



Grower to grower: Creating a livelihood on a fresh market vegetable farm

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Grower to grower: Creating a livelihood on a fresh market vegetable farm

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Executive summary

Growing produce is not the biggest hurdle facing most fresh market vegetable growers; earning a reasonable living poses the greatest challenge. One way for farmers to analyze their operations in order to better meet their financial goals is to share information through farmer networks, conferences and coffee shop talk. Farmers may feel reluctant to share sensitive financial information, however.

From 2002-2004, the Center for Integrated Agricultural Systems worked with a group of 19 growers on a participatory, farmer-led case study. The growers collected data on their sales, labor and other aspects of their businesses. They then created financial ratios that allowed them to compare small, medium and large operations in a way that respected their confidentiality. Their goal was not to provide a complete economic analysis of their operations, but to provide a basis for comparisons between farms and discussions of how to forge a quality livelihood from farming. Growers wanting a standard economic analysis of their farms can use traditional balance sheets, financial statements, and cash flow statements.

The information contained in this case study can help guide growers as they set financial and quality of life goals for their farms and structure their operations to realize those goals. There is no ideal size for a fresh market vegetable farm; growers need to use their management skills and economic analysis tools to figure out the scale and level of mechanization that makes the most sense for them.

This case study involved a small number of farms that were not randomly selected. The results, therefore, may not be readily generalized to other operations.

Participating Farms

Most of the farms in this project were located in Wisconsin, although a few were in neighboring states. All but one used organic production practices. They ranged from less than one acre to over 70 acres, and were divided into three scale categories:

Market gardens had fewer than three acres in active production, not including fallow or cover cropped areas. There were six market gardens in this project, with 0.5 to 2.7 acres in active production.





Market farms had between 3 and 12 acres in active production, not including fallow or cover cropped areas. There were eight market farms in this project. Some of these farms were struggling with issues of mechanization versus hand labor, while others were among the more successful and stable in the study.

Vegetable farms produced crops on more than 12 acres, not including fallow or cover cropped areas. There were five vegetable farms in this project. Four were diversified organic operations. An additional non-organic farm that followed low-input, integrated pest management (IPM) practices participated. Its numbers are not included in the stated averages or ranges. Acres in production ranged from 15 to 80 acres.

These farming scales are both similar and different in terms of marketing, equipment, crops and labor.

Marketing: Selling produce directly to customers was the cornerstone of most growers' marketing plans. Most sold product through farmers' markets, restaurants and retail outlets and Community Supported Agriculture (CSA); pick-your-own and on-farm sales were less common. Many growers used one dominant marketing outlet along with a variety of secondary outlets.

Equipment: Equipment value was defined as the growers' estimate of current (resale) value of all farming equipment of lasting or enduring quality, excluding farmers' personal dwellings and land. This is an imprecise measure that should be treated as a rough guide. Investment in equipment per acre ranged from \$2,011 to \$26,784; the smallest farms with no tractors had the lowest investment.

Crops: All of the organic farms in this study grew a wide variety of crops, although some were more specialized than others. Diversification prevented pest buildups and provided some insurance against crop failure. But learning to grow many different crops was challenging, and growers with a wide array of crops often could not justify specialized equipment purchases.

Labor: Labor hours on the market gardens with fewer than three acres ranged from 933 to 2,994 hours per acre, and averaged just under 2,000. Payroll amounted to between 0% and 42% of gross sales. Labor on the 3 to 12 acre market farms ranged from 402 to 1,443 hours per acre and averaged just under 850. Payroll expenses consumed as much as 34% of gross sales on these farms. Labor on the four large-scale

organic vegetable farms ranged from 462 to 613 total hours per acre and averaged 554. Payroll expenses consumed between 19% and 41% of gross farm sales.

Farm finances

The growers participating in this case study tracked their expenses, sales and labor hours over the three years of this project. They helped choose what data to collect and how to analyze it. They opted to compare the annual net cash income they earned from their farms without including factors such as prescribed machinery use and land costs, depreciation and opportunity costs. In their own words, they wanted to know “how much cash they had at the end of the season to provide for themselves and their households—and perhaps take a vacation.” The averages and ranges for some measures are shown below. Although this study was not designed to produce statistically significant quantitative data, average values instead of ranges are reviewed as a means to simplify the discussion and help respect grower confidentiality. The growers used additional ratios that are described in the full report.

Summary of financial measures for three different farm sizes						
	Market gardens under 3 acres		Market farms 3 to 12 acres		Vegetable farms over 12 acres	
	Range	Average	Range	Average	Range	Average
Gross sales/acre	\$8,888-\$25,605	\$15,623	\$6,267-\$15,276	\$11,121	\$6,750-\$14,466	\$10,810
Net cash income/acre	\$1,892-\$9,487	\$5,664	\$1,331-\$8,547	\$4,679	\$1,103-\$7,430	\$3,757
Net cash to gross	9% - 57%	36%	16% - 57%	40%	16% - 51%	31%
Hourly wage for owner	\$3.32-\$6.57	\$4.96	\$2.26-\$16.92	\$7.45	\$3.46-\$14.90	\$11.36

Gross sales per acre: Small plantings of organic, fresh market vegetables, herbs, flowers and berries can garner large gross sales. The farms in this study realized three-year average annual gross sales between \$6,267 and \$25,605 per acre. The most impressive gross sales per acre were seen at the smallest scale of production. These gross sales per acre figures are based only on the land being used for cash crops in a given year. If land in cover crops or fallow land were included, these figures would be lower for most farms. Some farms had additional farm income from enterprises such as eggs, chicken or beef, which were not included here.

Net cash income per acre: Expenses, especially labor costs, can quickly eat into gross sales on a vegetable farm of any size. Net income matters most in terms of financial sustainability. The term net cash income is used in this report to describe a farm’s gross sales minus all current year cash expenses. Factors such as prescribed machinery use and land costs, depreciation and opportunity costs were not included. Three-year average net cash income for the farms in this study ranged from under \$2,000 to over \$8,000 per



acre. Market gardens experienced more year-to-year variation in net cash income per acre than the two larger farm types.

Community Supported Agriculture (CSA) appeared to help stabilize income. CSA farms are assured relatively steady sales because members pay for their share of the harvest at the beginning of the year. Other marketing strategies are subject to the vagaries of the marketplace and weather.

Comparing net cash income to gross sales: Dividing net cash income by gross sales results in a net cash to gross ratio. Higher net cash to gross ratios were strongly associated with farms that concentrated on CSA. The smaller farms with higher net cash to gross ratios had lower payroll expenses, with the farmer doing the bulk of the work and keeping more money. Some larger farms maintained high net cash to gross ratios through careful training and management of labor crews.

Hourly wage: Hourly wages were calculated by dividing the growers' reported net cash income by hours worked. Average hourly wages were as low as \$3.32 on a small farm and as high as \$14.90 on a large farm, averaging \$7.45 for all farms.

Livelihood and quality of life

Most of the small market gardens provided part-time livelihoods for the growers. For most of the market farmers with 3 to 12 acres in production, farming represented a primary or full-time livelihood. Farming was a full-time livelihood for all of the vegetable farmers with over 12 acres in production.

All of the growers in this study reported that they were generally, but not overwhelmingly, pleased with their quality of life. They would like more personal time, health insurance and retirement security. The mid-and large-scale growers also felt that dedicated, skilled employees would improve their quality of life.

There is no universal recipe for success as a vegetable grower. Farmers who excel have a passion for growing and often have business and marketing savvy. Employee management skills are also important. Keys to financial success included increasing work efficiency and utilizing techniques and tools to keep expenses low. Four of the five farms that focused on CSA as their sole or primary marketing outlet were among those with the highest net cash income per acre in the study.



If you would like to learn more about the financial information and ratios described here, please see Appendix A and B or contact John Hendrickson at the Center for Integrated Agricultural Systems: telephone: 608-265-3704, e-mail: jhendric@wisc.edu

Introduction

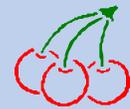
Growing produce is not the biggest challenge facing most fresh market vegetable growers. Although each year has its ups and downs of weather, weeds, insects, and other uncertainties, earning a reasonable living poses the greatest challenge. It is easy to locate information on the fertility needs of broccoli and trellising tomatoes. It is much harder to investigate the prospects for making money growing and selling fresh produce. If you wish to earn \$12,000 or \$36,000 or \$75,000, how many acres do you need to farm to reach that target? How much labor will be required? In what kinds of equipment and facilities will you need to invest?

Traditional tools such as balance sheets, income statements and cash flow analysis are critical to understanding the economics of any farm business. In addition, farmers analyze their operations by sharing information through farmer networks, conferences and coffee shop talk. Many growers are looking for ways to collect financial information and comfortably share it with other farmers.

The Center for Integrated Agricultural Systems worked with a group of growers to share financial information in a way that respected their confidentiality and allowed small, medium and large farms to compare their numbers. This was a participatory, farmer-led case study. The 19 growers involved in this effort collected data on their sales, labor and other aspects of their businesses over a three year period from 2002-2004. They then created financial ratios such as net cash income per acre to launch discussions on how to forge a quality livelihood from farming. They used their ratios to better evaluate labor needs, product pricing, investment in labor-saving equipment and other decisions.

Most of the farms in the study were in Wisconsin, although a few were in neighboring states. All but one used organic production practices. The farms ranged in scale from less than one acre to over 70 acres. These scales are described as the less than three acre market garden, the 3 to 12 acre market farm, and the greater than 12 acre vegetable farm.

The project helped a group of fresh market vegetable growers analyze and compare their finances, equipment and labor. This case study provides information about gross sales and hourly wages on these farms, as well as how much cash the participating growers had on hand at the end of each growing season. Because this case study involved a small number of farms that were not randomly selected, the results cannot be generalized to other operations.



Although each year has its ups and downs of weather, weeds, insects, and other uncertainties, earning a reasonable living poses the greatest challenge.





The farms in this project achieved impressive gross sales per acre, especially at the smallest scales. Earning decent net cash income (gross sales minus all operating expenses except depreciation and the opportunity costs of unpaid/family labor)¹ was a challenge complicated by labor needs and expenses, equipment needs and repairs, and yearly vagaries in markets and weather. Three year average net cash income for the farms in this study ranged from under \$2,000 to over \$8,000 per acre. Average per hour wages were about \$7.45 for all of the participating farmers, with larger farms generally, but not always, providing higher hourly earnings.

While fresh market vegetable growers need a variety of tools in order to evaluate the sustainability of their operations, participants in this project found it very helpful to compare their financial data to farms of similar and different scales. There is no ideal size for a fresh market vegetable farm; growers need to use their management skills and economic analysis tools to figure out the scale and level of mechanization that makes the most sense for them. The information contained in this case study can help guide growers as they set goals for their farms and structure their operations to realize those goals.

Funding for this farmer-driven project came from the USDA Sustainable Agriculture Research and Education Program.²

How was the information collected?

Because this project required trust and collaboration among growers, the farms were not randomly selected. Selected growers were willing to share their financial information and interact openly and honestly with the other participants. In addition, growers were chosen to represent a variety of scales, marketing avenues and levels of experience. While 24 farms initially participated in the project, this number dropped to 19 because some farms chose not to continue and others did not fit the project's goals and objectives. In order to protect growers' identities, this report does not share complete data on individual farms.

The growers helped choose what data to collect and how to analyze it. They opted to compare and contrast the annual net cash income they earned from their farms without including factors such as prescribed machinery use and land costs, depreciation

¹ See page 12 for a more detailed explanation of net cash income and why this measure was used in this study.

² Profit by Planning: Helping Fresh Market Vegetable Growers Meet Financial Goals and Improve their Quality of Life. North Central Region SARE project #LNC01-194.



