CREAM OF THE CROP

The Economic Benefits of Organic Dairy Farms

Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

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Executive Summary

Milk is perceived as a healthful food produced by happy cows on green hillsides. But the reality of U.S. dairy production doesn't quite match the wholesome image. Hundreds of thousands of small pasture-based dairies have disappeared from the landscape as milk production is increasingly occurring at CAFOs (confined animal feeding operations)—large and crowded facilities that take advantage of ill-advised farm policies to make a less nutritious product; pollute our air, water, and soil; and reduce the effectiveness of antibiotics in humans.

This current trajectory is not in our long-term interests. Identifying methods by which milk can be produced for healthful consumption and with a smaller environmental footprint, while simultaneously supporting rural economic development, should be a priority.

One attractive alternative, and the subject of this report, is the organic dairy sector. Under rules of the U.S. Department of Agriculture (USDA), "organic milk" must come from cows that graze on pasture for the entire length of the growing season, eat organically grown feed (i.e., produced without the use of synthetic chemicals), and are not treated with hormones or antibiotics. Well-managed organic dairy farms can reduce many of the environmental and public health risks associated with most conventional dairy farms. In addition, studies have shown that cows on pasture diets produce milk with more healthful fatty-acid profiles relative to cows in confinement dairies.

Organic Dairies: Good for Farmers and Good for the Economy

Given these benefits, organic dairy products have experienced significant growth in consumer demand over recent years—so much so that organic milk has been in short supply in some regions. The organic dairy sector, virtually nonexistent just two decades ago, has become the most prominent market opportunity for smaller pasture-based dairies to remain in production. National sales of organic milk from farms are now at least $750 million annually. And organic milk often serves as a "gateway" product for many consumers moving toward organic foods in general.

The development of the organic dairy sector has provided an alternative for farmers who do not want to "get big or get out." It helps maintain regionally based milk production by preventing smaller pasture-based dairies from going out of business; many small organic dairy farmers believe they would no longer have a farm had they not been able to convert.

To our knowledge, this report is the first to calculate the economic value associated with organic dairy farming, and it reveals the potential for that sector to create opportunities and jobs in rural economies. In the scenarios we consider—by comparing the economic impacts of organic and conventional milk production in two major dairy states, Vermont and Minnesota—organic dairies offer greater regional economic impacts than conventional dairies.

Increased production is needed to help satisfy the growing demand for organic milk. For this to occur most effectively for farmers and consumers, we show that current farm policies need to change. Regulations for CAFOs must become more stringent; at present they are allowed to give antibiotics to healthy cows (which reduces the effectiveness of antibiotic therapy in humans), are not adequately regulated with regard to air and water pollution, and frequently are not subject to zoning requirements. Meanwhile, federal dairy programs are underfunding important research programs that could improve the efficiency of pasture-based systems, and programs to support dairies are not structured to help organic dairy farms.

Significant improvements are therefore needed in federal policies so they can help organic dairy farmers operate their farms more effectively and endure difficult market conditions. However, revisions currently proposed for federal dairy programs would further subsidize the entrenchment of CAFOs at the expense of organic and other dairies that engage in sustainable production of more healthful milk.

As of this writing, organic dairy farms have been challenged by the high costs of organic feed, a situation exacerbated by the 2012 drought. Unlike conventional dairy farms, the price that organic dairy farms receive for milk is set by long-term contract. This implies that rising input prices place them in a financial squeeze, as organic dairies cannot increase the price they receive for milk by decreasing supply. To rectify this problem, we identify principles for reforming farm policy in a way that will effectively support organic dairy farms.

Report Methodology and Major Findings

The report contains three chapters. In the first chapter, we describe the development of the organic dairy farm sector, outline the production methods of organic dairy farms, show their geographic and size distribution, and describe the organic milk supply chain. In the second chapter, we describe the data, methodology, and results associated with our calculations of organic dairy farms' economic value. In the third chapter, we provide policy recommendations that would support organic milk production and consumption.

We assembled financial data from organic and conventional dairy farms in Vermont and Minnesota because the organic dairy farm sector is prominent in both states, with relevant information available there over a multiyear period. In addition, conducting case studies in two distinct locales—the Northeast and the Upper Midwest—allowed us to assess how the economic impacts of small pasture-based farms vary by region. We developed dairy farm production functions per region and per dairy type by decomposing the farm financial data into purchased inputs and returns to land, capital, and labor. We then used state-level "input-output" models to calculate economic impacts.

We calculated the economic value of organic dairy farms using several metrics. *Output* is the value of an industry's production within the state. *Gross state product*, which equals the difference between output and the costs of purchased intermediate inputs within the state, measures the incremental economic value that a sector provides to the state's economy. *Labor income* represents the proceeds from employment, including wages, benefits, and revenue of self-employed business owners.

These economic values for the two states are as follows:

- Vermont's 180 organic dairy farms contribute $76 million in output, 1,009 jobs, $34 million in gross state product, and $26 million in labor income to the Vermont economy.

- Minnesota's 114 organic dairy farms contribute $78 million in output, 660 jobs, $32 million in gross state product, and $21 million in labor income to the Minnesota economy.

We also compared the relative economic impacts of conventional and organic farms in these two states by asking which of the organic and conventional farm sectors provide greater economic impacts within their states when both experience the same hypothetical level of increased sales (in this report, we considered a $5 million increase in revenue). We found that increased sales from organic dairy farms in Vermont and Minnesota lead to greater economic impacts in those states when compared with the results of an equivalent level of sales from conventional dairy farms. We report the results as percentage comparisons because the relative results will not change for any given level of hypothetically increased sales.

Specifically, we found that:

- In Vermont, an increase in sales revenue to organic dairy farms results in a 3 percent increase in the state's output, a 39 percent increase in labor income, a 33 percent increase in gross state product, and an 83 percent increase in employment relative to an equivalent increase in sales revenue for conventional dairy farms.

- In Minnesota, these economic impacts are 4 percent, 9 percent, 11 percent, and 14 percent greater, respectively, for the organic sector relative to the conventional sector.

Recommendations

Existing dairy risk-management programs can help dairy producers cope with market risks, but these programs are not structured for organic dairy farms. Thus the Union of Concerned Scientists recommends that the programs be revised to accommodate the risk profile and production characteristics of the organic dairy sector. Our recommendation has four parts:

1. The USDA should reform minimum-pricing orders to make them more effective for the organic dairy sector.

Federal milk marketing orders (FMMOs) establish minimum prices that dairy processors must pay to farmers. Such marketing orders create a revenue-pooling system whereby the minimum price each dairy receives is a weighted average of prices for various end uses of milk in a region. FMMOs set higher minimum prices for fluid milk relative to manufactured dairy products such as cheese and butter.

The justification for revenue pooling is based on the equity principle that if each dairy is producing an identical commodity, they all should receive the same minimum price. However, these orders were first established in the 1930s—when dairies were much smaller and well before the organic sector even existed. Organic milk is not identical to conventional milk. Organic milk is produced through different farming practices, has a different nutritional content, and is perceived by consumers as being distinct from conventional milk. But farm policy makers, apparently trailing the public, fail to distinguish between the different types of milk, though it is no longer equitable for them to do so.

