



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

*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.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Identifying Factors Influencing a Hospital's Decision to Adopt a Farm-to-Hospital Program

Bobby J. Smith II, Harry M. Kaiser, and Miguel I. Gómez

Farm-to-hospital (FTH) programs can potentially improve the economy of local communities and preserve the environment. Research on adoption of farm-to-hospital (FTH) programs is extremely limited in the agricultural and applied economics literature. Using data from our 2012 regional FTH program survey of hospital food-service directors in the Northeastern United States and from the U.S. Department of Agriculture, this study estimates a logit model to determine factors that influence a hospital's decision to adopt an FTH program. The empirical results indicate that specific hospital characteristics and agricultural factors significantly influence a hospital's decision to adopt.

Key Words: community-supported agriculture, farm-to-hospital program, locally produced fresh food, logit model

The agricultural and food sector in the United States has evolved from being highly localized to more regional and national, driven primarily by tremendous improvements in transportation and distribution technologies that have made it possible to move food substantially greater distances and at a lower cost. However, in recent years, there has been an increase in consumer demand for local agriculture and food. The term "local food" has no formally established definition, but the definition adopted by the U.S. Congress in the 2008 Food, Conservation, and Energy Act (2008 Farm Act) is food that is produced in the same state or less than 400 miles from the location in which the food is being consumed (Martinez et al. 2010). While the local food movement remains small relative to the food industry overall in the United States, its share has grown substantially in recent years. For example, in 2008, the *Agricultural Resource Management Survey* (ARMS) conducted by the U.S. Department of Agriculture (USDA) estimated gross sales of locally marketed food at \$4.8 billion or about 1.6 percent of the U.S. market for agricultural products, four times larger than in the previous census in 2002 (Low and Vogel 2011).

There are numerous examples of campaigns and partnerships within local food systems. For instance, farm-to-institution partnerships involve organizations such as elementary and secondary schools, universities, colleges,

Bobby J. Smith II is a doctoral student in the Charles H. Dyson School of Applied Economics and Management at Cornell University. Harry M. Kaiser is the Gellert Family Professor of Applied Economics and Management and Miguel I. Gómez is the Ruth and William Morgan Assistant Professor of Applied Economics and Management, both in the Charles H. Dyson School of Applied Economics and Management at Cornell University. Correspondence: *Bobby J. Smith II • Charles H. Dyson School of Applied Economics and Management • 301 Rice Hall • Cornell University • Ithaca, NY 14853 • Phone 817.480.0568 • Email bjs282@cornell.edu.*

Funding for this research was provided by the Gellert Family Endowment in the Dyson School of Applied Economics and Management at Cornell University. The views expressed are the authors' and do not necessarily represent the policies or views of the sponsoring agency.

and hospitals that purchase some or all of the food they serve locally. “Buy Local” and “Know Your Farmer, Know Your Food” campaigns, farmers markets, community-supported agriculture (CSA) organizations, and locally produced food guide publications promote local, regional, and sustainable food systems. In turn, the localization of food systems supports rural sustainability initiatives and cultivates relationships between farmers and consumers.

There have been many studies and popular articles aimed at improving people’s understanding of local food production and promoting direct marketing of local food (see Hinrichs 2000, Thilmany 2004, Thilmany and Watson 2004, Allen and Hinrichs 2007). Currently, however, little is known about the contribution of hospitals in support of local food systems and empirical research on farm-to-hospital (FTH) programs is nearly nonexistent. In this study, we define an FTH program as the supply-chain relationship associated with locally produced fresh food incorporated into patients’ meals through programs that link hospitals and other healthcare facilities with the farms that produce the food. Such programs can improve the freshness, quality, and nutritional value of hospital food while opening new markets for small- and medium-sized farms (Beery and Markley 2007).

FTH programs are being implemented primarily through pilot-program initiatives across the United States, and several case studies have been conducted to raise awareness and highlight the benefits of the programs. In addition to case studies and pilot programs, more than 350 hospitals nationwide are taking steps to improve the health of their patients, communities, and the environment through the Healthy Food in Healthcare Pledge. The pledge is structured to guide members of the healthcare industry through support for community and sustainability initiatives (Health Care without Harm 2006). Currently, the pledge does not require hospitals to meet any specific requirements. The pledge gives hospitals the freedom to develop relationships with local food systems independently while providing various resources to aid in development of those relationships.