Participants in this project found it very helpful to compare their financial data with farms of similar and different scales.

and opportunity costs. In their own words, they wanted to know “how much cash they had at the end of the season to provide for themselves and their households—and perhaps take a vacation.” Because of this, the financial figures discussed in this case study present a different picture than a standard economic analysis, which would include prescribed machinery use and land costs, depreciation and opportunity costs. See Appendix A on page 26 for more information on the data collected for this project.



The benefit of the approach used in this case study was that the growers actively participated in the research process and decisions, and helped define project objectives. Ratios provided a useful tool for growers to compare their economic performance, labor hours and investment levels without divulging sensitive figures. The picture represented here is, of course, partial. The results of this work cannot be generalized to other farming operations. The numbers here cannot be compared to standard economic analyses and should not be used by any grower approaching a banker for a loan. The analysis is intended for real-time comparisons of operations and, if used as part of a long-term plan, should be considered alongside traditional financial statements including balance sheets, income statements, and cash flow statements.

Context and participating farms

Organic, fresh market vegetable farming represents an important, viable agricultural business opportunity for growers in Wisconsin. This popular, expanding form of agriculture appeals to those with a passion for growing fresh, high quality food. These growers share a commitment to farming approaches that emphasize soil health and prohibit the use of synthetic pesticides and fertilizers. The organic marketplace has averaged 20% annual growth over the past decade, creating opportunities for existing and beginning growers.³

Consumers have also come to recognize the value of locally grown food. This has contributed to the growing popularity of farmers’ markets, community supported agriculture (CSA, see explanation on page 6) and other forms of direct marketing. Across the Upper Midwest and in other regions, increasing numbers of farmers and consumers are working to create sustainable systems where organic food can be grown and sold mostly within local markets. They perform valuable educational and social functions in connecting consumers with the source of their food. Also, fresh market vegetable farms of all sizes contribute to local economies and provide employment opportunities.



³ Organic Trade Association’s Manufacturer Survey, 2004



Definitions

The majority of organic, fresh market vegetable farms are small by conventional standards. For this publication, the **market garden** is defined as an operation with fewer than three acres in active production, not including fallow areas. Market gardens are capable of producing significant quantities of food or flowers per acre. The small size of a market garden often reduces the amount of machinery and hired labor a grower needs. There were six market gardens in this project ranging from 0.5 to 2.7 acres in active production. Two were separate enterprises that shared equipment and greenhouse space. The market gardeners had an average of 10 years of experience at the beginning of the project.

Market gardeners are most often part-time vegetable growers. All of the market gardeners in this project had additional household earnings from another job, an additional farm or home enterprise, or a partner or spouse with off-farm employment.

The **market farm** is defined here as a mid-size operation with between 3 and 12 acres in active production. At this scale, a farmer or family typically works to secure a full-time livelihood from a relatively modest operation without the equipment costs and labor management issues associated with larger vegetable farms. There were eight market farms in this project, with an average of 10 years of experience at the beginning of the project. They ranged from 3 to 11 acres in production, not including fallow land. At certain points in this report, this group is divided into farms under and above six acres. Some of the farms below six acres rely mostly on personal or family labor, while those above six acres more often need significant hired help and equipment.



The majority of organic, fresh market vegetable farms are small by conventional standards.

These mid-size vegetable farmers must strike a balance between employees and mechanization. Some of these farms are large enough to require a relatively significant investment in equipment and facilities, but not large enough to achieve a reasonable return on that investment, or even afford some types of equipment. If mechanization is shunned in favor of hand labor, payroll expenses can greatly diminish net cash income for these farmers. Within this scale, some participating farms were struggling with these issues while others were among the more successful and stable in the study.

Vegetable farms, as defined in this project, produce crops on more than 12 acres. They typically have large work crews, invest more than \$100,000 in their farms, and are more likely to sell wholesale than smaller operations. Labor management is a primary activity at this scale of production. Farms above 12 acres most often have a fleet of tractors and a wide range of implements. Harvest and post-harvest handling are more likely to be mechanized, although significant hand labor is still required.

There were five farms larger than 12 acres in this project. Four were diversified organic vegetable operations. An additional non-organic farm that followed low-input, integrated pest management (IPM) practices participated. Its numbers are not included in the stated averages or ranges but present an interesting contrast in terms of labor inputs, sales, net cash income and other characteristics. These growers averaged 20 years of experience at the beginning of the project. Production scale ranged from 15 to 80 acres, with an average of 37 acres in active production. Two farms expanded by at least 20 acres during the course of the project; the others stayed about the same size.



There are expanding market opportunities for large-scale, wholesale-focused organic vegetable farms, especially in large urban markets such as the Twin Cities and Chicago. Nationwide, over 70% of supermarkets now carry organic products, and natural food retailers in the region are expanding.⁴ Despite these marketing opportunities, the number of larger organic vegetable farms does not seem to be increasing at the same rate as smaller operations. The reasons for this are unclear, but may include hesitation about labor management and equipment costs. Smaller scale vegetable farmers may also be lured by ideals about quality of life on small farms that may or may not be realized. Such growers tend not to be interested in larger scale vegetable farming.

Table 1. Overview of participating farms

Farm scale	Number in study	Acres in active production		Years of experience	
		Range	Average	Range	Average
Under 3 acre Market Garden	6	0.5 to 2.7	1.3	3 to 27	10
3-12 acre Market Farm	8	3 to 11	6.8	6 to 14	10
Over 12 acre Vegetable Farm	5	15 to 80	37	9 to 30	20

Marketing

Selling produce directly to customers was the cornerstone of most of these farms' marketing strategies. Ten of the farms sold product at farmers' markets, where customers tend to seek high quality produce. Fourteen sold directly to restaurants or



There are expanding market opportunities for large-scale, wholesale-focused organic vegetable farms.

⁴ Catherine Greene and Carolyn Dimitri, in *Amber Waves*, February 2003, USDA's Economic Research Service, www.ers.usda.gov/amberwaves/feb03/findings/organicagriculture.htm.



All of the growers in this project generally followed diversified marketing strategies.

retail outlets such as natural food stores, cooperatives and supermarkets. This “direct wholesale” marketing usually brought these farmers higher prices than selling through a distributor. While vegetable growers also sell directly to customers through pick-your-own and other on-farm sales, these strategies were less common in this project.

Another marketing option used by 13 of the 19 farms was Community Supported Agriculture (CSA). CSA customers become farm members by paying for a share of the harvest at the beginning of the season. This membership or share price entitles them to weekly deliveries of whatever is being harvested. The CSA farms in this study served from 25 to 35 member households per acre.

All of the growers in this project generally followed diversified marketing schemes. Among the market gardens under three acres, all but one sold produce through more than one outlet, with an average of 2.5 marketing strategies per farm. These strategies included farmers’ markets, CSA, selling to restaurants and retail stores, and on-farm sales such as pick-your-own or farm stands. However, all but one farm had a clearly dominant marketing avenue that accounted for at least 70% of sales. One farm sold its produce exclusively to CSA members. Having a focused marketing plan seemed to work well for most of these growers, although they valued having several sales outlets.

Like the smaller market gardens, the 3 to 12 acre market farms engaged in an average of 2.5 different marketing strategies per farm. Five of these eight farms used a focused marketing approach. One farm sold all of its produce to restaurants and retail stores, and another sold 80% of its products at farmers’ markets. Three farms were exclusively, or almost exclusively, supported by CSA members. Based on data collected in this project, a hypothetical six-acre CSA farm could supply food for 150 to 200 member households, have gross sales of \$80,000 and a net cash income of around \$40,000. The remaining three farms engaged in multiple marketing efforts including farmers’ markets, CSA, restaurants, retail stores, wholesale and on-farm sales.



The vegetable farms over twelve acres also tended to be diversified with a clear marketing focus. The four organic farms averaged 3.4 marketing outlets, which is slightly more than for the smaller farms. The greater number of outlets likely helped these growers move much larger volumes of produce. Three of these farms had a dominant marketing strategy accounting for at least 80% of gross sales. Although larger farms are more apt to sell wholesale, these four farms sold large amounts of their

product directly to consumers as well as to wholesale markets. Each sold produce via the CSA model. Using data from this project, a 20-acre CSA vegetable farm might supply food to as many as 600 member households. The non-organic farm sold all of its product, in addition to produce purchased from neighboring farms, at a well-established roadside stand.

Equipment

It is possible to operate a market garden of less than an acre with little more than a shovel, rake, hoe and garden hose. However, most serious market gardeners acquire labor-saving tools such as walk-behind rototillers, mowers, small greenhouses and small refrigeration units. Some growers, especially those farming more than an acre, use small tractors with a limited array of implements.

The market gardeners owned farming equipment that ranged in value from \$2,011 to \$26,192 per acre. Those without tractors had equipment valued at \$4,000 to \$6,000 per farm.⁵ Market gardens with tractors had equipment valued at \$12,000 to over \$40,000 per farm. The growers who spent the most money on equipment had been in business longer, were using their equipment for another farm- or home-based enterprise, and/or had made the decision to buy a new tractor.

Experienced market gardeners advise beginning growers to first purchase equipment that will support the back ends of their operations. A small walk-in cooler to maintain high product quality or an irrigation system to assure consistent yields and quality might be more important early purchases than a tractor.

A market gardener with one or two acres may be able to operate with a sturdy walk-behind tiller. On 3 to 12 acre market farms, it is more efficient and easy on the body to use small tractors and implements such as a plow, rotavator, mower, field cultivator and transplanter. Walk-in coolers, greenhouses for transplant production, and hoopouses for crop protection and season extension are found on most market farms. Growers in this project felt that market farms need, at a minimum, a reliable tractor (and often a back-up tractor), a rotavator to incorporate cover crops and prepare ground for planting, a walk-in cooler to maintain product quality, and an irrigation system.

⁵ Equipment value was defined as the estimated current (resale) value of all farming equipment of lasting or enduring quality (tractors, implements, tools, buildings, etc.). This was admittedly an imprecise measure, and readers are cautioned to treat these figures as rough guides. Farmers' personal dwellings and land are not included in this figure. See Appendix A for more information.



Experienced market gardeners advise beginning growers to first purchase equipment that will support the back ends of their operations, such as a small walk-in cooler.



Friends of Troy Gardens

Facilities for vegetable production and post-harvest handling

The project participants supplied information on their production and post-harvest handling facilities. Space requirements, utilization and efficiency varied among the participating farms. The larger farms generally moved more transplants through their greenhouses and produce through their washing and packing facilities than the smaller farms, and had lower average square feet per acre (sf/a) in these facilities than smaller farms. Refrigeration needs were more similar among all farms, at 120 to 125 cubic feet per acre (cf/a) in cultivation.

Table 2. Typical facility size per acre of production

Farm scale	Greenhouse (for transplant production)		Washing and packing area		Refrigeration	
	Range	Average	Range	Average	Range	Average
0-6 acres	60-400sf/a	300 sf/a	80-250sf/a	150 sf/a	30-250 cf/a	125 cf/a
6-80 acres	30-300 sf/a	130 sf/a	30-130 sf/a	70 sf/a	50-250 cf/a	120 cf/a

The estimated current value of farming equipment on the 3 to 12 acre market farms ranged from \$1,543 to \$26,784 per acre, with an average value of about \$10,500 per acre or \$60,000 per farm. The median value was just \$7,500 per acre, as two farms had considerably higher estimated equipment values. Farms under six acres averaged around \$50,000 in equipment while those above six acres averaged \$70,000. Equipment values were not always directly related to farm scale. Three of the eight farms carried debt on their equipment that ranged from \$1,200-\$90,000. The farms with high debt were gearing up to expand significantly.