Because a greater percentage of organic milk is sold in fluid form compared with conventional milk, organic milk processors have to make sizable payments into FMMO pools. However, these payments do not benefit organic dairies, as organic milk prices are generally set by organic processors, independently of the FMMO, at higher levels. Thus the overall effect of the FMMO as currently structured is to reduce both the production and consumption of organic milk. While evaluating the relative merits of various alternatives to reforming FMMOs requires more in-depth study, the USDA should nevertheless commit itself to revising FMMOs so that they are effective for organic producers, organic processors, and consumers.

2. Congress and the USDA should customize risk-management programs to reflect organic milk market conditions.

Volatile market conditions in the dairy sector resulted in new risk-management programs being proposed during deliberations on the 2012 farm bill. For example, a subsidized insurance program was suggested that would provide payments to dairies when the difference between milk prices and feed costs narrows. Also under consideration is a voluntary supply-management program intended to prevent dairies from producing more milk during adverse market conditions—an action that collectively would decrease milk prices further.

Among other drawbacks, these programs are designed for conventional milk market conditions. While this doesn't preclude organic dairy farms from accessing them, differences between conventional and organic milk market conditions imply that the programs may be largely ineffective for organic dairy farms. We show in this report that, in recent years, organic feed costs have increased sharply for organic dairies, and the financial situation for organic dairy farms has become more precarious during the extreme drought of 2012. Subsidizing one particular production method also reduces incentives for dairies to reduce production costs.

To make these proposed risk-management programs more effective, they should be applicable to organic dairies when the difference between organic milk prices and organic feed costs narrows. Further, any payments that are withheld from organic dairies in a supply-management program should be used to promote the demand for organic milk specifically, and not for conventional milk.

3. Congress should maintain or increase funding for programs that support organic agriculture.

The USDA already offers some modest incentives to encourage organic agriculture, and they can be useful to organic dairies in particular. Expansion of these programs—such as the organic cost-share certification program, which helps farmers certify their organic farms, and programs that fund research on organic production systems—would further support organic milk production and rural economic development. Expansion of on-farm conservation programs could also help organic dairies. One example is the Environmental Quality Incentives Program, which provides technical and financial assistance to farmers for developing efficient pasture-management systems, installing pasture fencing, and implementing specific conservation practices.

4. Congress should fund, and the USDA should implement, programs that support regional food-system development.

Because organic dairy farms are an important component of regional food systems and contribute to rural development, programs that support the expansion of these food systems could help the organic dairy sector. For example, rural development programs such as value-added producer grants could help organic dairies develop milk-bottling facilities or promote other organic dairy products—including cheese, butter, yogurt, or ice cream. And farm-to-school programs that help schools do their sourcing from regional farmers could also spur the expansion of organic dairy production in many areas.

Chapter 1. Structure of the Organic Dairy Sector

Trends in Milk Consumption

Dairy products can be part of healthful and well-rounded diet—they are a critical source of calcium, for example. However, per capita fluid-milk consumption in the United States has fallen by 22 percent since 1975; it was surpassed by soda consumption in 1976 and by alcohol consumption in 1980. By 2003, Americans were drinking twice as much soda as milk (USDA ERS 2011).

Exacerbating this problem are the relatively unhealthful choices Americans are making among dairy products. In 2010, 33 percent of milk production was consumed as fluid milk and 67 percent was consumed from manufactured dairy products, which include cheese, butter, and frozen foods such as ice cream. In contrast to the downward trend for fluid milk, per capita cheese consumption increased by 86 percent between 1975 and 2010. While the growing demand for cheese has provided a critical market opportunity for the dairy sector, the way it is occurring is problematic from a nutritional perspective. Seventy-five percent of cheese consumption is from high-fat cheeses rather than from the low-fat or fat-free milk products that are recommended in U.S. dietary guidelines (Wells and Buzby 2008).

The Transformation of the U.S. Dairy Sector

The dairy sector has undergone a radical transformation in recent decades as dairies have become larger in size and fewer in number. In 1970, the average dairy-herd size was 19 cows (MacDonald et al. 2007). By 2009, average herd size had increased to 142 cows, with 31 percent of U.S. dairy production occurring on "confined animal feeding operations" (CAFOs)—livestock facilities in which animals lack access to pasture or the ability to graze—with at least 2,000 cows (USDA NASS 2010). Some excessively large dairy CAFOs have tens of thousands of cows.

Consolidation has accompanied the proliferation of CAFOs. In 2009, there were 65,000 dairies in the U.S., which is just 10 percent of the number of dairies that existed in 1970 (USDA NASS 2010; MacDonald et al. 2007). But productivity has increased, with cows currently producing twice as much milk as they did in 1970 (USDA ERS 2012a). CAFOs have also become increasingly dependent on immigrant labor, whereas such labor is minimally used, if at all, on smaller dairies (Harrison, Lloyd, and O'Kane 2009; Rosson et al. 2009). This distinction has implications for the economic impacts of increases in labor income, which we elaborate on in Chapter 2.

Nonetheless, small dairies remain in existence, and it is not possible to make overarching generalizations about the optimal size for dairies. First, various production methods are available to them. While economies of scale can arise for confinement systems, operating a pasture-based dairy becomes increasingly difficult for larger herd sizes, as grazing land is constrained to be within close proximity of the milking center. Second, farmers select the type of dairy they seek to operate as a function of idiosyncratic preferences, varying skill levels, and different ways of seeking life satisfaction (Lloyd et al. 2007). Other factors that influence dairy sizes include the stringency of pollution controls, region-specific growing conditions, and volatility in milk and feed prices.

The Rise of Organic Milk

Demand for Organic Milk

A rapidly increasing demand for organic milk has emerged from consumers' recognition of its nutritional advantages (Clancy 2006), as well as from a growing awareness of CAFOs' environmental consequences. The biggest problems caused by CAFOs are the increased incidence of antibiotic-resistant bacteria, animal-welfare ethical issues, massive accumulations of manure that pollute the air and water, and reduced property values in neighboring communities (Gurian-Sherman 2008).

Organic milk is perhaps the most prominent organic food product, and dairy is the second-largest organic sector (behind fruits and vegetables) (OTA 2011). Most organic milk is consumed as fluid milk (McBride and Greene 2009). Annual U.S. organic milk sales increased by 12 percent in 2010, 13 percent in 2011, and 5 percent in the first seven months of 2012; during the latter interval, organic milk constituted 4 percent of the volume of fluid milk sales, with 75 percent of organic fluid milk consumed as a reduced-fat formulation (USDA AMS 2012a).

Monthly fluid organic milk sales, plotted in Figure 1, show that in January 2012 sales peaked at 193 million pounds. Demand for organic milk has increased to such a degree that retail stores are having a difficult time keeping it in stock (Hill 2012; Neuman 2011).

Organic-Milk Production Methods

Cows on organic dairies are raised in conditions more akin to their natural habitat. Specifically, USDA regulations require that these cows have a greater percentage of forage in their diet (that is, they must graze outdoors during the grazing season), eat organic feed (i.e., produced without the use of synthetic chemicals), and not be injected with antibiotics or hormones. On average, organic dairies have fewer cows compared with conventional dairies, and the animals produce less milk because of their diet and lifestyle (USDA ERS 2012e; USDA ERS 2012f). In conventional dairies, production is boosted by the use of hormones such as bovine somatotropin (BST), at the expense of cow health and longevity (Dohoo et al. 2003). Organic dairy cows also are physically smaller than conventional Holstein cows and, because organic dairies have smaller herd sizes, only 40 percent have milking parlors (Mayen, Balagtas, and Alexander 2010). Organic dairies choose smaller cow breeds, such as Jerseys and crossbreeds, which are more efficient at converting pasture into milk. They also produce milk with higher butterfat components (which, when controlling for all other factors, implies a greater milk price) and are more fertile than Holsteins.