Regions of the country differ in geographic size, land uses, soil characteristics, production practices, and a host of other economic factors. In addition, Morrison, Nelson, and Ostry (2011) explained the importance of the rise in interest in local food and of its relationship with policy and policymakers, who require regional agricultural data. Therefore, to understand the nature of these new FTH programs fully, region-specific research is required. We use an econometric model to identify key factors that impact decisions by healthcare facilities in the Northeast United States (New York, Connecticut, Massachusetts, New Hampshire, Maine, Pennsylvania, Rhode Island, and New Jersey) to adopt FTH programs. A regional survey of hospital food-service directors is used to assess interest in the programs. Data from the survey is then combined with agricultural and county-level data from USDA to develop an econometric model identifying the determinants.

This investigation is unique in that other research endeavors have focused solely on the presence of onsite farmer’s markets at hospitals. Our identification of factors that influence a hospital’s decision to adopt an FTH program can facilitate a discussion between hospital administrators and members of local farming communities. Such discussions have the potential to increase participation in FTH programs and thereby promote viable local food systems in the Northeast and broaden the role of food and agriculture in society.

Background

There are few peer-reviewed studies of FTH programs. However, a number of institutional reports and case studies have examined potential benefits and barriers to adoption of farm-to-institution programs at schools, universities, and colleges. The number of farm-to-school (K–12) programs in the United States has grown rapidly since the mid-1990s and continues to grow, and the relationship between farmers and schools is strong (Allen and Guthman 2006, Joshi, Azuma, and Feenstra 2008, Bagdonis, Hinrichs, and Schafft 2009). The rapid growth in farm-to-school programs also gave rise to similar programs and sustainability initiatives at colleges and universities (Strohbehn and Gregoire 2005, Merrigan and Bailey 2008, Chen, Arendt, and Gregoire 2010).

In one of a handful of studies of local food in a hospital setting, Kirby (2006) surveyed fifteen hospital food service directors in western North Carolina to determine whether hospital administrators were willing to purchase local food and support local food systems. Kirby found that 87 percent (thirteen of fifteen) of the directors expressed a high degree of interest in buying locally grown food, and the majority of the directors ranked current contractual agreements along with company policies as the major barriers to procuring local food.

Beery and Vallianatos (2004) conducted a series of case studies in hospitals that had developed a relationship with the local farming community. The authors concluded that hospitals have the ability to procure local food institutionally if they incorporate their interest in local food in yearly goals and initiatives through hospital-wide food policies. In another study, Hardesty (2008) used an ordered logit model to assess the impact of transactional costs, institutional characteristics, and prices on the status of an institution's program for buying locally grown produce. Hardesty found that teaching hospitals were less likely than private hospitals to consider year-round availability of key items and stable product prices as important and were more likely to have vendor-approval requirements and a larger number of produce suppliers.

In terms of local food programs in general, research by Martinez et al. (2010) suggested that, in most cases, multiple farmers would have to pool their products to make processing and shipping economical and increase participation in local food programs. The authors also found that production of locally marketed food is more likely to occur on small farms located in or near metropolitan areas. Through a series of case studies from across the United States, King et al. (2010) argued that local food is being incorporated in programs designed to reduce food insecurity, support small farms, and encourage more healthful eating habits by fostering relationships between farmers and consumers.

Environmental sustainability is a common theme associated with farm-to-institution programs and, recently, with links between farms and hospitals. The National Research Council (2010) suggested that FTH programs could improve the sustainability of a healthy environment and economic and social systems by decreasing how far food travels to consumer markets, creating new opportunities for farmers, and providing people with greater access to fresh food. Beery and Markley (2007) argued that FTH programs could reduce the ecological impact of the agricultural sector (by decreasing travel miles) and boost local economies by assisting in overcoming challenges associated with small sustainable farms.

The existing literature on relationships between local food systems and institutions has focused primarily on farmers, farm-to-school programs, and methods by which to increase farmers' sales volumes by identifying alternative markets. It is clear that the interest of hospital food service directors in FTH programs has not been thoroughly investigated. Although the work by Kirby (2006) and Beery and Vallianatos (2004) discusses FTH programs, it does not provide a quantitative or systematic approach to understanding development of such programs. Here, we specifically examine FTH programs and systematically investigate factors that influence a hospital's decision to adopt such a program.