Vegetable farms over 12 acres have considerable equipment needs, unless a limited range of crops is grown. These farms often have a fleet of at least three tractors and numerous implements for tillage, cultivation, cover crop management and harvesting. Some have several small tractors with specific cultivating tools mounted and ready to go at a moment's notice. Large vegetable farms tend to have relatively sophisticated post-harvest handling facilities. A typical setup includes a designated building for washing, grading, sorting, bagging and cooling produce. Multiple walk-in coolers are often used to accommodate different optimal holding temperatures.



The estimated current value of farming equipment on the large-scale organic farms ranged from \$4,054 to \$12,915 per acre. The non-organic farm had less than \$36,000 in equipment, but produced a limited array of vegetables on 17 acres. The organic farms had equipment valued at over \$7,454 per acre on average. Two farms had higher equipment values per acre—around \$12,000—while the two others were much lower: \$4,054 and \$6,106. These latter two farms, including an older, more stable farm with a small amount of debt and a younger, expanding farm with a

great deal of debt, carried debt on their equipment. Appendix C on page 36 details sample equipment options at different scales of operation.

Crops

All of the organic farms in this study grew a variety of crops for farmers' markets, although some were more specialized than others. Crop diversity provided these farmers with a degree of security. In a given year, some crops may have fared poorly but others performed well. Diversity enabled crop rotations that prevented pest buildups, although rotating crops was hard for growers with limited space. On the other hand, diversification challenged farmers to become adept at growing a wide variety of crops. Especially at smaller scales, it was difficult for diversified farms to justify buying specialized equipment because modest plantings and harvests usually did not warrant significant equipment expenditures.

Labor

Labor significantly impacts sales, net cash income and quality of life on all farms producing fresh market vegetables. Planting, cultivating, harvesting, washing, packaging and selling produce are labor-intensive activities, even at a small scale. In addition, marketing, sales and deliveries require a significant time investment. Vegetable growers also spend considerable time during the off-season planning, marketing, repairing machinery, updating records and ordering seed and supplies. Vegetable production is a year-round vocation.

Labor hours per acre and per farm are summarized in Table 4 on page 13. Labor hours on the market gardens with fewer than three acres ranged from 933 to 2,994 hours per acre, and averaged just under 2,000. These growers performed anywhere from 33% to 98% of the total labor hours in their enterprises. Payroll amounted to between 0% and 42% of gross sales, with an average of 22%. The farm with the highest labor needs and payroll grew berries as a primary crop.

The 3 to 12 acre market farms in this study ranged from 402 to 1,443 labor hours per acre and averaged just under 850. Farms under six acres averaged 1,000 labor hours per acre, while farms over six acres averaged 707 hours per acre. The market farmers in this project contributed 40% to 97% of the total labor hours in their enterprises themselves. The four market farms over six acres typically managed crews of four to eight workers. Payroll expenses consumed as much as 34% of gross farm sales, although the average was 16%.

Vegetable farms over 12 acres often have crews of 10 or more people during the growing season. A 20-acre vegetable farm may require 12,500 or more total labor hours per year. The four large-scale organic operations ranged from 462 to 613 total



Crop diversity enabled rotations that prevented pest build-ups, although rotating crops was hard for growers with limited space.



labor hours per acre and averaged 554. The farmers themselves accounted for between 17% and 45% of the total labor hours in these enterprises. Payroll expenses consumed between 19% and 41% of gross farm sales (average of 32%). This average may be low, given that one of the farms used a good deal of unpaid volunteer labor from CSA members in addition to paid employees. In contrast, the non-organic farm logged only 166 labor hours per acre.

Table 3. Labor hours per acre for three farm sizes over three years

Farm scale	Average labor hours/acre	Labor performed by farm owner		Payroll expenses as a % of gross income	
		Range	Average	Range	Average
Under 3 acres	1,957	33-98%	60%	0-42%	22%
3 to 6	1,000	52-97%	64%	1-29%	13%
6 to 12	707	40-67%	53%	12-34%	20%
More than 12 acres	554	17-45%	31%	19-41%	32%



Growers used ratios such as net cash income per acre and labor hours per acre to compare their numbers in a confidential way with farms of similar and different scales.

Farm finances

The farmers participating in this case study identified financial indicators they wanted to track and kept diligent records of these numbers over the three years of the project. Tracking expenses, sales and labor hours helped them set prices that covered their costs, and put them in a better position to make decisions that could improve their efficiency and quality of life. They used ratios—numbers in relation to one another—such as net cash income per acre and labor hours per acre to help compare their numbers with farms of similar and different scales. In order to protect the identities of participating growers, most of the numbers are presented here as ranges and averages.

See Appendix A on page 26 for specific descriptions of the data collected for the project and additional comparisons of the ratios for each of the farm scales. Appendix B on page 34 is a worksheet you can use to collect numbers for your farm and create your own ratios.

Gross sales

Given the high value of organic, fresh market vegetables, herbs, flowers and berries, relatively small plantings can garner large sales. The farms in this study realized average annual gross sales between \$6,276 and over \$25,605 *per acre* based on three-year

averages of land in production that year.⁶ Potential gross sales per acre for cut flowers alone are reported to be even higher.⁷

These gross sales per acre figures are based only on the land being used for cash crops in a given year. If land in cover crops or fallow were included, these figures would be lower for most farms. The farms in this study varied widely in how intensively they used their land and how much land they had available for cover crop rotations.

Gross sales per acre and per farm are summarized in Table 4 on page 13. The most impressive gross sales per acre were seen at the smallest scale of production. The three-year average for the six farms under three acres ranged from \$8,888 to \$25,605 and averaged \$15,623 per acre. Two farms influenced this average with gross sales per acre over \$20,000; the median value for all six farms was \$13,586. Not surprisingly, the more labor hours per acre invested by the grower, the higher gross sales per acre.

For the 3 to 12 acre farms, three-year average annual gross sales ranged between \$6,267 and \$15,276 and averaged \$11,121 per acre. The farms under six acres had a significantly higher per acre average—\$12,658—than those farming more than six acres—\$9,701. Only one farm that mainly sold wholesale earned less than \$8,000 in gross sales per acre.

The four organic vegetable farms over 12 acres realized three-year average annual gross sales between \$6,750 and \$14,466 per acre. These figures are similar to the gross sales on the 3 to 12 acre farms. The smallest farm in this size category achieved the highest gross sales per acre over the course of the project:

2002: \$12,137 **2003:** \$14,575 **2004:** \$16,687 **Average:** \$14,466

The organic vegetable farms earned average gross sales of \$10,810 per acre. The non-organic farm, which concentrated on crops such as sweet corn, tomatoes and other standard fare, achieved \$2,500 in gross sales per acre.

High gross sales per acre are not always easy to achieve. Local markets and prices significantly influence gross sales potential.

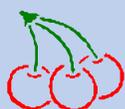
⁶ The figures in the section represent gross sales from land in vegetables, herbs, berries, and flowers. Some farms had additional farm income from enterprises such as eggs, chicken, beef, or other products. Fallow land was not included, nor were headlands and field roads.

⁷ *The Flower Farmer: An Organic Grower's Guide to Raising and Selling Cut Flowers*. 1997. Lynn Byczynski. Chelsea Green Publishing Company.



A farm is never fully capitalized; there are always improvements and repairs to make.





Most growers find that they cannot sustain high gross sales per acre as their farms get bigger.

Most growers in this case study had access to markets in at least one mid-size town, if not a city such as Madison or the Twin Cities. Smaller farms earn greater gross sales per acre by planting at higher densities, providing more attention and care to crops, growing high value crops for specialty markets, and planting more than one crop on a given area over the course of a season. Greater gross sales per acre may be achievable with extensive use of season extending technologies or in locations with longer growing seasons. Prior to the study, the author had anecdotal evidence that organic vegetables can gross \$8,000 to \$12,000 per acre. This research confirms this observation, but also suggests that higher gross sales are possible.

Most growers find that they cannot sustain high gross sales per acre as their farms get bigger. Dense plantings become impractical because of the need for tractor cultivation. Growers' time and attention is spread over more acres and the niche markets for valuable specialty crops may not be large enough to warrant extensive plantings.

Net cash income

Expenses, especially labor costs, can quickly eat into gross sales on a vegetable farm of any size. Net income matters most in terms of financial sustainability. As explained in the methods section, the farmers in this study chose not to collect standard net income figures for their operations. Depreciation was not included, but all cash outlays related to depreciable property (such as interest payments) were included as expenses. The value of buildings and land was not included. The group wanted a figure that reflected the amount of cash in hand at the end of the year. The term **net cash income** is used in this report to describe a farm's gross sales minus all current year cash expenses.⁸ Net cash income per acre and farm is summarized in Table 4, page 13.

Three-year average net cash income for the market gardens under three acres ranged from \$1,892 to \$9,487 per acre, with an average net cash income of \$5,664 per acre.

This is not a great return for a season's worth of hard work, especially when a market gardener may have worked 1,500 to 2,000 hours on his or her farm. The highest single-year net cash income per acre recorded over the three years of the project was \$17,269 (\$8,980 from roughly a half-acre farm) and the lowest was a loss of \$1,886.

Nearly all of these market gardens had extremely variable net cash incomes from year to year. For example, over the three years of this project, a one-acre market gardener reported earning annual net cash income of \$5,056, \$7,753 and \$12,260. These figures reflect variation in weather and markets as well as outlays for major equipment repairs and purchases. They demonstrate the challenge of earning a steady livelihood from a small farm.

⁸ Factors such as prescribed machinery use and land costs, depreciation and opportunity costs were not included in net cash income calculations.



Table 4. Farm finances for three farm sizes, per acre and per farm

Farm scale	Labor hours per acre		Gross sales per acre		Net cash income per acre	
	Range	Average	Range	Average	Range	Average
<3 acres	933-2,994	1,957	\$8,888-\$25,605	\$15,623	\$1,854-\$9,487	\$5,664
3-12 acres	402-1,443	850	\$6,267-\$15,276	\$11,121	\$1,331-\$8,547	\$4,679
>12 acres	462-613	554	\$6,750-\$14,466	\$10,810	\$1,103-\$7,430	\$3,757
Farm scale	Total farm* labor hours		Total farm* gross sales		Total farm* net cash income	
	Range	Average	Range	Average	Range	Average
<3 acres	1,229-4,972	2,464	\$11,316-36,029	\$18,947	\$3,103-8,682	\$6,026
3-12 acres	3,004-8,646	5,045	\$32,040- \$138,759	\$71,203	\$5,597-53,513	\$29,080
>12 acres	9,697-37,879	19,450	\$228,567-783,979	\$337,096	\$38,110-187,043	\$108,713

*Total farm figures refer to vegetable or fruit enterprises only, not other enterprises such as pastured poultry.

Three-year average net cash income for the 3 to 12 acre market farms also ranged widely—from \$1,331 to \$8,547 per acre, with an average of \$4,679 per acre. The 3 to 6 acre market farms had a significantly higher average, \$5,903, than the \$3,550 average achieved on the 6 to 12 acre farms. This is because smaller farms often have lower labor needs and operating expenses than larger farms. At 3 to 6 acres, the farmer or farm couple can still perform a significant amount of the work themselves. The highest single-year net cash income per acre was \$9,792 on a farm just above three acres.

While net cash income on individual market gardens under three acres varied widely from year to year, most of the individual 3 to 12 acre market farms realized more consistent net cash income per acre. The following net cash income figures were reported by two of these mid-size farms:

Total Farm* Net Cash Income

Farm ⁹	Acres in Vegetables	2002	2003	2004
Farm 1	4	\$35,615	\$39,400	\$37,821
Farm 2	10	\$47,940	\$48,750	\$46,750

*Total farm figures refer to vegetable or fruit enterprises only, not other enterprises such as pastured poultry.