Converting to organic dairy production can be challenging. Dairy farms must treat cows according to organic standards for one year prior to being eligible for certification. For integrated farms that are growing their own feed, crops must be produced according to organic standards for three years. This transition period of one to three years can be difficult for newly converted farms; as they implement organic practices, they can only command conventional prices for their products. Further, productivity can be lower during this period as farmers acquire experience about how to farm organically. Because such factors can be a deterrent to prospective organic farmers, programs that offer them technical and financial assistance during the transition period are especially important.

Geographic and Size Distribution of Organic Dairy Farms

The surging demand for organic milk has caused a remarkable increase in the nation's organic-cow herd—from just 2,000 cows in 1992 to 250,000 by 2008 (USDA ERS 2012c). However, the organic dairy cow herd has since decreased to 200,000 (as of the end of 2011) for reasons we will later discuss (USDA NASS 2012).

Many organic dairies were originally small conventional dairies using pasture-based systems. The emergence of the organic milk market offered these small operations the opportunity to stay in business and maintain the viability of their farms. Some of these organic farmers wanted to retain their pasture-based production methods for ethical reasons and animal-welfare concerns, and the price premium afforded by the organic milk label implied that these farms did not have to “get big or get out.” Numerous organic dairy farmers in Vermont believe they would no longer be in business had they not converted (Parsons 2010). In addition, a greater percentage of organic dairy operators, compared with conventional operators, intend to operate their dairy long into the future (Mayen, Balagtas, and Alexander 2010).

Because converting to organic was easier for smaller Northeast and Upper Midwest dairies (particularly in instances in which cows were already on pasture-based diets), 70 percent of organic dairies were located in the Northeast and Upper Midwest in 2011 (USDA NASS 2012). Organic dairies in the West are much larger, as shown in Table 1, with organic dairies in Texas—where there were just eight of them, with an average herd size of 3,278 cows, in 2011—the largest of all. There are several reasons for this geographical disparity. The Northeast and Upper Midwest had smaller conventional dairies historically, so when they converted they were already of a smaller size. These dairies may not have expanded because of streams or valleys that constrained farm acreage, an inability to obtain the financing needed to expand, or simply a lack of desire to operate a larger dairy (Parsons 2010).

In 2010, the USDA adopted a more stringent definition of “organic dairy,” given the problems that had existed regarding the ambiguity and enforceability of previous organic dairy standards. The new rule mandates that organic dairy cows graze on pasture for the entire length of the grazing season, which varies regionally but is 120 days at a minimum. The rule also stipulates these cows must get at least 30 percent of their food (on a dry-matter basis) from pasture during the grazing season (USDA AMS 2010). This new rule, if properly enforced, can help small pasture-based organic dairies remain in organic production without getting forced out by confinement dairies using organic feed.

We see in Figure 2 that this new rule may have contributed to reductions in the herd sizes of organic dairies, as some of the larger confinement dairies that were operating as organic in 2005 were probably no longer able to do so in 2010. Average organic dairy herd size in the West fell by 24 percent, from 381 cows to 288 cows, and the average national organic dairy herd size decreased from 82 cows to 77 cows.

This shift toward smaller organic dairy sizes contrasts with trends in the conventional dairy sector, particularly in the West, as shown in Figure 3. In 2005, organic and conventional dairies in the West were of similar average size. However, while organic dairies in the West had decreased in size by 2010, conventional dairies in the West doubled in size; in 2010 they had a herd average of almost 900 cows. Conventional dairy sizes in the Northeast, Upper Midwest, and Corn Belt changed minimally during this five-year period, but the national average conventional dairy herd size increased from 156 to 182 cows.

What will be the herd sizes and geographic distribution of organic dairy farms in the future? Even though organic dairy farms in the Northeast and Upper Midwest may be far better off in the organic dairy sector than by operating as conventional dairy farms, organic is still a difficult proposition. Table 2 provides estimates of the “economic costs”—which are greater than accounting costs because they also include estimates of “opportunity costs” (the values of the best forgone alternatives)—that organic dairy farms incur. Their opportunity costs include, for example, unpaid labor costs or homegrown feed that would otherwise be sold. While such estimates of opportunity costs are not meaningful in the short-term—a dairy farmer can’t simply walk off the farm into a job that pays $25 per hour—they can be useful in assessing the long-term viability of the sector. Table 2 shows that organic dairies in the West, on average, are essentially breaking even and that their smaller counterparts elsewhere in the country have negative economic profits. (The following subsection explores why the soaring demand for organic milk hasn't necessarily translated into greater profits for most organic dairies.) The difficulty of operating small organic dairy farms heightens the importance of ensuring that federal dairy policies effectively support them.

The Organic-Milk Supply Chain

If the demand for organic milk is increasing, economic theory suggests that organic dairy farms may command higher prices, thereby incentivizing the production of more organic milk. Similarly, economic theory would predict that if feed prices increased and milk production fell, then wholesale prices for organic milk should increase. However, it turns out that the profitability of organic dairies depends on how quickly, and to what extent, changes in upstream or downstream market conditions are transmitted through the organic milk supply chain. For example, fluctuations in feed prices, which are fairly volatile, are not necessarily reflected in the retail milk prices that consumers pay at grocery stores, which are relatively stable (Liebtag 2009).

There are several steps along the supply chain from when a cow produces milk to when a consumer ultimately consumes a dairy product—fluid milk, cheese, butter, or ice cream, for example—and there are a multitude of such supply chains. For example, while cheese can be purchased directly by consumers at a retail outlet like a grocery store, a significant percentage is used as an ingredient in processed foods—e.g., cheese on a pizza. In this report, we focus specifically on the supply chain for organic milk, both for simplicity—the majority is consumed as fluid milk—and brevity.

Figure 4 provides a simplified overview of the supply chain for organic milk. It shows that organic dairies must purchase inputs, such as feed. After the cows are milked, the dairies send the milk to a processor. In addition to producing the final product, processors also help "balance" any timing discrepancies between when milk is produced and when consumers demand it, as fluid milk is a perishable product that must get to market quickly. Processors sell the milk to retail institutions such as grocery stores, where it is ultimately purchased by consumers.

Cow feed is a critical expense for dairies. Many organic dairies provide organic feed to cows in the winter months and as a supplement during the growing season to ensure meeting nutritional needs. The amount of feed an organic dairy has to purchase depends on the length of the growing season—a longer growing season implies that pasture grazing can occur for a greater duration over the course of the year—and how much feed the dairy is growing on its own. Although organic dairies purchase less feed than conventional dairies, the feed that they do purchase is more expensive on a per-unit basis, both because it is organic and also because they generally purchase feed in smaller quantities. In some regions, organic dairies raise their own grain for energy and purchase protein—typically, soybean meal—as a supplement, whereas in regions such as Vermont, where the availability of farmland is limited, dairies do not grow grain and have to purchase all of their energy and protein feed.