Data

The primary data on hospitals and FTH programs in this study were generated through a regional online survey sent to 160 randomly selected food and nutrition service directors at hospitals in the Northeast (New York, Connecticut, Massachusetts, New Hampshire, Maine, Pennsylvania, Rhode Island, and New Jersey) between April and November of 2012. The 2012 edition of the *American Hospital Association's (AHA's) Guide to the Healthcare Field* was used to compile the list of hospitals (AHA 2011). The eight-question survey was developed using Cornell University's Qualtrics web survey software.

The main objective of the survey was to assess hospital food service directors' views on developing a relationship with local farming communities through FTH programs. The survey provided a definition of an FTH program and local food and asked whether the respondent's hospital had adopted such a program to determine how many of the hospitals were already participating. In addition, the survey collected information regarding hospital characteristics that could influence adoption of an FTH program—the number of licensed beds, number of patient meals prepared daily, type of food service used, location (city and state), and percentage of food procured locally versus nationally. The response format of most questions was either closed-choice (check all that apply, yes/no, and fill-in) or selection from a list of answers in a five-point Likert-type scale (unimportant to critically important). To maximize the response rate, we made a series of phone calls and emails to the sampled directors to individually discuss the purpose of the survey and assist them in successfully completing it.

The final number of hospital food service directors who took the online survey was 101, a 63 percent response rate. One survey was removed because it was not complete, so 100 surveys were used for the analysis.

We obtained secondary data from USDA's *Atlas of Rural and Small-Town America*, which is produced by the Economic Research Service (ERS) (2007). The atlas data are provided under four broad categories of socioeconomic factors—people, jobs, agriculture, and county classification. The data on agriculture and county classification were used to identify the characteristics of local agriculture and the county in which each hospital was located and to determine whether any of those characteristics influenced a hospital director's decision to adopt an FTH program. Both the primary and secondary data were used to gain insight into hospital-specific characteristics and agricultural/county factors that could significantly influence the adoption decision.

Variables in the Model

Descriptive statistics and definitions of the variables included in the model are presented in Table 1. The dependent variable was a hospital's decision regarding adoption of an FTH program. About 58 percent of the hospitals surveyed had adopted an FTH program and 63 percent had self-operated food service. The average number of meals served per day was 498. The average percent of farms participating in CSAs was 1.62 percent within a hospital's county; 36 percent of the hospitals had signed the Healthy Food in Health Care Pledge. Twenty-one percent of the hospitals represented in the survey were located in nonmetropolitan counties adjacent to metropolitan areas, and, on average, 17 percent of the land in the county in which the hospital was located was classified as farm land.

To model a hospital's decision to adopt an FTH program, we use a dichotomous dependent variable, *FTHProgram*, where $Y = 1$ for adoption and $Y = 0$ for no adoption. Three explanatory variables—*HealthPledge*, *Meals/Day*, and *Foodservice*—measure the hospital's ability to prepare food and the degree of flexibility it has in procuring local food through FTH programs. Three other explanatory variables—*NonmetroAdj*, *FarmCSA*, and *PctLandFarms*—are associated with county and agricultural classifications of the areas in which the hospitals are located. We next discuss the explanatory variables.

Hospital-specific Characteristics

The variable associated with the Healthy Food in Healthcare Pledge, labeled *HealthPledge*, indicates whether a hospital had already signed the pledge. The variable regarding food service type, *Foodservice*, classified the hospital's service as self-operated or third-party-contracted. Average patient meals

Table 1. Descriptive Statistics of Variables

Variable	Description	Mean	Standard Deviation
Dependent Variable			
<i>FTHProgram</i>	1 when hospital adopted an FTH program; 0 otherwise	0.58	0.50
Explanatory Variables			
<i>HealthPledge</i>	1 when signed Healthy Food in Healthcare Pledge; 0 otherwise	0.36	0.48
<i>Meals/Day</i>	Average number of meals prepared daily	498	575
<i>Foodservice</i>	1 for self-operated food service; 0 otherwise	0.63	0.49
<i>NonmetroAdj</i>	1 when a nonmetro area is adjacent to a metro area; 0 otherwise	0.21	0.41
<i>FarmCSA</i>	Percent of farms participating in CSAs in a hospital's county	1.62	1.58
<i>PctLandFarms</i>	Percent of land area in farms in a hospital's county	17	16

served per day, *Meals/Day*, is equivalent to patient meals per patient-day where patient-days are the number of occupied beds in a month. Thus, the variable *Meals/Day* is calculated by dividing the total number of patient-meals provided in a month by the total number of patient-days in that month (Reed 2011).