Three farms in this category, including the two in the above table, were established CSA farms. CSA farms are assured relatively stable sales because members pay for their shares at the beginning of the year. Other sales are subject to the vagaries of the marketplace and weather. Earnings on all market farms varied somewhat from year to year as a result of outlays for major equipment repairs and purchases.



While net cash income on market gardens under three acres varied widely from year to year, most of the 3 to 12 acre market farms realized relatively consistent net cash income per acre.

⁹ In Appendix A, Farm 1 is referred to as Farm I and Farm 2 is referred to as Farm N.



Three-year average net cash income for the organic vegetable farms over 12 acres ranged from \$1,103 to \$7,430 per acre. The average was \$3,757. The non-organic farmer earned \$1,546 per acre.

Individual larger scale vegetable farms achieved fairly consistent gross sales and net cash income per acre throughout the project compared to the small farms. This is likely due, in part, to the fact that many of the farmers had more experience and established markets for their products. One of the newer, large farms had the lowest sales and net cash income per acre. Furthermore, some of the smallest scale growers were juggling farming with an off-farm job, which could lead to lost opportunities. All of the organic farms over 12 acres used CSA, which provided consistent sales.

Crop failures and bumper crops obviously affected net cash income. One farm over 12 acres had a bumper crop of high-value red peppers in the last year of the project that dramatically boosted its gross sales and net cash income. Another farm experienced a loss of a significant crop that caused its sales and net cash income to dip in year two.



Individual larger scale vegetable farms achieved more consistent gross sales and net cash income per acre from year to year throughout the project compared to the small farms.

Reinvesting in the farm business

Investment in equipment such as tillers, tractors and coolers enhances a farm's net worth. Adding net cash income to the amount invested back into the farm and dividing by acres in vegetables yields **net cash income plus reinvestment per acre**.¹⁰ This ratio provides a means to compare farms that are currently making major equipment purchases or repairs with those that are not.

Each scale group reinvested an average of 13 to 14% of its gross sales in new equipment or major repairs to existing equipment. This demonstrates that some cash will almost always be needed for improvements and repairs. There may be years when reinvestment is low or nil, but other years it could consume 10 to 30% of gross sales.

The average net cash income plus reinvestment for the market gardens under three acres ranged from \$3,202 to \$10,478 and averaged \$7,133 per acre. This is about \$1,500 more than their net cash income per acre. Net cash income plus reinvestment on the 3 to 12 acre market farms ranged from \$2,651 to \$9,807 and averaged \$6,141 per acre. This is \$1,462 more than their net cash income per acre. On the vegetable farms, net cash income plus reinvestment ranged from \$2,169 to \$9,526 and averaged \$5,049 per acre. This is \$1,292 more than their net cash income per acre.

¹⁰ Reinvestment represents the amount spent in a given year on farming equipment of lasting quality.

Comparing net cash income to gross sales

Dividing net cash income by gross sales results in the ratio **net cash to gross**. These figures are summarized in Table 5 on page 16. The market gardeners had an average three year net cash to gross ratio ranging from 9% to 57% and averaging 36%. All but one fell between 32 and 57 percent. One grower's ratio was very low due to a major crop failure one year. Although crop failures are part of farming, it is likely that most market gardens can achieve and maintain net cash to gross ratios of at least 40%. Most of these farms had considerably lower net cash to gross ratios in one of the three years. One farmer had ratios of 77% and 80% for two years, but this ratio plummeted to 15% one year due to a major tractor repair.

Most of the 3 to 12 acre market farms had average, three-year net cash to gross ratios ranging from 16% to 57% and averaging 40%. The average was influenced by two farms with average ratios of 16% and 17%. One of these farms had high payroll expenses while the other had unusually high annual operating expenses. Without these two farms, the average climbs to nearly 50%. This seems like a reasonable target for most market farms. Most of the more established farms had higher, relatively stable net cash to gross ratios while several of the newer farms' ratios increased over the course of the project.

The organic vegetable farms over 12 acres had average, three-year net cash to gross ratios between 16% and 51% and averaging 31%. The non-organic farm came out on top, at 61%. This farm grew fewer crops and therefore had less equipment and labor expenses than the organic farms. The lower net cash to gross ratios on the larger farms result from more wholesale marketing, and may be compensated for by volume. A 30% to 40% net cash to gross ratio may be a practical target for large-scale organic vegetable farms. However, a higher ratio is possible.

Higher net cash to gross ratios were strongly associated with farms that concentrated on CSA. Of the nine farms that had ratios over 50%, eight had a strong CSA component. CSA tends to assure more stable gross sales that are sheltered from unfavorable weather and marketplace fluctuations. Some CSA farms make extensive use of unpaid volunteer labor or have members who barter for their share of vegetables by working for the farm, thereby reducing labor costs. Marketing costs may be substantially reduced for established CSA farms. Crafting a budget and having cash in hand at the beginning of the season may result in more careful spending on CSA farms.



Higher net cash to gross ratios were strongly associated with farms that concentrated on CSA.





The market gardens and smaller farms with better net cash to gross ratios were those that had lower payroll expenses, with the farmer doing the bulk of the work and keeping more money.

The market gardens and smaller farms with better net cash to gross ratios were those that had lower payroll expenses, with the farmers doing the bulk of the work and keeping more money. Some of these operations had less equipment and did more work by hand. Some larger farms maintained high net cash to gross ratios through careful training and management of labor crews. Several newer farms with low ratios were in the process of buying equipment and expanding acreage. Some also carried debt. Part-time market gardeners with significant off-farm earnings sometimes had lower ratios. Interestingly, in this project, farms in the 3 to 12 acre range were more likely to have net cash to gross ratios near or above 40% than those below three acres or over 12 acres.

Table 5. Comparing net cash income to gross sales for three farm sizes

Farm scale	Net cash to gross	
	Range	Average
<3 acres	9%-57%	33%
3 to 12 acres	16%-57%	40%
>12 acres	16%-51%	31%

Appendix D on page 39 provides examples of sales, expenses and net cash income on three of the project farms, one at each scale of operation.

These net cash income to gross sales ratios paint a partial picture, as they do not account for net cash income that was invested back into the farm business. **Net cash income plus reinvestment divided by gross sales** includes this reinvestment. For this ratio, the market gardens of less than three acres ranged from 23% to 83% and averaged 46%, the 3 to 12 acre market farms ranged from 33% to 67% and averaged 53%, and the vegetable farms with over 12 acres ranged from 32% to 64% and averaged 43%. This ratio was 66% on the non-organic farm.



Hourly wage

Hourly wages, summarized in Table 6 on page 17, were calculated by dividing the growers' reported net cash income by hours worked. Hourly wages varied widely for individual market gardeners farming fewer than three acres. For example, one market gardener's calculated net cash hourly wages were \$3.72, \$5.54, and \$8.83 in each of the three years of the project. The average annual net cash hourly wage for this group

was about \$5.00. The highest single year net cash hourly wage was \$10.68; the lowest was -\$2.76, which was the result of a primary crop failure.

Net cash hourly wages on the 3 to 12 acre market farms ranged from less than \$3.00 to about \$17.00 with significant annual variation on individual farms. The average annual net cash hourly wage for the whole group was \$7.45. Finding and affording appropriate equipment was considered a key challenge by many of these farmers. There is a clear need for tools, equipment and systems that can help these growers work efficiently and reduce payroll costs.

While the large vegetable farms typically had significantly lower gross sales and net cash income per acre than the smaller farms, these growers tended to earn higher hourly wages. The three-year average net cash hourly wage for the four organic farmers ranged from \$3.46 to \$14.90 and averaged \$11.36. Three of the farms had very similar averages of over \$13 per hour while one (with less experience and a focus on wholesale markets) earned only \$3.46. The non-organic grower's net cash hourly wage was \$6.79 per hour.

Managing an efficient work crew coupled with an effective line of tools and implements was key to achieving a decent hourly wage at all scales. Achieving high gross sales per acre also helped. A high net cash income to gross sales ratio did not guarantee a good hourly wage, but a low net cash income to gross sales ratio was always associated with a low hourly wage.

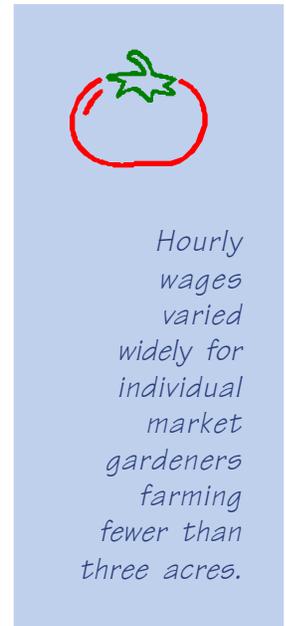


Table 6. Hourly wage of owner for three farm sizes over three years

Farm scale	Net cash income hourly wage (net cash income/hours worked)	
	Range	Average
<3 acres	\$3.32-\$6.57	\$4.96
3 to 12 acres	\$2.26-\$16.92	\$7.45
>12 acres	\$3.46-\$14.90	\$11.36

Each farmer brings a different set of experiences, skills, resources, savings and goals to his or her enterprise. Accordingly, financial success is uniquely defined and achieved for each individual. A retiree who operates a market garden on land he or she owns will have different financial needs than a young market gardener who may want to buy a small farm. The growers in this project were passionate about farming and deeply appreciated the farming lifestyle. They may have been willing to accept lower pay in order to achieve quality of life goals that included living and working on a farm.

Larger farms are also building significant equity. When they decide to call it quits, they will have land and equipment to sell. Larger farms also offer the possibility for farmers to sell off a portion of their land upon retirement and still keep a house to live in. Zoning restrictions may limit this option for smaller farms, even if they have enough land to divide and still maintain a house.



Quality of life is a vital part of the decision to grow and market fresh vegetables.

Livelihood and quality of life

Dollars are not the only measure of success or sustainability. Organic vegetable growers may go into business for other reasons. They may want to live as a farmer in the country, raise their children on a farm, create sustainable farming and food systems, grow healthy food, or restore degraded land. Quality of life is a vital part of the decision to grow and market fresh vegetables.

The market gardeners operating fewer than three acres reported that they were generally pleased with their quality of life, although one expressed frustration because he did not own or live on the land used for production and longed for more stability. Most of these small enterprises provided part-time livelihoods and were combined with growers' off-farm jobs, a partner or spouse's off-farm job, and/or a complimentary small business such as selling other farms' produce via a farmstand, pastured poultry or arts and crafts.

All but one market gardener associated larger farms with decreased quality of life and did not have plans to expand. One young couple expanded from two to almost ten acres in year three of the project. This move helped them realize their dream of working together full-time on their farm. All of the market gardeners wanted more personal time, health insurance and retirement security, and increased financial compensation.

The market farmers operating 3 to 12 acres also reported that they were generally pleased with their quality of life. However, nearly all the growers at this scale rated their quality of life with a score of two on a scale of one to four, suggesting room for improvement. Quality of life for these growers was diminished by employee management difficulties and long work hours. All the growers strongly desired skilled, dedicated employees who would stay with the farm for more than one year.

For most of the mid-size market farmers in this study, farming represented a primary or full-time livelihood. On four of the eight farms, the growers worked part-time off the farm during the winter. On another, a spouse had off-farm earnings. One farm combined its vegetable operation with a large pastured poultry enterprise that was not included in the project data.