In 2010, a decline in the price premium for organic corn and soybeans relative to conventional corn and soybeans, in addition to the high transaction costs of organic certification, resulted in a significant number of organic commodity-crop farmers reverting to conventional production methods (Silva et al. 2012). The loss of organic crop acreage is not a short-term aberration that can easily be reversed, because, as previously mentioned, farmers are required to undertake organic practices and receive conventional prices for three consecutive years prior to becoming certified for organic crop production. However, the sharp increases in grain and oilseed prices that have occurred since 2010, which have been greatly exacerbated by the devastating 2012 drought, recently sent the prices of organic feed soaring. Figure 5 shows that organic corn prices tripled since 2010 to almost $17 per bushel in September 2012 and that organic soybean prices almost doubled, surpassing $30/bushel.

Organic dairies can respond to higher feed prices by reducing their feed purchases, by purchasing feed with suboptimal protein content, by selling cows, or by culling less productive cows for beef. While these actions reduce milk output, decreasing production does not mean that organic dairies can command higher prices from processors, given that the price they are paid for organic milk is fixed for a period of time. Many of these dairies transitioned to organic in the early 2000s, when the price stability provided through these arrangements was appealing—organic dairies were no longer subject to the daily-price volatility of milk that they confronted as conventional dairies (McBride and Greene 2009). However, financial problems arise when feed costs increase sharply but the price that dairies receive for milk does not increase to the same extent.

Two national processors, Organic Valley and Horizon Organic, market fluid milk from organic dairies. Organic Valley is a cooperative that farmers can join by making an equity investment. Its board of directors, with input from regional member committees and management, determines milk prices paid to farmers. Horizon Organic, a subsidiary of Dean Foods, directly contracts with dairies for 93 percent of its milk and also sells milk from two dairies that it owns and operates. The contracts that Horizon signs with organic dairies are two to five years in length. The contracts specify the price that Horizon will pay for milk, and they give Horizon the discretion to curtail production when retail prices are low or to increase or decrease the price (Table 3).

Organic milk processors sell their products to retail institutions, predominately in half-gallon cartons. Ninety-four percent of organic milk retail purchases occur in grocery stores and supercenters (Dimitri and Venezia 2007). When purchasing organic milk, consumers can choose between the two national branded labels, smaller regional brands, and private label lines (whose market share is increasing) (Dimitri and Oberholtzer 2009). Private label lines are brands developed by grocery stores or supercenters and are typically priced below national brands. Milk in private labels can be supplied by a processor, such as Organic Valley, or by an independent dairy, such as Aurora Organic Dairy.

Grocery stores and supercenters price some products as "loss leaders," which means they are sold to consumers at or below cost. This is done to induce purchases of products that are more profitable and as a reference price to make consumers believe that products in the store or center are cheaper than in other retail outlets. Milk is a typical loss leader because consumers tend to be aware of its usual price, as they purchase it frequently. Further, some retail stores price organic milk as a loss leader so that it may serve as a gateway to other organic products (NODPA 2012), although without access to pricing data from grocery stores or supercenters it is hard to quantify the extent to which this is occurring.

So if organic milk production costs increase, can they be passed on to consumers? To what extent would consumers respond to higher prices by reducing their purchases of organic milk? A risk with raising organic milk prices is that the product is price-elastic, which means that price increases in organic milk could induce a proportionally greater decrease in organic milk purchased, thereby lowering its sales revenue (Glaser and Thompson 2000). The organic milk sector did, in fact, experience a decline in sales in 2009 after the financial crisis occurred. This implies that retailers may not raise organic milk retail prices even if there is excess demand.

Federal and state dairy programs exist because milk production—organic and conventional alike—is diffuse, market conditions are volatile, milk is nutritionally important but perishable, and the supply of milk does not always match demand. The organic dairy sector is particularly important because of the nutritional advantage of organic milk and because it is produced using environmentally sustainable methods, but the governmental dairy programs are not well equipped to assist this sector, which needs an effective safety net to help maintain its viability through volatile market conditions. An in-depth discussion of suggested reforms to federal dairy programs is included in the Recommendations section of this report (Chapter 3).