We expect that hospitals that have signed the Healthy Food in Healthcare Pledge are more likely to have adopted an FTH program than hospitals that are not participating in the pledge. An inverse relationship is expected between the dependent variable (adoption of an FTH program) and average patient meals served per day because more than 50 percent of survey respondents listed “supply reliability” as a barrier to adoption. Consequently, the more meals prepared per day at a hospital, the less likely that hospital would be to adopt an FTH program.

County and Agricultural Land Characteristics

We identified nonmetropolitan areas adjacent to metropolitan areas (*NonmetroAdj*) from ERS rural-urban continuum codes, which are based on a county’s degree of urbanization. The variable *NonmetroAdj* represents areas that have urban populations of 20,000 or more and are adjacent to a metropolitan area. The percent of a county’s farms that participate in CSAs (*FarmCSA*) captures the extent to which direct market channels are used by farms in the county. *PctLandFarms* captures the proportion of a county’s land that is devoted to agricultural production.

We expect that the percentage of farms participating in CSAs in a county will influence a hospital’s decision to adopt an FTH program. The percent of county land area in farms also is expected to influence a hospital’s decision to adopt because it influences the amount of food available locally.

Empirical Model

A logit model is employed to identify factors that influence a hospital’s decision to adopt an FTH program (Greene 2008). The model,

$$(1) \quad \text{Prob}(Y = 1|x) = \frac{e^{x'\beta}}{1 + e^{x'\beta}} = \Lambda(x'\beta),$$

assumes a logistic cumulative distribution function, $\Lambda(\cdot)$, and $Y = 1$ indicates that a hospital had adopted an FTH program. The vector \mathbf{x} represents the explanatory variables expected to influence a hospital’s decision to adopt and β is a vector of the estimated parameters. To avoid multicollinearity, we examined the correlation matrix of variables included in the empirical model to identify any highly correlated variables. The correlation coefficients have the expected signs, and the highest correlations among the variables are between *FTHProgram* and *FarmCSA* (0.33), *FTHProgram* and *HealthPledge* (0.31), and *NonmetroAdj* and *PctLandFarms* (0.25). These results indicate a low degree of correlation among the explanatory variables so the model appears to be free of multicollinearity.

The marginal effects of the continuous variables are calculated at the means of the data,

$$(2) \quad \frac{\partial E[y|x]}{\partial x} = \Lambda(x'\beta)[1 - \Lambda(x'\beta)]\beta,$$

and the marginal effects for the dummy variables, indicated by the subscript d , are estimated as

$$(3) \quad \text{Prob}[Y = 1 | \bar{x}_d, d = 1] - \text{Prob}[y = 1 | \bar{x}_d, d = 0]$$

where \bar{x} refers to all variables other than d , which were held constant at their mean values.

Empirical Results

Table 2 reports parameter estimates and marginal effects for the logit model for factors that influence a hospital's decision to adopt an FTH program. Overall, four of the estimated coefficients are statistically significant and their signs are as expected.

The estimated coefficient for the Healthy Food in Healthcare Pledge (*HealthPledge*) is positive and statistically significant at the 1 percent level. The magnitude of the coefficient of the variable *HealthPledge*, interpreted as the marginal effect, indicates that having signed the pledge significantly increases the probability of a hospital adopting an FTH program. When we hold all of the other explanatory variables constant, the results indicate that hospitals that have signed the pledge have an approximately 35 percent higher probability of adopting an FTH program than hospitals that have not signed the pledge.

Table 2. Parameter Estimates and Marginal Effects from the Logit Model Estimating Factors that Influence a Hospital's Decision to Adopt a Farm-to-Hospital Program

Explanatory Variable	Estimate (Standard Error)	Marginal Effect (Standard Error)
Constant	-0.0122 (0.5914)	
<i>HealthPledge</i>	1.6384** (0.5729)	0.3497** (0.1040)
<i>Meals/Day</i>	-0.0012* (0.0006)	-0.0003* (0.0001)
<i>Foodservice</i>	-0.6033 (0.5034)	-0.1390 (0.1125)
<i>NonmetroAdj</i>	-1.23264* (0.6707)	-0.3194* (0.1526)
<i>FarmCSA</i>	0.5820** (0.2118)	0.1376** (0.0489)
<i>PctLandFarms</i>	0.0106 (0.0158)	0.0025 (0.0038)
Observations	100	
Pseudo R-square	0.2065	
Log-likelihood value	-53.98	
Percent correctly predicted	62	

Note: * and ** indicate statistical significance at 5 percent and 1 percent levels, respectively.