There was a clear and challenging dynamic between the level of mechanization, equipment expenses and hired labor on the 3 to 12 acre market farms. Most farms associated having more equipment with a more positive quality of life, while several associated mechanization with decreased quality of life. All growers wanted efficient systems that would help them accomplish their work in a timely, effective manner.

Most of these market farmers aimed to earn a livelihood from a mid-size farm, although two farmers were planning to expand beyond 12 acres. The other growers felt an increase in farm scale would bring a decline in their quality of life. These growers also desired health insurance and retirement security, networking opportunities with other growers, progress toward developing a sustainable farm, and increased financial compensation.

Like the mid-size market farmers, most of the vegetable farmers with more than twelve acres rated their quality of life with a score of two on a scale of one to four. Employee management issues were the main reason for diminished quality of life for these farmers. Like the mid-size farmers, these growers valued hard-working employees who stayed for many years. They put a high value on developing sustainable farming systems and rotations that build soil health and reduce weed and pest pressure.

Farming was a full-time livelihood for all the large-scale farmers in this study. None of these farmers had off-farm jobs, although spouses had off-farm jobs on one farm managed by two partners.

Special challenges

There are many challenges for vegetable growers that may vary with scale of production. Some of the most common challenges are:

1. Finding affordable land, including adequate land for crop rotations. Crop rotations build and maintain soil fertility and prevent pest and weed problems. Many growers in this project wanted to be able to afford the land necessary for an extended crop rotation, with land kept idle under cover crops for a year or more.
2. Achieving a scale of production and marketing that meets net cash income needs and goals without the expense and hassles of extensive paid labor. One larger scale grower expressed this as a conflict between his desire to have well-paid employees and an honest need to earn more money for his household.
3. Balancing hand labor with scale-appropriate, inexpensive tools and machinery. This is especially true at the small and mid-size scales of production. For the 3 to 12 acre market farms there are significant gaps in available—and affordable—equipment.
4. Finding and managing employees. While there are more and more young people interested in organic farming, finding hard workers who are a good match with a farmer's management style is a year-to-year challenge. Many workers put in only one season on a farm before leaving.



Farming was a full-time livelihood for all the large-scale farmers in this study.





There is no universal recipe for success as a vegetable grower.

5. Balancing the demands of a farm with personal time, health considerations, personal and social relationships, and raising children. Some part-time growers also struggle with balancing their farm businesses with off-farm jobs.

Keys to success

There is no universal recipe for success as a vegetable grower. Farmers who excel have a passion for growing, and they enjoy the work. They also often have a certain amount of business and marketing savvy. Employee management skills are also important. The following observations and recommendations were gleaned from this case study:

- Farming begins with the soil, and making money requires managing soil for optimal health, fertility and weed management. Smaller growers are wise to adapt cover cropping and soil fertility practices from larger farms. For example, some of the market gardens under three acres seeded narrow strips of various cover crops on unused sections and between cash crops. For more information, see *Cover Crops on the Intensive Market Farm*, published by CIAS.
- Season extending techniques and technologies, such as hoopouses, can increase gross sales through longer harvest seasons and premium prices paid for vegetables out of season. Growers should fully consider the additional costs and work commitment required to extend the growing season, including, perhaps, some negative impacts on quality of life.
- Focus on quality and set your prices accordingly. The smaller grower's advantage over larger growers (and all growers' advantage over most conventional trucked-in produce) is offering premium quality crops using limited land and equipment.
- It is often best to avoid standard commodity crops such as russet potatoes and sweet corn. Seek unique crops or unusual varieties of standard crops. Carefully evaluate labor-intensive crops such as berries.
- Keep records of your production costs and price your products accordingly. Run your market garden like a business, even if it is mostly a hobby. If you lack business skills, hand off those duties to a partner while you focus on production.
- Try to limit your investment in equipment, but do invest in tools that will increase productivity. For instance, investing in a small cultivating tractor and set of cultivating tools frees up labor for activities more closely linked with generating

income: harvesting, post-harvest handling and marketing/sales. Analyze equipment purchases carefully to ensure that tools fit your operation and goals. At smaller scales, an irrigation system and cooler may be more important early purchases than a tractor. Be careful not to fall into the trap of thinking that higher earnings are just one more equipment purchase away. Auctions can be excellent places to buy used equipment at low prices—if you know what you're looking for and have enough knowledge to judge quality. For some specific ideas about equipment for vegetable production, see the University of Wisconsin's Healthy Farmers, Healthy Profits web site: bse.wisc.edu/hfhfp/



- Develop a marketing plan. Most growers find that direct marketing through farmers markets or CSA is more profitable than selling wholesale. Other farms earn better-than-wholesale prices from direct sales to restaurants and retail stores. Some growers prefer to focus on one market. Other growers feel that a diversified marketing strategy ensures stability and flexibility. With most direct marketing, it is often the grower's personality that sells the produce. You are marketing yourself and your farm as much as your vegetables.
- Spend time developing your employee management style and training workers. Communication is critical. When interviewing potential employees, make sure their goals and expectations mesh with your own. Consider offering advanced positions and pay increases for good workers who stay for more than one year. Beginning growers or those expanding their operations should carefully consider whether they have the desire, temperament and skills to be effective managers. Do not underestimate the value of building up your management skills through workshops, reading books, or talking with more experienced farmer-managers.
- Strive for a net cash to gross ratio of at least 40 to 50 percent. (This goal may be somewhat lower on large farms). Keep expenses low. If on a smaller scale farm, do most of your own work. Manage an efficient work crew and mechanize thoughtfully. If on a larger scale farm, retain a focus on direct marketing.
- Learn from others. Network with other growers and visit as many farms as you can to discover new ways to grow, market and manage your business. Many growers are willing to share information and strategies.



Network with other growers and visit as many farms as you can to discover new ways to grow, market and manage your business.

Summary

The farmers participating in this case study were able to earn livelihoods growing and marketing fresh vegetables at a variety of farm scales. Most growers with fewer than three acres in production realized a part-time income, often supplemented by another job or enterprise. On 3 to 12 acre farms, there were instances where farmers or farm couples earned a net cash income between \$35,000 and \$55,000 from their farms. On other farms at this scale, a spouse worked off farm. On the largest vegetable farms, some households were able to achieve a total farm net cash income over \$100,000.

The farms in this project achieved impressive gross sales, with the highest gross sales per acre observed at the smallest scales. Over the three years of this project, the farms under three acres earned average gross sales of \$15,623 per acre. The 3 to 12 acre market gardens averaged \$11,121 per acre and vegetable farms over 12 acres averaged \$10,810 per acre.

Although this study was not designed to produce statistically significant quantitative data, average values instead of ranges are reviewed in most of this summary as a means to simplify the discussion.



Earning decent net cash income (gross sales minus all operating expenses except depreciation)¹¹ was a challenge complicated by labor needs and expenses, equipment needs and repairs, and yearly vagaries in markets and weather. Three year average net cash income for the farms in this study were, in some instances, under \$2,000 per acre and in other instances exceeded \$8,000 per acre.

Gross sales and net cash income varied both on individual farms and across all farms. Variability at all scales was the result of labor needs and expenses, equipment needs and repairs, market fluctuations, crop failures and bumper crops, and the weather. Individual large scale vegetable farms achieved fairly consistent gross sales and net cash income per acre from year to year. Individual small farms generally saw more variability. Many of the larger scale farmers had more experience and established markets for their products, which reduced variability. All of the organic farms over 12 acres and three of the mid-size farms used CSA, which provided consistent sales. Net cash to gross ratios tended to be more variable on smaller, newer and/or expanding farms. Expanding farms had higher rates of reinvestment. On the smallest operations, the relative impact of year-to-year gross and net cash income fluctuations was accentuated simply because of the smaller amounts of sales and income.

Per hour wages were generally low, and these farmers worked hard, long hours during the growing season. The market gardeners with fewer than 3 acres worked an average of 2,000 hours per acre at an average net cash hourly wage (net cash income/hours worked) of about \$5. Average labor hours per acre dropped to 1,000 on 3 to 6 acre farms and 850 on 6 to 12 acre farms, with an average net cash hourly wage of \$7.45 for all of these farms. Farmers with more than 12 acres worked about 550 hours per acre on average at an average net cash hourly wage of \$11.36.



Per hour wages were generally low, and these farmers worked hard, long hours during the growing season.

While these average hourly wages were low, the ranges varied widely among all farms. The least variability was seen on the market gardens under three acres, where per hour wages ranged from \$3.32 to \$6.57. Hourly wages ranged from \$2.26 to \$16.92 on 3 to 12 acre market farms, and from \$3.46 to \$14.90 on vegetable farms over 12 acres. Significant variation in hourly wages was seen on individual farms as well. Some of this variation can be explained by season-to-season variations in yields, weather and markets. Given that the reported hourly wages are based on net cash income, reinvestment expenses in a given year also caused fluctuations in hourly earnings.

The growers in this study mostly enjoyed their work and felt positive about their quality of life. Employee management issues were considered a primary detriment to a more satisfactory quality of life. The growers suggested that more personal time,

¹¹ See page 12 for a more detailed explanation of net cash income and why this measure was used in this study.

earning higher net cash income, and finding reasonably priced health insurance would improve the quality of their lives.

There is significant demand for high quality organic produce and, by selling directly to their customers, the farmers in this study were able to set fair but often premium prices. Most of the organic vegetable growers in this study followed diversified marketing schemes, but many focused on one primary market, usually farmers' markets, CSA or restaurants.

Keys to financial success included increasing work efficiency and utilizing techniques and tools to keep expenses low. It also helped to develop a particular niche in terms of products or marketing. CSA appears to have been one key to higher gross profit margins for the farmers in this study. Four of the five farms that focused on CSA as their sole or primary marketing outlet were among those with the highest net cash incomes in the study.

Given the complexity of farming and the uniqueness of individual farm businesses, it can be difficult to see how the financial ratios presented here can shed light on the advantages and disadvantages of specific practices and systems. However, the project participants used these ratios and the financial records they kept during the project to improve their farming enterprises. For example:

- One farm in the study had very little hired labor compared to other farms in their scale range. Thus, they made the decision to hire more part-time labor in 2003. Because this is a CSA farm, they communicated this change to their members and increased their share price to cover the increase in payroll. The end result was one of the best years on their farm in terms of reduced stress and solid financial returns.
- Another farm used its labor hour records to better determine seasonal labor needs as well as change product pricing based on labor costs.
- Still another farm recognized that it had less equipment compared to other farms in its scale range. These farmers purchased machinery and tools that allowed them to work more efficiently and increase their production. Over the three years of the project, this farm's gross sales and net cash income !increased significantly.

If you would like to learn more about these ratios and how to use them to analyze your farm, please see Appendix A and B or contact John Hendrickson at the Center for Integrated Agricultural Systems: telephone: 608-265-3704, e-mail: jhendric@wisc.edu, or visit the CIAS web site at www.cias.wisc.edu

Start small, be realistic, keep records, and enjoy the work!



Keys to financial success included increasing work efficiency and utilizing techniques and tools to keep expenses low.