Figure 1. Consumption of Organic Fluid Milk Is Increasing

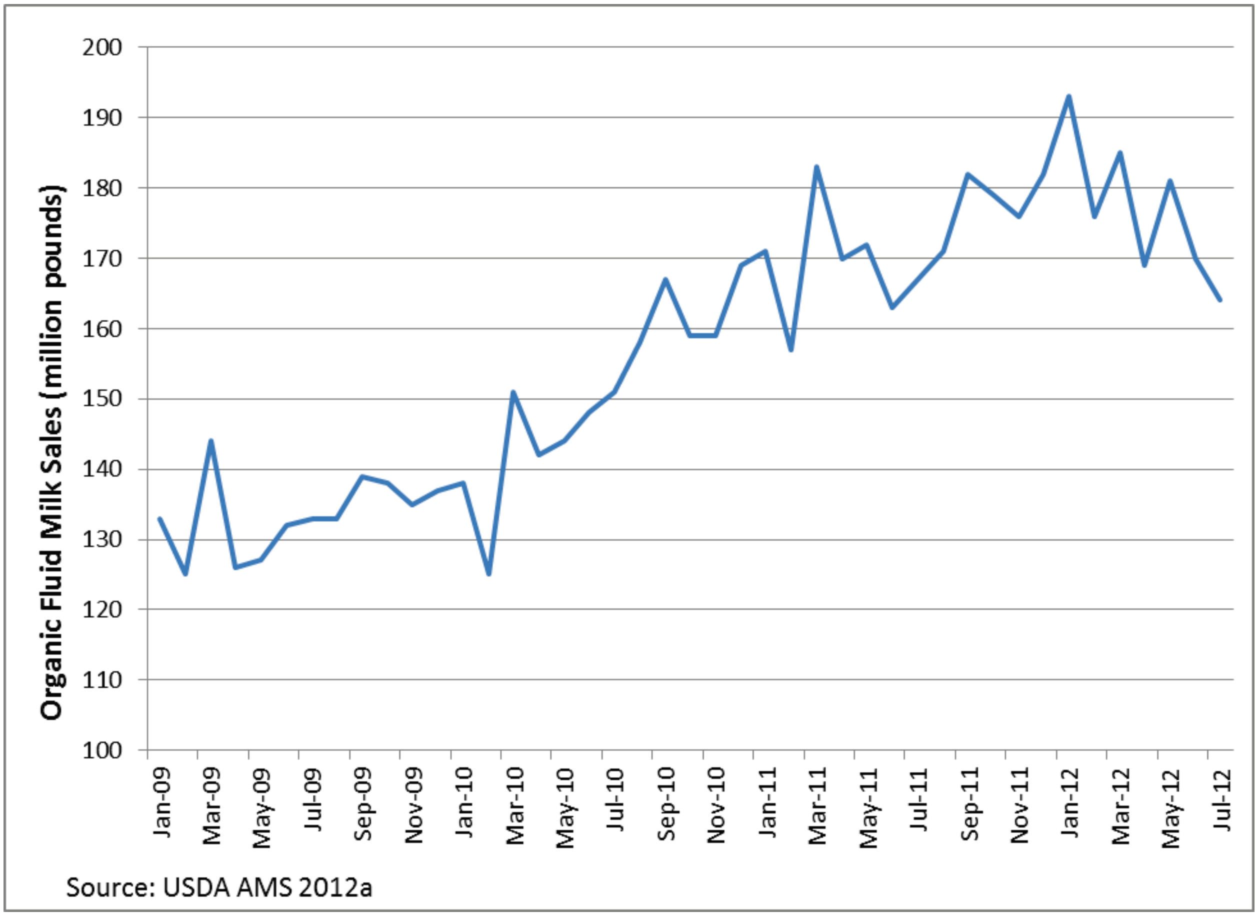


Figure 2. Organic Herd Sizes Are Decreasing

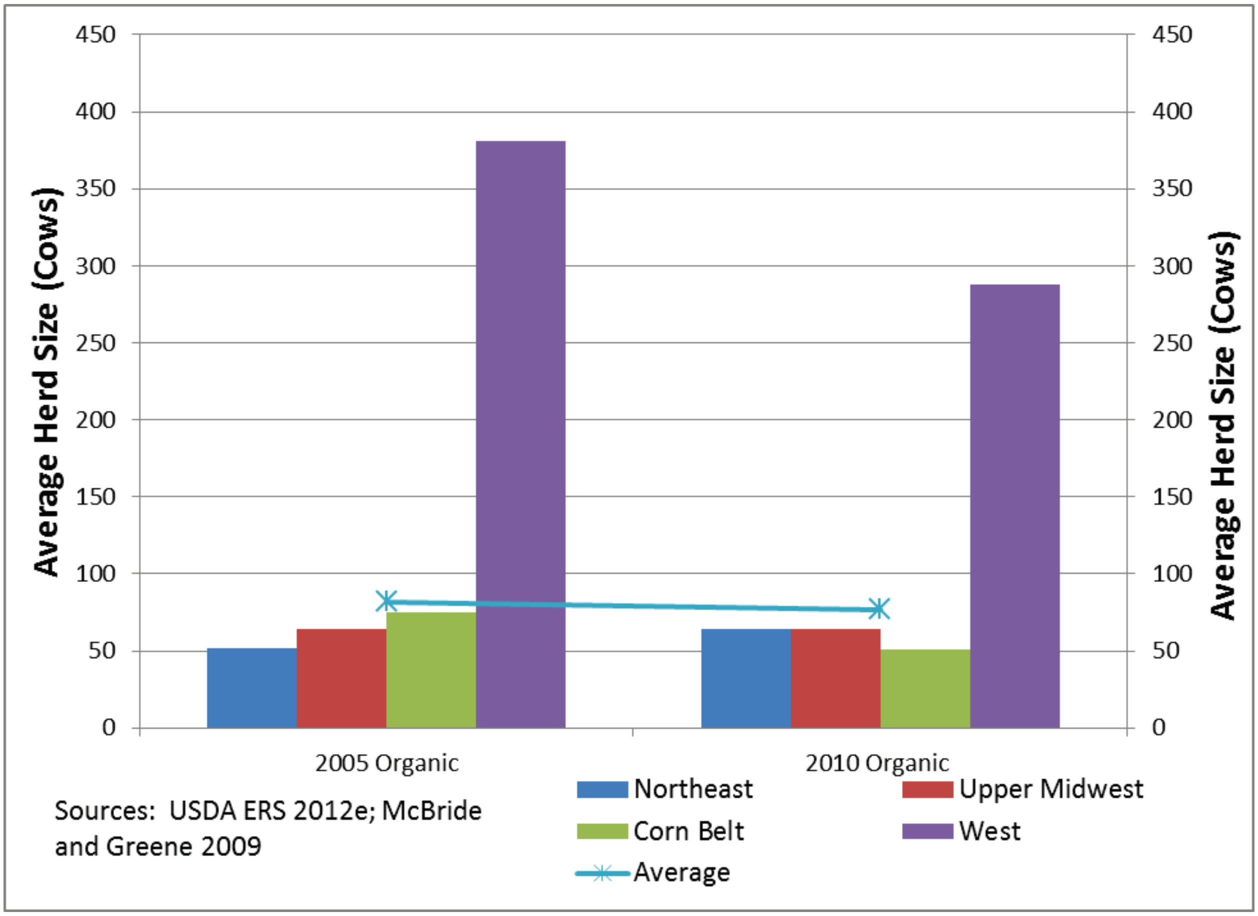


Figure 3. Conventional Herd Sizes Continue to Increase

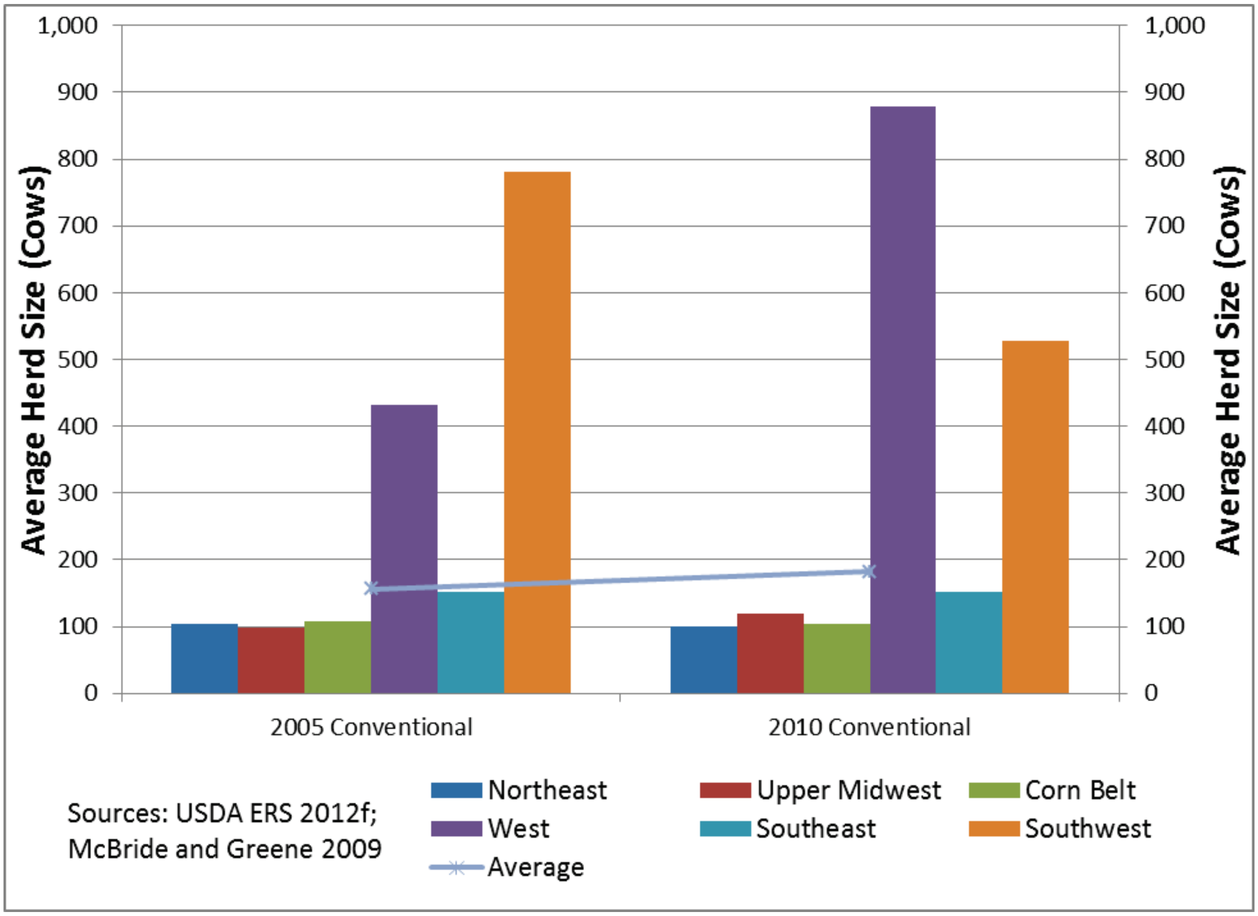


Table 1. 2011 Sales of Organic Milk from Cows: Top 10 States

State	2011 sales (USD)	2011 farms	Cows (12/31/11)	Average herd size	2011 Conventional production rank
California	$127,201,275	72	32,939	457	1
Texas	$120,232,218	8	26,225	3,278	6
Wisconsin	$82,278,236	397	23,115	58	2
Oregon	$69,140,278	43	16,256	378	18
New York	$60,165,502	235	17,471	74	4
Pennsylvania	$42,632,437	236	11,996	51	5
Vermont	$41,702,950	180	11,813	66	17
Minnesota	$33,187,033	114	9,381	82	7
Washington	$25,628,798	35	6,570	188	10
Idaho	$25,310,940	17	5,580	328	3
Total	$764,685,911	1,823	199,737	110	

