life*. New York, NY: Harper Collins.
- Kirschenmann, F., Stevenson, S., Buttel, F., Lyson, T., & Duffy, M. (n.d.). Why Worry About the Agriculture of the Middle? Retrieved from <http://www.agofthemiddle.org/papers/whitepaper2.pdf>.
- Lobao, L. (1990). *Locality and Inequality. Farm Structure and Socioeconomic Conditions*. Albany, NY: State University of New York Press.
- Lyson, T. A., & Welsh, Rick. (2005). Agricultural industrialization, anticorporate farming laws, and rural community welfare, 37(1479-1491).
- Meter, K., & Rosales, J. (2001). *Finding Food in Farm Country*. Minneapolis, MN: Crossroads Resource Center. Retrieved from <http://www.crcworks.org/ff.pdf>.
- Oglethorpe, D.R. (2008). Local Food - Miles Better? *European Supply Chain Management*, (1), 12-15. Retrieved from <http://www.europeansupplychainmanagement.co.uk/article-page.php?contentid=4203&issueid=174>.
- Ostrom, M. (2005). Consumer food purchasing: Interest in local and direct markets. Washington State University.
- Oxford University Press USA. (2007). Oxford Word Of The Year: Locavore. Retrieved from <http://blog.oup.com/2007/11/locavore/>.
- Peters, C. J., Wilkins, J. L., & Fick, G. W. (2009). Testing a complete-diet model for estimating the land resource requirements of food consumption and agricultural carrying capacity: The New York State example. *Renewable Agriculture and Food Systems*, 22(2), 145-153.
- Peters, C.J., Bills, N.L, Lembo, A.J., Wilkins, J.L., and Fick, G. W. (2009a). Mapping potential foodsheds in New York State: A spatial model for evaluating the capacity to localize food production. *Renewable Agriculture and Food Systems*, 24(1), 72-84.
- Pollan, M. (2008). *Beyond the Bar Code: The Local Food Revolution*. (Bioneers, Eds.). Retrieved from <http://www.bioneers.org/pollan>.
- Swenson, D. (2006). The Economic Impacts of Increased Fruit and Vegetable Production and Consumption in Iowa: Phase II. Ames, IA: Regional Food Systems Working Group Leopold Center for Sustainable Agriculture, Iowa State University.
- Swenson, D. (2010). Selected Measures of the Economic Values of Increased Fruit and Vegetable Production and Consumption in the Upper Midwest. Ames IA. Retrieved from [http://www.leopold.iastate.edu/research/marketing\\_files/Midwest\\_032910.pdf](http://www.leopold.iastate.edu/research/marketing_files/Midwest_032910.pdf).
- Thilmany, D., Bond, C. A., & Bond, J. K. (2008). Going Local: Exploring Consumer Behavior and Motivations for Direct Food Purchases, 90(5), 1303-1309. doi: 10.1111/j.1467-8276.2008.01221.x.
- Timmons, D., Wang, Q., & Lass, D. (2008). Local Foods: Estimating Capacity. *Journal of Extension*, 46(4). Retrieved from <http://www.joe.org/joe/2008october/a7.php>.
- Vermont Sustainable Jobs Fund. (2011). Farm to Plate Strategic Plan. Montpelier, VT. <http://www.vsjf.org/project-details/5/farm-to-plate-initiative>
- Welsh, R, & Lyson, T. (2001). Anti-Corporate Farming Laws, the "Goldschmidt Hypothesis" and Rural Community Welfare. Albuquerque, NM.
- Wright, W., Score, M., & Conner, D. (2008). Food System Makers: Motivational Frames for Renewing Food and Agriculture Through Multi-Stakeholder Collaboration. *Journal of the Community Development Society*, 38(3), 39-59.
- Zepeda, L., & Leviten-Reid, C. (2004). Consumers Views on Local Food. *Journal of Food Distribution Research*, 35(3), 1-6.
- Zepeda, L., & Li, J. (2006). Who Buys Local Food? *Journal of Food Distribution Research*, 37(3), 1-11.

---

## END NOTES

1. The figure is the total of farm output (USDA, COA) and the value of goods sold in food manufacturing (Economic Census). It was verified by Nic Rockler of Kavet, Rockler & Associates and adjusted to 2010 dollars.
2. These prices are those used in the Conner, Knudson et al. (2008) study, which relied on USDA Census of Agriculture and Terminal Market data. Inasmuch as these are largely wholesale rather than direct market prices, and do not represent any increase over time, the revenue estimates may be considered conservative.
3. USDA Census of Agriculture



## About This Series:

The Food System Research Collaborative Opportunities for Agriculture Working Paper Series highlights the breadth of research by the collaborative's members and is intended to foster discussion on food system topics.

For more information, or to submit a proposal for the next round of white papers, contact Jane Kolodinsky at [Jane.Kolodinsky@uvm.edu](mailto:Jane.Kolodinsky@uvm.edu).

**The full series is available online at  
[www.foodsystemresearch.net](http://www.foodsystemresearch.net)**

## Vol. 2 Working Paper topics:

1. Economic Opportunity in Local Food Systems: Baselines and Targets
2. Regional Food Systems Planning: A Case Study from Vermont's Northeast Kingdom
3. Place-Based Marketing Opportunities for Vermont
4. Taste of Home: Migration, Food and Belonging in a Changing Vermont
5. Working towards the Common Table: How Vermont Addresses Social Justice and Food Access with Local Food and Why it Matters



Center for Rural Studies  
206 Morrill Hall  
University of Vermont  
Burlington VT 05405

**Tel:** (802) 656-3021  
**E-mail:** [crs@uvm.edu](mailto:crs@uvm.edu)

Visit us online at [www.uvm.edu/crs](http://www.uvm.edu/crs)