Resources

Organizations and Programs

Wisconsin School for Beginning Market Growers. Three-day workshop taught by experienced growers. Center for Integrated Agricultural Systems, UW-Madison. 608-262-5200, www.cias.wisc.edu

Appropriate Technology Transfer for Rural Areas (ATTRA). Many free and excellent publications with practical information. 1-800-346-9140. attra.ncat.org

Fresh Market Vegetable Program, Department of Horticulture, 608-262-6429, www.hort.wisc.edu/FreshVeg/default.htm

Healthy Farmers, Healthy Profits Project. Biological Systems Engineering Department, UW-Madison, (608) 262-1054, bse.wisc.edu/hfhp

Midwest Organic and Sustainable Education Service. Upper Midwest Organic Farming Conference and other programs. 715-772-3153, www.mosesorganic.org

Michael Fields Agricultural Institute. East Troy, WI. Education and research on organic, sustainable, and biodynamic farming. 262-642-3303; michaelfieldsagainst.org

Cooperative Extension County Offices. A complete listing of county offices in Wisconsin is available at www.uwex.edu/ces/cty

Ag Innovation Center: Wisconsin's support network for agricultural entrepreneurs. aic.uwex.edu/index.cfm

Publications

Exploring the Small Farm Dream: A decision-making workbook. 2004. New England Small Farm Institute. (413) 323-4531. www.smallfarm.org/explorer

Building a Sustainable Business. 2003. MN Institute for Sustainable Agriculture, 1-800-909-MISA or download free at: www.misa.umn.edu/publications/bizplan.html

The Legal Guide for Direct Farm Marketing. 1999. Neil Hamilton. Drake University Agricultural Law Center. Des Moines, IA 50311.

Market Farm Forms: Spread Sheet Templates for Planning and Organizing Information on Diversified Market Farms. 1998. Marcie Rosenzweig. Full Circle Farm.

Making Your Small Farm Profitable. 1999. Ron Macher. Storey Books.

The New Organic Grower—A Master's Manual of Tools and Techniques for the Home and Market Gardener. 1988. Eliot Coleman. Chelsea Green Publishing Company.

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Knott's Handbook for Vegetable Growers, 4th ed. 1997. Donald Maynard and George Hochmuth.

The Flower Farmer: An Organic Grower's Guide to Raising and Selling Cut Flowers. 1997. Lynn Byczynski. Chelsea Green Publishing Company.

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Sell What You Sow! 1994. Eric Gibson. New World Publishing: 11543 Quartz Dr. #1, Auburn, CA 95602; (530) 823-3886 (ph/fax), www.nwpub.net/swys.html

Growing for Market. (national monthly journal for direct market farmers). Edited by Lynn Byczynski. 1-800-307-8949, www.growingformarket.com

Small-Scale Post Harvest Handling Practices. 4th edition. Kitinoya and Kader. 2002. Dept of Pomology, UC-Davis, www.fao.org/Wairdocs/X5403E/x5403e00.htm#Contents

Managing Cover Crops Profitably. 1998. Sustainable Agriculture Network.

Steel in the Field: A Farmer Guide to Weed Management Tools. 1997. Edited by Greg Bowman.

The New Farm. Web site loaded with practical information, www.newfarm.org

Appendix A: Data collection and ratios

There are many ways to track information and analyze productivity, efficiency, financial health and sustainability on a vegetable farm. The approach used by this project grew out of the efforts of organic vegetable farmers at Red Cardinal Farm in Minnesota.¹² Their goal was to help vegetable growers at all scales of production evaluate their financial information and integrate this with a discussion of quality of life goals. Their approach was to collect data with groups of farmers, create ratios such as labor per acre and net cash income per acre, and use those figures to launch thoughtful discussions on how to forge a quality livelihood from farming.

Similarly, the group of farmers associated with this project worked together to define the data to collect and the ratios to analyze. They used a consensus process to choose how basic farm data would be defined, recognizing that any decision would have pros and cons. They discussed how each variable they selected would be defined and how the information would be collected. For example, acres farmed could include the total acres managed or needed, including necessary roadways, paths, and headlands (space for moving and turning equipment). This figure could include acreage devoted to cover crops included in a rotation, or it could simply include the land in vegetable crops. Once they agreed on what to measure and how to define it, it was important for the growers to consistently stick with their choices throughout the project.

Farms, like any other business, are complex systems. A farm's true bottom line cannot be reduced to this set of ratios, nor can profitability, sustainability, or success be deduced from this analysis. The numbers in this project should not be compared to more conventional economic analyses. This project did not collect the numbers necessary to calculate a traditional net income. Rather, the growers sought to measure the cash they have on hand at the end of the season, excluding non-cash expenses such as depreciation, opportunity costs, and prescribed machinery use costs. Please see the 'How was the information collected?' section on page 2 for further details. With those caveats, the following is an explanation of the data collected each year.

1. Acres in vegetables, berries, herbs and flowers. Given that this project included farms of many sizes that used a wide array of production practices (*e.g.*, intensive bed systems or row cropping, use of headlands for turning tractors on larger farms, and planting cover crops on fallow land), the group decided to limit this to the actual land planted to vegetable crops. Some farms included (usually minor) amounts of flowers, berries, and herbs. Headlands and fallow areas in cover crops were not included. This was a difficult decision for the group that required extensive discussion.

2. Farmer labor hours. This included the total hours worked by the farmer or farmers as owners of the farm enterprise. Hours were kept for the entire calendar year, from planning and ordering seeds to

¹² Myers, Everett. "Keeping an Eye on Quality of Life and the Bottom Line in Sustainable Agriculture by Using Key Farm Economic Ratios to Aid in Decision-making" in *Greenbook 2000*. Energy and Sustainable Agriculture Program, Minnesota Department of Agriculture. P. 160-163.

planting and cultivating to marketing and selling. Growers used diaries, calendars, logbooks, or computer spreadsheets to collect this information.

3. Other labor hours. This included the total hours worked by hired workers, interns or apprentices, volunteers, and the farmers' children or other 'non-operator' family members.

4. Gross sales. This included total sales from vegetables, berries, herbs and flowers grown on the above acreage figure. Sales of products such as honey, meat, eggs or other enterprises was not included in order to maintain a focus on fresh produce.

5. Net cash income. This was tricky to define. For this project, net cash income was defined as the grower's income after subtracting all annual cash operating expenses (seeds, field supplies, paid labor, interest, fuel, advertising, etc.) but *not* depreciation and IRS section 179 deductions (an option allowing business owners to fully expense equipment investments immediately instead of depreciating them across a period of several years). This decision was made given the variability in depreciation and tax strategies employed by the participating farmers. The group members also wanted the net cash income figure to reflect the amount of money they had at the end of the year. Other expenses that were left out of this study include prescribed machinery use and land costs, opportunity costs and depreciation. See page 2 for further explanation.

6. Value of farming equipment. This was defined as the estimated current (resale) value of all tractors, implements, tools, buildings, and other farming equipment of lasting or enduring quality. We did not include the farmer's personal dwelling and land in this figure. Land was not included because land values are variable and are based on proximity to urban areas and other factors rather than agricultural worth. Since growers reported their farming equipment and estimated its value themselves, these figures are variable and approximate.

7. Debt on farming equipment. This is the total amount of debt on all farming equipment described above (#6), and does not include land mortgages. This figure was not used extensively in the project or this report. However, interest on debt was deducted from gross sales to compute net cash income.

8. Cash purchases of farming equipment. Cash spent on new farming equipment (see #6) was monitored each year. This figure represents the portion of a farm's sales that were reinvested back into the farm business.

9. Other facts and figures. In order to gain a better understanding of certain aspects of vegetable farming and background information on the farms, some additional information was collected. This included:

- A percentage breakdown of each farm's gross sales by marketing outlet
- Payroll expenses
- Seed and plant costs
- Years farming
- Years on current farm
- Short farm descriptions and histories
- Information on facilities such as square feet of greenhouse space and cubic feet of cooler space.

Using the above information, the following ratios were created.

Gross sales per acre. Calculation: divide gross sales by number of acres in vegetables. Farms with more intensive plantings will tend to have higher gross sales than farms using a wider, row cropping system. Gross sales can also vary depending on a farm's mix of crops. Salad greens will gross more per acre than sweet corn, for example. In general, gross sales per acre decreased as farm scale increased in the project.

Market Garden Scale (under three acres)

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F	Average
2002	\$18,979	\$11,088	\$8,527	\$23,461	\$6,217	\$9,888	\$13,027
2003	\$28,442	\$11,077	\$11,700	\$23,420	\$12,525	\$13,586	\$16,792
2004	\$21,019	\$4,500	\$13,721	\$29,935	\$11,100*	\$17,500	\$16,296
Average	\$22,813	\$8,888	\$11,316	\$25,605	\$9,947	\$13,658	\$15,623
Median	\$21,019	\$11,077	\$11,700	\$23,461	\$11,100	\$13,586	

*For purposes of analysis, this data point is included in the Market Farm averages because this operation jumped in scale from less than 3 acres to 9.5 acres in 2004.

Market Farm Scale (3-12 acres)

	3-6 acres				6-12 acres				Average
	Farm G	Farm H	Farm I	Farm J	Farm K	Farm L	Farm M	Farm N	
2002	\$12,175	\$8,796	\$13,828	\$10,100	\$7,059	\$13,764	\$7,978	\$9,230	\$10,366
2003	\$14,303	\$8,385	\$15,209	\$11,576	\$7,525	\$16,339	\$5,322	\$8,482	\$10,893
2004	\$15,226	\$12,642	\$16,262	\$13,400	\$9,439	\$15,726	\$5,500	\$8,653	\$12,106
Average	\$13,901	\$9,941	\$15,100	\$11,692	\$8,007	\$15,276	\$6,267	\$8,789	\$11,122
Median	\$14,303	\$8,796	\$15,209	\$11,576	\$7,525	\$15,726	\$5,500	\$8,653	

Vegetable Farm Scale (greater than 12 acres)

	Farm O	Farm P*	Farm Q	Farm R	Farm S	Average
2002	\$12,137	\$2,000	\$9,955	\$6,712	\$11,369	\$8,435
2003	\$14,575	\$2,797	\$11,523	\$8,087	\$9,723	\$9,341
2004	\$16,687	\$2,714	\$11,985	\$5,451	\$11,516	\$9,671
Average	\$14,466	\$2,504	\$11,154	\$6,750	\$10,869	\$10,810
Median	\$14,575	\$2,714	\$11,523	\$6,712	\$11,369	

*This farm did not follow organic production practices and was less diversified.

Net cash income per acre. Calculation: divide net cash income by number of acres in vegetables. This ratio shows how well a farm converts acres farmed into household income. This can be quite variable from year to year and across farms. Again, this figure tends to decrease as farm acreage increases.

Market Garden Scale (under three acres)

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F	Average
2002	\$9,615	\$4,246	\$1,248	\$5,056	\$627	-\$1,886	\$3,151
2003	\$17,269	\$2,769	\$9,017	\$7,753	\$7,731	\$2,930	\$7,912
2004	\$1,575	\$633	\$10,927	\$12,260	\$4,439*	\$4,518	\$5,725
Average	\$9,487	\$2,550	\$7,064	\$8,356	\$4,265	\$1,854	\$5,664
Median	\$9,615	\$2,769	\$9,017	\$7,753	\$4,439	\$2,930	

*For purposes of analysis, this data point is included in the Market Farm averages because this operation jumped in scale from less than 3 acres to 9.5 acres in 2004.

Market Farm Scale (three to twelve acres)

	3-6 acres				6-12 acres				Average
	Farm G	Farm H	Farm I	Farm J	Farm K	Farm L	Farm M	Farm N	
2002	\$6,043	\$1,118	\$8,479	\$4,841	\$466	\$3,556	\$3,405	\$4,566	\$4,059
2003	\$8,023	\$1,208	\$8,756	\$5,596	\$1,063	\$7,165	\$1,840	\$4,314	\$4,746
2004	\$9,792	\$2,975	\$8,405	\$5,600	\$2,464	\$6,805	\$1,735	\$4,329	\$5,263
Average	\$7,952	\$1,767	\$8,547	\$5,346	\$1,331	\$5,842	\$2,327	\$4,403	\$4,679
Median	\$8,023	\$1,208	\$8,479	\$5,596	\$1,063	\$6,805	\$1,840	\$4,329	

Vegetable Farm Scale (greater than twelve acres)

	Farm O	Farm P*	Farm Q	Farm R	Farm S	Average
2002	\$5,373	\$1,156	\$3,134	\$1,056	\$2,256	\$2,595
2003	\$6,797	\$1,891	\$4,295	\$1,474	\$2,279	\$3,347
2004	\$10,120	\$1,590	\$4,380	\$779	\$3,137	\$4,001
Average	\$7,430	\$1,546	\$3,936	\$1,103	\$2,558	\$3,757
Median	\$6,797	\$1,590	\$4,295	\$1,056	\$2,279	

*This farm did not follow organic production practices and was less diversified.