Sources: USDA ERS 2012d; USDA NASS 2012

Table 2. 2010 Average Economic Returns to Organic Dairies

($/cwt)	Northeast	Upper Midwest	Corn Belt	West	National average
Revenue	$30.82	$27.27	$27.87	$29.80	$29.11
Total operating costs:	$20.11	$19.62	$22.01	$18.43	$19.93
Purchased feed	$6.58	$4.00	$5.37	$10.39	$7.08
Homegrown harvested feed	$7.26	$10.18	$10.35	$3.51	$7.36
Total allocated overhead:	$21.42	$19.41	$21.19	$11.49	$17.60
Hired labor	$2.18	$2.12	$0.77	$4.07	$2.60
Opportunity cost of unpaid labor	$9.18	$8.24	$9.54	$1.87	$6.65
Capital recovery of machinery and equipment	$7.91	$7.06	$9.22	$4.64	$6.71
Total economic costs	$41.53	$39.03	$43.20	$29.92	$37.53
Economic profits	($10.71)	($11.76)	($15.33)	($0.12)	($8.42)

Source: USDA ERS 2012e

Figure 4. Simplified Diagram of Organic Milk Supply Chain

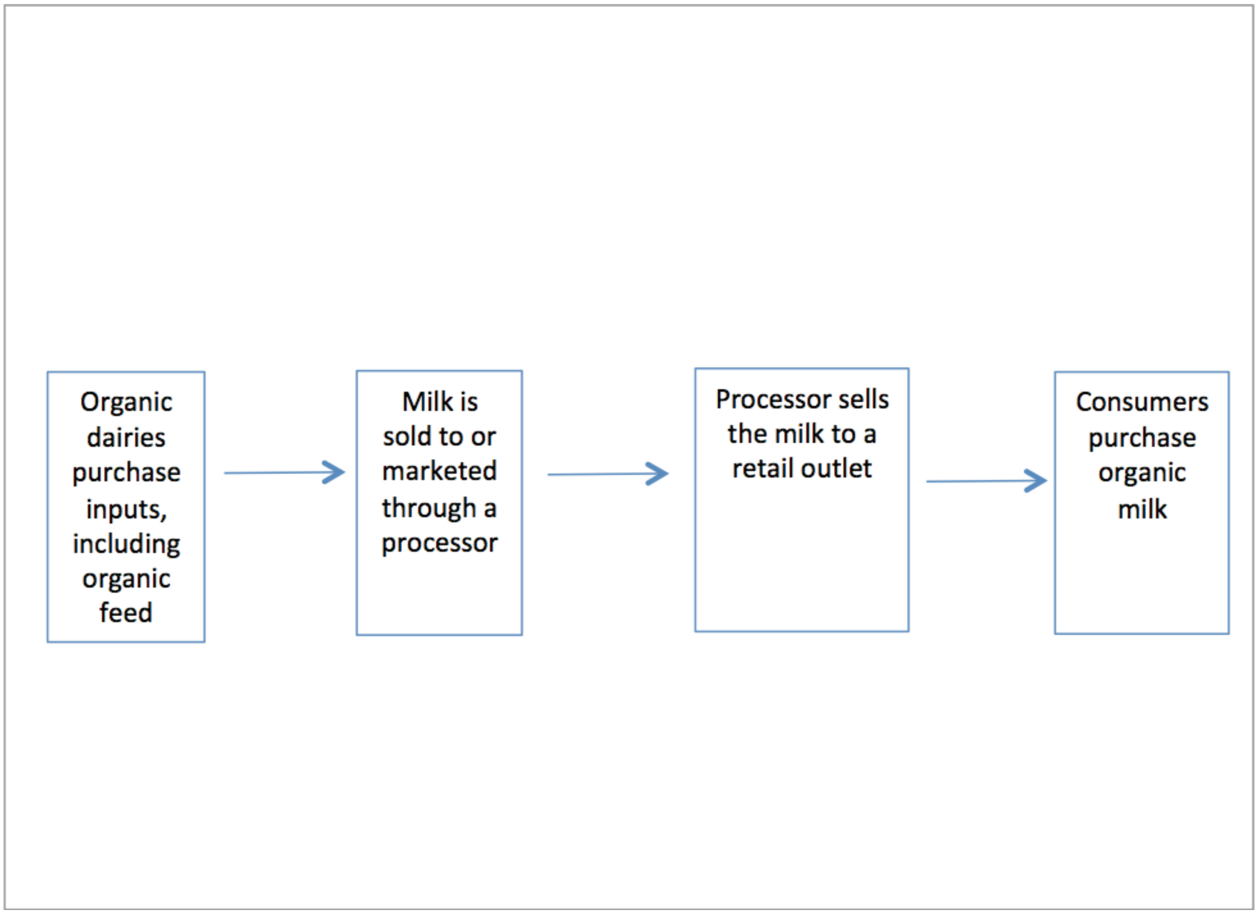
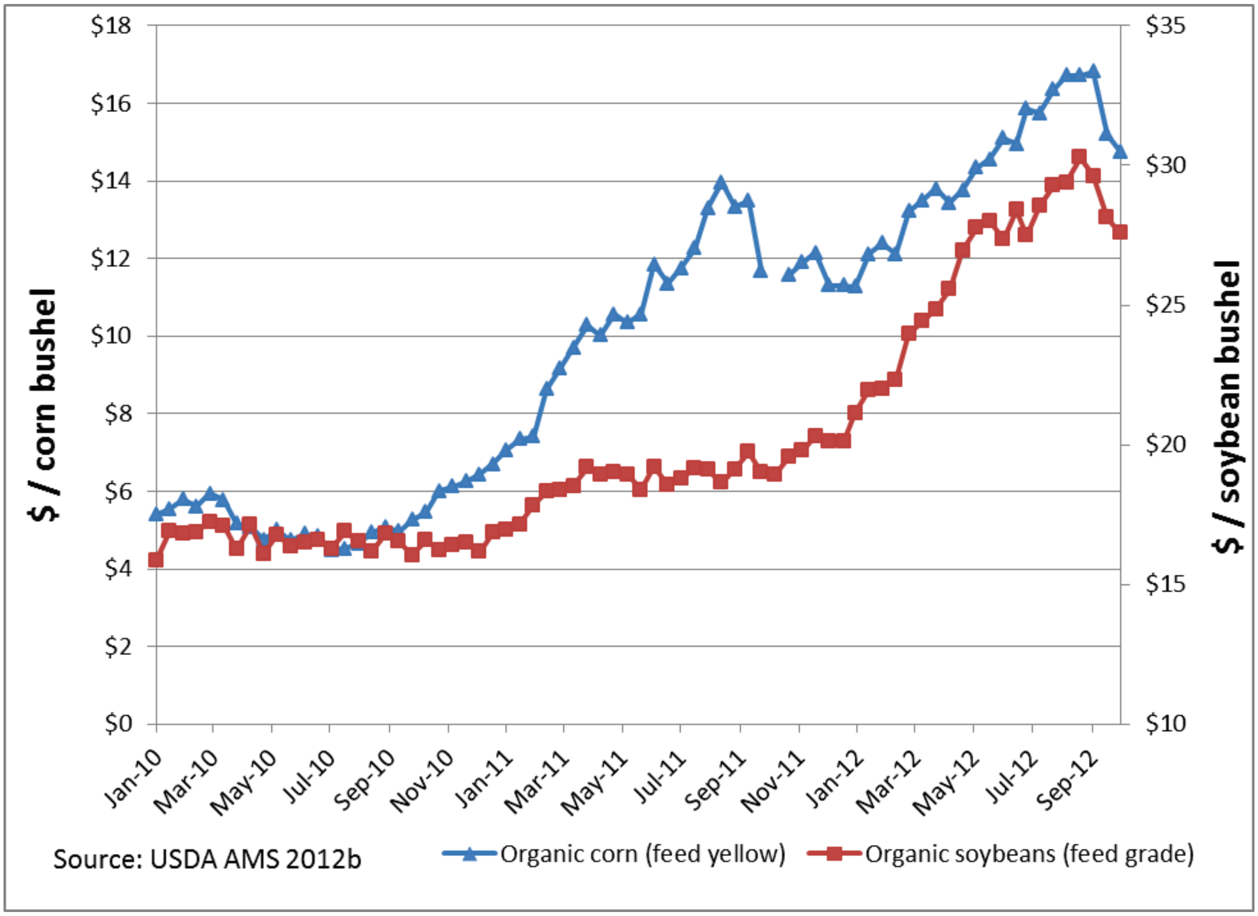