The average number of patient meals prepared per day (*Meals/Day*) has a negative coefficient and is statistically significant at the 5 percent level. The marginal effect of this variable suggests that an increase in the number of meals prepared daily at a hospital would decrease the likelihood of adoption of an FTH program, implying an inverse relationship. Specifically, if the number of patient meals prepared per day increased by 100, the probability of FTH program adoption would decrease by 3 percent. This result is expected due to the amount of food needed for a large number of patients and the fact that supply reliability was a common challenge for survey respondents whose facilities had adopted an FTH program. However, the magnitude of this variable's impact on the adoption decision is quite small.

The percentage of farms participating in CSAs (*FarmCSA*) has a positive coefficient and is statistically significant at the 1 percent level. That is, a 1 percent increase in the number of county farms participating in CSAs would lead to a 14 percent increase in the probability of adoption of an FTH. This is not surprising since communities in which large numbers of farms participate in CSAs understand the importance of and support local food systems. The farms provide customers with a variety of fresh, nutritious foods that hospitals would need to adhere to the dietary guidelines of many patients.

The parameter of *NonmetroAdj* is negative and statistically significant at the 5 percent level. The marginal effect suggests that hospitals located in nonmetropolitan areas adjacent to a metropolitan area have a 32 percent smaller probability of adopting an FTH program than hospitals located outside these areas. This result is consistent with findings by Martinez et al. (2010) that most FTH programs are located in or near metropolitan areas.

The results in Table 2 suggest that neither the type of food service nor the percent of county land allocated to farming has a significant influence on a hospital's adoption of an FTH program. The negative sign on the coefficient for *Foodservice* implies that a hospital that does not have a self-operated food service is less likely to adopt an FTH program than one that does, displaying an inverse relationship. The lack of influence of the percent of county land devoted to agriculture (*PctLandFarms*) is important. Most counties that are strongly influenced by regional food systems require a smaller number of acres to produce high-value crops than counties more focused on large-scale agricultural products.

Conclusion

FTH programs can cultivate an ongoing relationship between hospitals and local food systems. However, factors influencing a hospital's decision to adopt these programs have not been explored. In this study, a logit model was used to identify some of those factors. The information gained from the study can assist farmers in identifying an alternative market for their products and assist cooperative extension personnel who work directly with farmers to find better ways to market their products through FTH programs.

The logit model was estimated using primary data from a regional online survey and secondary data from USDA's Economic Research Service. The empirical results indicate that the Healthy Food in Healthcare Pledge, average number of patient meals prepared daily, percentage of farms in a county that participate in CSAs, and a hospital's county's urbanization classification are major factors that influence a hospital's decision to adopt an FTH program.

Most of the hospitals that have adopted FTH programs are located in counties in or near metropolitan areas. In addition, farmers in areas that have a strong CSA presence who are looking for alternative markets can begin to establish a relationship with hospitals and vice-versa. This can be achieved through regional food distributors or by a direct relationship with hospitals.

The gap in the agricultural and applied economics literature that served as motivation for this research is partially filled by identification of these factors. However, there is a need for additional research on FTH programs to encourage development of a network of hospitals and farms. Many areas of the United States are working to build sustainable food systems through regional networks, and this study can facilitate a discussion among policymakers, farmers, and advocates for local food systems, which will improve the economy of the communities and preserve the environment. The primary goal of this research was to identify factors that influence hospitals' decisions regarding FTH programs. An underlying goal was to provide an avenue by which to explore this type of farm-to-institution programming and build a body of knowledge that will promote additional studies aimed at generating and sustaining new ideas for achieving a healthier, more accessible local food system.