Net cash income plus farm reinvestment per acre. Calculation: add net cash income to cash purchases of farming equipment and major equipment repairs, and divide by acres in vegetables. This is the income made from farming before deciding to buy a new tiller or pickup truck. This ratio perhaps allows for a truer assessment of a farm's ability to generate wealth because it demonstrates that farmers regularly invest in their businesses and increase their net worth. This ratio also allows for more accurate comparisons between farms that are in a growth phase and those that are not currently making significant investments in equipment. Farms at all scales, based on three-year averages, invested between 12% and 15% of their gross sales back into the farm in the form of equipment. This varied from year to year on most farms; some years involved significant outlays for equipment and other years did not. This demonstrates that new and mature farms need to continuously invest money in equipment.

Market Garden Scale (under three acres)

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F	Average
2002	\$10,673	\$4,669	\$6,938	\$8,138	\$1,736	-\$1,575	\$5,097
2003	\$17,269	\$2,769	\$10,364	\$8,636	\$8,333	\$5,520	\$8,815
2004	\$2,460	\$2,167	\$10,927	\$14,660	\$5,500*	\$7,585	\$7,216
Average	\$10,134	\$3,202	\$9,410	\$10,478	\$5,189	\$3,843	\$7133
Median	\$10,673	\$2,769	\$10,364	\$8,636	\$5,500	\$5,520	

*For purposes of analysis, this data point is included in the Market Farm averages because this operation jumped in scale from less than 3 acres to 9.5 acres in 2004.

Market Farm Scale (three to twelve acres)

	3-6 acres				6-12 acres				Average
	Farm G	Farm H	Farm I	Farm J	Farm K	Farm L	Farm M	Farm N	
2002	\$6,376	\$1,421	\$9,253	\$6,362	\$1,300	\$8,489	\$3,855	\$5,328	\$5,298
2003	\$9,084	\$2,993	\$10,126	\$6,265	\$3,421	\$8,675	\$2,311	\$4,953	\$5,979
2004	\$12,424	\$5,884	\$10,042	\$6,300	\$3,464	\$10,520	\$1,788	\$7,384	\$7,226
Average	\$9,295	\$3,433	\$9,807	\$6,309	\$2,728	\$9,228	\$2,651	\$5,888	\$6,141
Median	\$9,084	\$2,993	\$10,042	\$6,300	\$3,421	\$8,675	\$2,311	\$5,328	

Vegetable Farm Scale (greater than twelve acres)

	Farm O	Farm P*	Farm Q	Farm R	Farm S	Average
2002	\$6,314	\$1,156	\$4,102	\$2,112	\$3,320	\$3,401
2003	\$9,085	\$2,315	\$4,913	\$2,778	\$3,824	\$4,583
2004	\$13,181	\$1,590	\$4,833	\$1,616	\$4,509	\$5,146
Average	\$9,526	\$1,687	\$4,616	\$2,169	\$3,884	\$5,049
Median	\$9,085	\$1,590	\$4,833	\$2,112	\$3,824	

*This farm did not follow organic production practices and was less diversified.

Net cash to gross. Calculation: divide net cash income by gross sales and multiply by 100. This yields a percent figure representing how much of gross sales are kept as personal cash income. The farms in this project had varying net cash to gross ratios, ranging from less than 20% to nearly 60%. This is a key ratio that should ideally increase as a farm business settles on a certain scale of production and develops efficient systems. Farms that are new or expanding and investing in significant equipment or new buildings will have lower net cash to gross ratios. The market gardens had net cash to gross ratios ranging from 9% to 57%. The market farms ranged from 17% to 57%. The organic vegetable farms ranged from 16% to 51%. The non-organic vegetable farm came in at 61%. Based on averages, the middle scale market farms did better as a group (40%) than the market gardens (33%) or the organic vegetable farms (31%).

Net cash income plus reinvestment divided by gross sales. Calculation: add net cash income plus cash spent on new farming equipment of lasting and enduring quality, divide by gross sales, and multiply by 100. In this project, market gardens averaged 46%, 3 to 12 acre farms averaged 53%, and greater than 12-acre farms averaged 48%. Some farms, often where the farmer had more experience, seemed to have rather consistent ratios, but others varied from year to year.

Labor hours per acre. Using the data above, it is possible to break down farmer labor hours per acre, other labor hours per acre, and total labor hours per acre. It is also possible to calculate a farmer’s percentage of total labor hours to gauge how much a farm relies on other (hired) labor. Labor hours per acre is one measurement of the efficiency of a farm’s labor practices. However, it is wise to examine this in relation to other ratios, such as net cash income per acre, as a drive toward labor efficiency may reduce productivity (harvested yields), product quality, sales and net cash income.

Market Garden Scale (under three acres)

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F	Average
2002	2,012	1,402	2,059	2,980	904	1,727	1,847
2003	2,463	2,200	1,424	3,021	962	1,842	1,985
2004	2,615	1,107	1,488	2,982	592	2,083	1,811
Average	2,363	1,570	1,657	2,994	820*	1,884	1,957
Median	2,463	1,402	1,488	2,982	904	1,842	

*For purposes of analysis, this data point is included in the Market Farm averages because this operation jumped in scale from less than 3 acres to 9.5 acres in 2004.

Market Farm Scale (three to twelve acres)

	3-6 acres				6-12 acres				Average
	Farm G	Farm H	Farm I	Farm J	Farm K	Farm L	Farm M	Farm N	
2002	963	1,382	858	492	1,870	1,012	444	627	956
2003	1,101	1,396	884	631	641	970	412	429	808
2004	1,116	1,552	902	720	445	891	349	514	811
Average	1,060	1,443	882	614	986	958	402	523	848
Median	1101	1,396	884	631	641	970	412	514	

Vegetable Farm Scale (greater than twelve acres)

	Farm O	Farm P*	Farm Q	Farm R	Farm S	Average
2002	529	150	633	476	577	473
2003	588	172	609	544	504	483
2004	723	177	594	364	504	472
Average	613	166	612	462	528	554
Median	588	172	609	476	504	

*This farm did not follow organic production practices and was less diversified.

Net cash income hourly wage. Calculation: divide net cash income by number of individual farmer hours. This can be a sobering exercise. While virtually all of the growers in this project expressed their passion for farming in non-economic terms, many also acknowledged that they wouldn't mind earning more in return for their long hours, skills and investment risk. The market gardeners in this project earned about \$5.00 per hour on average. Their counterparts on 3 to 12 acre farms earned \$7.45/hour on average while farmers on greater than 12-acre farms made \$11.36/hour on average. Farmers with more experience tended to have higher hourly wages, suggesting they had developed efficient work habits and techniques over time.

Gross sales or net cash income to equipment value. Calculation: divide either gross sales or net cash income by the estimated value of farming equipment (Number 6 under 'Data collected', page 27). This ratio is not precise, given the variation in how growers list and value their farming equipment. Still, this ratio provided a measure of how well growers' equipment investments helped them generate gross and net cash income. A higher number reflected a good return on investment. Some of the smallest farms in the project had the most impressive ratios here because it is possible to grow and sell a lot of vegetables without much investment in equipment. An example would be a hypothetical one-acre market gardener who earns gross sales of \$15,000 or more without much more than a tiller and hoe. For the *gross sales to equipment value* ratio, the market gardens averaged 1.9. In other words, annual gross sales were nearly double the estimated value of the farm equipment. This was quite variable, however. The 3 to 12 acre

farms were similar, averaging a gross sales to equipment ratio of 1.8. The largest farms (>12 acres) averaged 1.3. The *net cash income to equipment value* ratio was quite similar, on average, across the three farm scale groupings: 0.7, 0.7 and 0.5 respectively.

Equipment value per acre. Calculation: divide value of farming equipment by number of acres farmed. This provides a way to compare equipment investments made on similar farms or investment needs at different scales. Again, this ratio is not precise given the variation in how growers list and value their farming equipment. Interestingly, the market gardens, mid-size market farms and large vegetable farms in the project had relatively similar average equipment values per acre: between \$7,400 on the vegetable farms and \$12,400 on the market gardens. Among the market gardeners, younger growers tended to have less equipment and were doing lots of work by hand while older growers (with tired backs!) utilized more equipment.

If you would like to learn more about these ratios and how to use them to analyze your farm, please contact John Hendrickson at the Center for Integrated Agricultural Systems: telephone: 608-265-3704, e-mail: jhendric@wisc.edu, or visit the CIAS web site at www.cias.wisc.edu

Appendix B: Worksheet

Farm Facts:

A. Acres in vegetables (you may include herbs, flowers and berries)		Acres
----------------------------------------------------------------------------	--	--------------

Notes: Do not guess but actually measure your garden or fields so that you are sure to be accurate. You can choose to include headlands, field roads, and areas in cover crops if you want. However, in order to compare your results with the data in this publication, include only the area in cash crops.

B. Farmer labor hours (This includes ALL hours related to the farm business: planning, ordering supplies, repairing and maintaining equipment, planting, cultivating, harvesting, marketing, selling and delivering)		Hours
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	--------------

Notes: There are many different ways to record hours. Growers might use a daily logbook, a wall calendar, or a computer program. Regardless of where the numbers are recorded, make it easy and efficient for yourself so that you keep up with it the whole year. Keep separate records for each farmer, if there is more than one.

C. Other labor hours (This includes all hours worked by employees, interns, volunteers, other family members, etc.)		Hours
----------------------------------------------------------------------------------------------------------------------------	--	--------------

Notes: This can be tricky on a farm where there are many different hands that help from time to time. There is basically no substitute for diligence in record keeping, although having a good system (either on paper or a computer) helps.

D. Gross sales (The total amount of money earned selling crops grown from the above acres in vegetables)		Dollars
-----------------------------------------------------------------------------------------------------------------	--	----------------

Notes: Keep other farm revenue sources (eggs, meat, hay, honey, etc.) separate.

E. Net cash income (Subtract all direct cash expenses from Gross Sales. Do not subtract depreciation and IRS section 179 deductions)		Dollars
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F. Cash reinvested (This is the total of all cash spent on farming equipment of lasting or enduring quality or major repairs to existing equipment, such as a new roof on a barn or an engine overhaul on a tractor)		Dollars
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	----------------

G. Payroll expenses (All payments and related costs—such as workers' compensation—related to paying employees)		Dollars
-----------------------------------------------------------------------------------------------------------------------	--	----------------

H. Value of farming equipment (Resale value of all farming equipment of lasting or enduring quality)		Dollars
-------------------------------------------------------------------------------------------------------------	--	----------------

Notes: This is somewhat subjective and imprecise, but is meant to be a provide a figure that you can use to gauge your level of investment and how well your equipment helps you earn gross and net cash income. If you are unsure how to value certain equipment ask other, experienced growers and check classifieds and auctions for comparable items.