Figure 5. The Prices of Organic Grains and Oilseeds Are Increasing



Note: The USDA AMS did not report an organic corn feed price on October 20, 2011.

Table 3. Different Business Models of Organic Milk Processors

	Organic Valley	**Horizon Organic**
Commitment by dairy	Equity investment	Multiyear contract
Determination of price	Board of directors	Horizon Organic management
# of dairies	1,366 dairies	Contracts with 600 dairies and owns and operates two dairies
2011 net sales	$690 million	$500 million

Sources: Dean Foods 2012; Organic Valley 2012

Chapter 2. Economic Value of Organic Dairy Farms

We use input-output (I-O) analysis to estimate the economic value of organic dairy farms in Vermont and Minnesota. Based on statistical relationships between sectors in an economy, I-O models indicate how sales in one particular industry affect a region's output, labor income, employment, and gross regional product. Such models can estimate the regional economic values that occur from a preexisting industry, and they can also measure the regional economic impacts should an industry expand by some hypothetical amount. In this report, we use I-O databases and software developed by IMPLAN, a commonly utilized I-O modeling system, for our analyses.[1]

Results from I-O models are decomposed into three categories. The "direct effects" are the economic impacts associated with the sales of the sector under examination—in this case, the organic dairy sector. The "induced effects" are the economic impacts resulting from an increase in labor incomes of employees and proprietors in that industry. The "indirect effects" are the economic impacts associated with the increase in sales to industries that sell inputs to the industry under consideration.

These measures are often presented with "multipliers," which are ratios of the total economic impacts within a region (the sum of direct effects, induced effects, and indirect effects) relative to the economic impacts of the industry being studied (direct effects).[2] For example, if a sector has an output multiplier of 2, this implies that an increase of $1 in that sector's output results in an increase in $2 in output for all sectors in the region. Multipliers for income, employment, and gross regional product have analogous interpretations.

I-O models have greater accuracy when examining the economic impacts of sectors or projects on scales that do not have economy-wide repercussions. This is because I-O models are fixed-price models, implying that an expansion that occurs within one sector does not affect the relative prices of any other sectors within the economy. I-O models are also more accurate when considering smaller hypothetical increases in production, as the models do not incorporate resource constraints for inputs. For example, if the production of organic milk were to significantly expand, more farm acreage and organic feed would be required—increases in input costs that are not captured by I-O models. I-O analysis further assumes that sectors exhibit constant returns to scale, which implies that increases in output from the sector under examination require the same proportion of inputs that is required for existing levels of production.

I-O models have commonly been used to examine the economic impacts of various agricultural sectors, including numerous studies done for the dairy industry (e.g., Connecticut Department of Economic and Community Development and the Connecticut Department of Agriculture 2009; Cabrera et al. 2008; Deller 2007; Neibergs and Holland 2007). However, to our knowledge, no study until now has examined the relative economic impacts of various dairy-farm production systems generally or of organic dairy farms in particular. Our study, which in its specificity is the first of its kind, is conceptually similar to I-O studies that evaluated the relative economic impacts of organic and conventional production for various crops (Swenson, Eathington, and Chase 2007; Mon and Holland 2005).

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[1] The IMPLAN software is developed by MIG Inc. Further information is available online at *http://implan.com/V4/Index.php*, accessed October 4, 2012.

[2] That description is applicable to the multipliers presented in this report, although there are a variety of ways to calculate multipliers. See Miller and Blair 2009.

Our examination of organic dairy farms' economic impacts in two distinct geographic regions, the Northeast and Upper Midwest, provides insights because such impacts are region-specific. We select Vermont and Minnesota as case studies because the organic dairy sector is prominent in the two states and financial data are available both for the organic and conventional dairy sectors over a multiyear period. Table 1 shows that Vermont is seventh nationally in organic milk sales and that Minnesota is eighth. In 2011, 8 percent of Vermont's milk sales were organic—the second-highest percentage among the major dairy-producing states—and 3 percent of Minnesota's milk sales were organic (USDA ERS 2012b).[3] Our results may not be applicable to organic dairy farms in the West, however, because herd sizes there are larger and cows are more productive than in the Northeast and Upper Midwest.

Data Sources

We calculated economic impacts in Vermont and Minnesota using IMPLAN state-level data sets. We focused on the economic impacts of the organic dairy farm sector alone; i.e., we did not quantify or incorporate the economic impacts from any downstream sectors in the organic milk supply chain, such as organic milk processing or retail impacts. We accessed financial data on Minnesota's organic and conventional dairy farms from the Farm Financial Database (FINBIN) maintained by the University of Minnesota Center for Farm Financial Management. Robert Parsons, an extension economist at the University of Vermont who collects annual financial data on Vermont's organic dairy farms, shared his data with us for use in this report. We obtained financial data on conventional dairy farms in New England from the annual Northeast Dairy Farm Summary (NDFS), a joint project of Farm Credit East, Farm Credit of Maine, and Yankee Farm Credit (Lidback 2011; Samuelson 2010; Samuelson 2009).