References

- Allen, P., and J. Guthman. 2006. "From 'Old School' to 'Farm-to-School': Neoliberalization from the Ground Up." *Agriculture and Human Values* 23(4): 401–415.
- Allen, P., and C.C. Hinrichs. 2007. "Buying into 'Buy Local': Engagements of United States Local Food Initiatives." In D. Maye, L. Holloway, and M. Kneafsey, eds., *Constructing Alternative Food Geographies: Representation and Practice*. Bingley, UK: Emerald Group Publishing.
- American Hospital Association. 2011. *American Hospital Association Guide to the Healthcare Field 2012*. Chicago, IL: American Hospital Association.
- Bagdonis, J.M., C.C. Hinrichs, and K.A. Schafft. 2009. "The Emergence and Framing of Farm-to-School Initiatives: Civic Engagement, Health, and Local Agriculture." *Agriculture and Human Values* 26(1/2): 107–119.
- Beery, M., and K. Markley. 2007. *Farm to Hospital: Supporting Local Agriculture and Improving Health Care*. Urban and Environmental Policy, Occidental College, Los Angeles, CA. Available at http://scholar.oxy.edu/cgi/viewcontent.cgi?article=1380&context=upe_faculty
- Beery, M., and M. Vallianatos. 2004. *Farm to Hospital: Promoting Health and Supporting Local Agriculture*. Urban and Environmental Policy Institute Center for Food and Justice, Occidental College, Los Angeles, CA.
- Chen, C.J., S.W. Arendt, and M.B. Gregoire. 2010. "What Sustainable Practices Exist in College and University Dining Services?" *Journal of Foodservice Management and Education* 3(1): 5–10.
- Economic Research Service. 2007. *The Atlas of Rural and Small-Town America*. ERS, USDA, Washington, DC. Available at www.ers.usda.gov/data-products/atlas-of-rural-and-small-town-america.aspx (accessed October 2012).
- Greene, W.H. 2008. *Econometric Analysis* (6th edition). Upper Saddle River, NJ: Prentice-Hall.
- Hardesty, S.D. 2008. "The Growing Role of Local Food Markets." *American Journal of Agricultural Economics* 90(5): 1289–1295.
- Health Care without Harm. 2006. *Healthy Food in Health Care: A Pledge for Fresh, Local, Sustainable Food*. Reston, VA: Health Care without Harm. Available at www.noharm.org/lib/downloads/food/Healthy_Food_in_Health_Care.pdf (accessed January 2012)
- Hinrichs, C.C. 2000. Embeddedness and Local Food Systems: Notes on Two Types of Direct Agricultural Markets. *Journal of Rural Studies* 16(3): 295–303.
- Joshi, A., A.M. Azuma, and G. Feenstra. 2008. Do Farm-to-School Programs Make a Difference? Findings and Future Research Needs. *Journal of Hunger and Environmental Nutrition* 3(2/3): 229–246.

- King, R.P., M.S. Hand, G. DiGiacomo, K. Clancy, M.I. Gomez, S.D. Hardesty, L. Lev, and E.W. McLaughlin. 2010. *Comparing the Structure, Size, and Performance of Local and Mainstream Food Supply Chains*. Economic Research Report 99, Economic Research Service, USDA, Washington, DC.
- Kirby, L. 2006. *Hospital Foodservice in Western North Carolina: Implications for the Local Food System*. Asheville, NC: Appalachian Sustainable Agriculture Project.
- Low, S.A., and S. Vogel. 2011. *Direct and Intermediated Marketing of Local Foods in the United States*. Economic Research Report 128, Economic Research Service, USDA, Washington, DC.
- Martinez, S., M.S. Hand, M. Da Pra, S. Pollack, K. Ralston, T. Smith, S. Vogel, S. Clark, L. Lohr, S. Low, and C. Newman. 2010. *Local Food Systems: Concepts, Impacts, and Issues*. Economic Research Report 97, Economic Research Service, USDA, Washington, DC.
- Merrigan, K.A., and M. Bailey. 2008. "The Potential of Farm-to-College Programs." *Nutrition Today* 43(4): 160–165.
- Morrison, K.T., T.A. Nelson, and A.S. Ostry. 2011. "Methods for Mapping Local Food Production Capacity from Agricultural Statistics." *Agricultural Systems* 104(6): 491–499.
- National Research Council Committee on Twenty-first Century Systems Agriculture. 2010. *toward Sustainable Agricultural Systems in the 21st Century*. Washington, DC: National Academies Press.
- Reed, L. 2005. *Specs: The Foodservice and Purchasing Specification Manual, Student Edition*. Hoboken, NJ: Wiley.
- Thilmany, D. 2004. "Colorado Crop to Cuisine." *Applied Economic Perspectives and Policy* 26(3): 404–416.
- Strohbehn, C.H., and M.B. Gregoire. 2005. "Local Foods: From Farm to College and University Foodservice." *Journal of Foodservice Management and Education* 2005(1): fifth article.
- Thilmany, D., and P. Watson. 2004. "The Increasing Role of Direct Marketing and Farmers' Markets for Western U.S. Producers." *Western Economics Forum* 3(2): 19–25.