Ratios:

1. Gross sales per acre (Divide D by A)		Dollars per acre
------------------------------------------------	--	-------------------------

2. Net cash income per acre (Divide E by A)		Dollars per acre
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3. Net cash income plus reinvestment per acre (Add E and F and then divide by A)		Dollars per acre
-----------------------------------------------------------------------------------------	--	-------------------------

4. Farmer labor hours per acre (Divide B by A)		Dollars per acre
-------------------------------------------------------	--	-------------------------

5. Total labor hours per acre (Add B and C then divide by A)		Dollars per acre
---------------------------------------------------------------------	--	-------------------------

6. Farmer net cash income per hour (hourly wage) (Divide E by B)		Dollars per hour
-------------------------------------------------------------------------	--	-------------------------

7. Net cash to gross (Divide E by D then multiply by 100)		%
------------------------------------------------------------------	--	----------

8. Net cash plus reinvestment to gross (Add E and F, divide by D, then multiply by 100)		%
------------------------------------------------------------------------------------------------	--	----------

9. Percent of gross reinvested (Divide F by D, then multiply by 100)		%
-----------------------------------------------------------------------------	--	----------

10. Percent of gross to payroll (Divide G by D, then multiply by 100)		%
------------------------------------------------------------------------------	--	----------

11. Equipment value per acre (Divide H by A)		Dollars per acre
-----------------------------------------------------	--	-------------------------

12. Gross sales to equipment value (Divide D by H)		
-----------------------------------------------------------	--	--

This factor represents a measure of how well farming equipment helps generate gross sales. The higher the number the better, as this suggests a good return on investment. Farms in this project averaged 1.7.

13. Net cash income to equipment value (E divided by H)		
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Again, the higher the number the better. Farm in this project averaged 0.7.

Recommendations and observations:

- Do this exercise annually to track changes and improvement on your farm.
- Expect some variation from year to year.
- Share and compare your ratios with other growers whom you trust and respect.

Appendix C: Equipment options at different scales

The first two sample equipment lists below are based on information from two individual farms in this case study, one at the under three acre scale and one at the 3 to 12 acre scale. The list of equipment options for the large scale farm is adapted from a textbook rather than a farm participating in this project. Equipment needs and usage can vary considerably across farms depending on crops grown, available labor, and grower preferences. Some growers like and are more comfortable with machinery than others.

In this study, equipment value was defined as the estimated current (resale) value of all farming equipment of lasting or enduring quality such as tractors, implements, tools, buildings, etc. This was admittedly an imprecise measure, and readers are cautioned to treat these figures as rough guides. We did not include the farmer's personal dwelling and land in this figure. See Appendix A on page 26 for more information.

Sample equipment list for a 1.5-acre market garden*

Item	Purchase price	Current value
Hoophouse and related supplies	\$1,700	\$1,000
Used walk-behind tractor w/ rotavator	\$2,700	\$1,600
Used mower	\$250	\$100
Used Walk-in cooler (6x6x4)	\$900	\$700
Garden cart	\$350	\$150
Miscellaneous garden tools, harvest crates, and irrigation lines	\$750	\$300
Totals	\$6,650	\$3,850

*This data comes from a participating market garden.

Sample equipment list for a 5-acre market farm*

Item	Purchase price	Current value
<i>Tractors and Vehicles</i>		
35 hp tractor with loader	\$8,500	\$6,500
All Terrain Vehicle (ATV)	\$2,500	\$2,000
Pickup truck	\$5,500	\$5,000
<i>Implements</i>		
3pt rotary mower	\$1,000	\$800
3pt tiller	\$1,400	\$500
3pt digger (field cultivator)	\$250	\$250
3pt chisel plow	\$250	\$250
3pt tool bar and clamps	\$150	\$100
3pt sprayer	\$750	\$500
6 ft grain drill	\$50	\$0
Manure spreader	\$50	\$25
4 x 6 trailer	\$500	\$100
Lely spring tine cultivator	\$1,400	\$500
Bedding (mulch) chopper	\$350	\$350
<i>Irrigation</i>		
5.5 horsepower pump	\$550	\$300
Lay flat hose (~3000 ft.)	\$1,000	\$100
Sprinkler heads and couplers	\$500	\$100
<i>Greenhouse</i>		
1000 sq. ft. greenhouse	\$4,500	\$1,000
Benches	\$200	\$0
Heater	\$650	\$100
16' x 96' hoophouse	\$1,400	\$500
<i>Hand tools, harvesting</i>		
Planet Jr. seeder	\$250	\$100
Misc. tools	\$500	\$250
Misc. shop tools	\$1,500	\$500
Computer and printer	\$200	\$0
50 harvest tubs	\$600	\$200
Saw horses	\$100	\$0
Wash tubs	\$300	\$30
Pressure washer	\$500	\$300
Totals	\$35,400	\$20,355

*This data comes from a participating market farm.

Equipment options for a 20-acre vegetable farm¹³

Item	Cost new	Cost used
50-75 horsepower tillage tractor with loader	\$25,000 and up	\$5,000-\$10,000
15-20 horsepower cultivating tractor	\$20,000 and up	\$3,000-\$8,000
Pickup truck	\$16,00 and up	\$3,000-\$10,000
Manure/compost spreader	\$5,000	\$500-\$2,000
3-bottom plow	\$3,000	\$500-\$750
3-shank chisel plow	\$1,500	\$500-\$750
Disk harrow	\$2,500	\$500-\$750
Field cultivator	\$2,500	\$250-\$1,000
Rotavator	\$3,000 and up	\$1,500-\$2,000
Bed former or mulch layer	\$1,400 and up	\$500-\$750
6-8 foot seed drill	\$2,000 and up	\$250-\$500
2 row tractor mounted plate or drill seeder	\$2,500 and up	\$500-\$1,000
2 row tractor mounted precision seeder	\$4,000 and up	\$2,000
2 row mechanical transplanter	\$2,500 and up	\$500-\$750
Boom sprayer	\$2,000 and up	\$500-\$1000
Basket weeder	\$1,000	\$500-\$750
Spring tine cultivator	\$2,000	\$500-\$750
Set of cultivating sweeps, shanks, shovels, etc.	\$1,250	\$250
Flail mower (or brush hog)	\$2,000	\$500
Hand tools and wheel hoes	\$1,000	\$250
Irrigation lines, sprinklers, pumps, etc. (per acre)	\$2,500 and up	\$1,000
2-row gravity fertilizer side-dresser	\$750	\$250
1 row potato harvester	\$2,500 and up	\$500-\$1000
Root lifter	\$1,500	\$500
Harvest wagons	\$2,000 each	\$200-\$500
Wash tanks	\$100 each	\$25-50
Washing line and sorting table	\$3,000	\$1,500
Barrel washer	\$1,500	\$750-\$1,000
2000 cubic foot walk-in cooler	\$8,000-\$12,000	\$1,000-\$5,000
Refrigerated delivery truck	\$40,000 and up	\$15,000-\$30,000
Shop tools (welder, drill, grinder, compressor, etc.)	\$3,000	\$1,000

¹³ Adapted from *Sustainable Vegetable Production from Start-Up to Market*. 1999. Vern Grubinger. Natural Resource and Ag. Engineering Service, p. 19.

Appendix D: Annual sales, expenses and net cash income on three project farms

The following cash expense summaries were provided by three individual farms, one at each scale, in the Profit by Planning Project. They are included here as examples and do not represent recommended budget categories or expense ranges. Some general observations about budgets are included at the end.

Sales and expenses over one year on a 1.5-acre market garden*

Gross sales

CSA (45 members)	\$14,415
Direct wholesale	\$9,869
Total sales	\$24,284

Annual cash expenses

Bank service charges	\$48
Hired labor	\$4,400
CSA crops purchased	\$300
Fuel-for equipment (tiller, mower, vehicle)	\$200
-LP for greenhouse	\$320
Greenhouse supplies	\$590
Insurance	\$310
Memberships/dues	\$130
Miscellaneous	\$301
Organic certification	\$520
Postage, printing, and reproduction	\$160
Repairs	\$580
Seed	\$820
Soil amendments	\$520
Supplies	\$1,490
Taxes	\$400
Telephone and utilities	\$940
Total expenses	\$12,029

Net cash income **\$12,255**

*This data comes from a participating market garden during one year of the project.

Sales and expenses over one year on a 4.5-acre market farm*

Gross sales	\$46,460
Cash expenses	
Hired labor	\$5,068
Seeds	\$3,361
Property taxes	\$2,558
Fertilizer	\$2,206
Services	\$2,010
Fuel	\$1,983
Farm and vehicle insurance	\$1,716
Greenhouse supplies	\$1,300
Maintenance	\$1,285
Phone	\$650
Electricity	\$630
Small tools and misc. supplies	\$590
Communications (printing, copying)	\$531
CSA supplies	\$435
Employment taxes	\$250
Bags	\$222
Office supplies	\$122
Total cash expenses	\$24,917
Net cash income	\$21,543

*This data is from a participating market farm during one year of the project.

Sales and expenses on a 16-acre vegetable farm*

Total gross sales	\$250,000
Cash expenses	
Automobile expenses	\$ 3,800
Chemicals	\$ 800
Custom hire	\$ 150
Equipment purchases	\$43,000
Employee benefits	\$ 7,000
Fertilizer	\$ 2,600
Trucking	\$ 500
Fuel	\$ 2,400
Insurance	\$ 2,900
Mortgage	\$ 7,300
Other interest	\$ 500
Hired labor	\$40,000
Equipment rental	\$ 1,900
Land rent	\$ 1,900
Repairs	\$ 2,400
Seeds	\$ 5,000
Misc supplies	\$16,000
Taxes	\$ 1,900
Utilities	\$ 2,400
Office supplies	\$ 2,000
Marketing	\$ 3,300
Subscriptions	\$ 300
Training	\$ 900
Professional services	\$ 1,200
Total cash expenses	\$150,150
Net cash income	\$ 99,850

*This data comes from a participating vegetable farm during one year of the project.

Observations

The most significant expense on a vegetable farm is hired labor. The percentage of gross sales that went to payroll expenses for hired labor on the under three acre market gardens ranged from 0% to 42%. The average was 22%. On 3 to 12 acre market farms, payroll expenses ranged from 1% to 34%, and the average was 16%. Vegetable farms over 12 acres spent 32% on average, and the range was 19% to 40%. Restaurants and other labor-intensive businesses can average around 30 percent.¹⁴

The percentage of gross sales going to payroll expenses plus the farm's net cash income used to pay the farmers themselves was remarkably consistent, averaging around 60% for the less than three acre market gardens and 3 to 12 acre market farms. After adding in 10% of gross sales reinvested into equipment of lasting value, this leaves around 30% for general overhead (annual operating supplies and expenses).

Please note that, in this analysis, net cash income is used in lieu of farmers' wages and farmers therefore are not contributing any unpaid labor to the farm.

For the vegetable farms over 12 acres, the percentage of gross sales going to payroll expenses plus the farm's net cash income used to pay the farmers themselves averaged around 66% to 70%. After adding in 10% to 13% of gross sales reinvested into equipment of enduring value (purchases or major repairs), this leaves around 20% for general overhead (annual operating supplies and expenses.)

The project also collected data on seed costs. The market gardeners growing on less than three acres spent, on average, \$700 per acre on seed. The three to 12 acre market farms spent about \$600 per acre, on average. The over 12 acre vegetable farms spent an average of \$327 per acre on seed. This is considerably less than the smaller farms spent, due to volume discounts.

All but one of the farms in this study were using organic farming methods and were likely paying more for organic seed. These farms often grew specialty crops with pricey seed. The non-organic grower who grew a far more limited array of crops spent only \$165 per acre on seed.

¹⁴ New York City Hotel Association, 1995. In: *Tempest in the Kitchen*, *New York Times*, March 15, 1995, page C1.