We used financial data on New England conventional dairies as representative of Vermont conventional dairy farms because the NDFS aggregates its financial data—i.e., it does not report separately by state. We believe that these data offer a reasonable proxy for Vermont, as 63 percent of New England's 2011 milk production occurred in Vermont (USDA ERS 2012d). We adjusted crop sales and feed costs for small conventional dairies reported in NDFS to be proportional to the crop sales and feed costs of dairies elsewhere in New England—not including New York (on which NDFS also collects data) because dairies there have lower feed expenses and higher crop sales (Lidback and Laughton 2012).

Selection bias in the samples could be possible—given that only dairies capable of documenting financial data could be included, they may have predominantly been the dairies with greater financial performances. Table 4 shows that financial data on Vermont was, on average, collected annually from 33 organic dairies, 135 conventional dairies, and 129 small conventional dairies. Table 5 shows that, in Minnesota, data were available annually from 32 organic dairies, 469 conventional dairies, and 379 small conventional dairies on average. Herd size cutoffs for "small" conventional dairies were selected in both states so that the average herd size of the conventional dairy sample was close to the average herd size of the organic dairy sample. Table 1 shows that Vermont had 180 organic dairies and Minnesota had 114 organic dairies in 2011, so our samples account for about 18 percent and 28 percent, respectively, of the organic dairies in those states.

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[3] As a reference, Minnesota's gross domestic product (GDP) in 2011 was $282 billion, with agriculture/forestry/fishing/hunting accounting for 2.9 percent of that figure. Dairy products are the fourth-largest agricultural commodity in Minnesota and constitute 10 percent of farm receipts in the state. 2011 GDP in Vermont was $26 billion, with agriculture/forestry/fishing/hunting accounting for 1.5 percent of that figure. Dairy products are the largest agricultural commodity in Vermont and constitute 72 percent of farm receipts in the state. See DOC BEA 2012; USDA ERS 2012g.

Minnesota and Vermont Dairy Farm Sectors

We standardized the financial data reported by the three different data sources to develop Tables 4 and 5, which provide average annual per-cow estimates of revenues and expenses for different types of dairy production systems in Vermont and Minnesota. We did not report off-farm income.

Because of volatile market conditions, we used a three-year average of the most recent data available to consider the economic impacts of dairy farms in these two states. These data are from 2009 through 2011 for Minnesota and from 2008 through 2010 for Vermont. Both the conventional and organic dairy farm sectors will likely have experienced worse financial years in 2012 (for Minnesota) and in 2011 and 2012 (in Vermont), relative to the immediately preceding years; thus our results could overstate the current economic value of these sectors. We opted for a three-year average because dairy market conditions are sometimes said to move through a three-year cycle (e.g., Lidback and Laughton 2012; Wolf 2010). Economic-impact studies of the conventional dairy sector also have used average values of data from multiple years because of pricing volatility (Deller 2007).

From these two tables, we can make some useful comparisons between the organic and conventional dairy farm sectors. While the Vermont and Minnesota data are consistent with national trends—that conventional dairies are larger, with cows that produce more milk, while organic dairies receive higher prices and spend less on feed—examining the specific regional accounting information in further depth is needed to interpret the results from the economic impact calculations. Some of the comparisons we draw from Tables 4 and 5 include:

Conventional dairies are larger and produce more milk per cow.

We see in Table 4 that conventional dairies in New England had an average of 287 cows, with each cow producing 21,769 pounds of milk annually. Organic dairies in Vermont, by contrast, had 63 cows on average, with per-cow milk production at 13,154—or 60 percent of conventional levels. Conventional dairies in the region of similar size as organic dairies (i.e., fewer than 89 cows) averaged 66 cows that each produced 19,535 pounds of milk per year.

Similarly, we see in Table 5 that Minnesota's conventional dairies had 148 cows that each produced 22,041 pounds of milk per year, on average, while organic dairies in the state averaged 80 cows that produced 12,399 pounds of milk per cow. Minnesota's small conventional dairies (i.e., those with fewer than 200 cows) had 84 cows that each produced 19,823 pounds of milk annually.

Organic dairies receive higher prices and spend less on feed.

Organic dairies are able to sell their milk at a premium, which for the time intervals studied was greater in Vermont than in Minnesota. In Vermont, organic dairies received $0.31 per pound and conventional dairies received $0.17/pound. In Minnesota, these prices were $0.25/pound and $0.16/pound, respectively. Even though organic cows produce less milk, Table 4 shows that Vermont's organic dairies earn greater milk sales revenue per cow than its conventional dairies—a likely consequence of the state's high organic price premium. In Minnesota, where the price premium is not as large, we see in Table 5 that the opposite condition holds true.

Feed costs are the largest expense for dairies. Organic dairies spend less on feed than do conventional dairies even though feed is more expensive for organic dairies. In Minnesota, organic dairies spent $608 per cow per year, compared with $1,182 per cow per year for conventional dairies. At $1,190 per cow, organic dairies in Vermont spent more on feed than did organic dairies in Minnesota but still less than conventional dairies within the New England region.

Organic dairies were more profitable than conventional dairies of comparable size.

On average, Vermont's organic dairy farms were more profitable on a per-cow basis than both conventional and small conventional dairies. Table 4 shows that Vermont's organic sector had net farm revenue of $822 per cow, compared with $120 per cow for the conventional sector and $154 per cow for the small conventional sector. Farm operators who own and run a dairy farm typically do not pay themselves, or (typically) other family members who work on the dairy, an hourly wage. However, they retain the revenue that remains after the rest of the expenses are met and use the income to support cost-of-living family expenses. While net farm revenue reported in Table 4 does not explicitly account for these latter expenses, the NDFS and Robert Parsons (noted above in the Data Sources section) both compute an average cost-of-living expense for dairy farming systems, which we report in Table 4 as a "labor and management charge." After these expenses are deducted, only organic dairies in Vermont were earning a positive profit during the period considered.

In Minnesota, organic dairies were more profitable on a per-cow basis than small conventional dairies, but not when compared with the larger conventional dairies. Table 5 shows that net farm revenue was $389 per cow for Minnesota's organic sector, compared with $637 per cow for the conventional sector and $82 for the small conventional sector. A critical reason for this disparity between the states is that non-milk sources of revenue are relatively greater for Minnesota's conventional dairies. Specifically, Table 5 shows that conventional dairies in Minnesota receive $483 per cow in crop sales relative to $93 per cow for organic dairies. This disparity is not as pronounced in Vermont. Also, in Minnesota "other" sources of income, which includes government payments, are greater for conventional dairies.

Methodology

Converting Financial Accounting Data Into I-O Production Functions

We follow Willis and Holland (1997) to convert standardized financial accounting tables, shown in Tables 4 and 5, into the I-O production functions shown in Tables 6 and 7. We include revenue from milk sales, cow/calf sales, crop sales, and inventory adjustments from Tables 4 and 5 in the revenue-expansion scenarios, given that expenses are incurred to support revenue from all of these sources. We exclude the impacts of "other" revenue, as government payments constitute a significant component of this category. Thus we define "total industry outlay" in Tables 6 and 7 as the difference between the "total farm revenue" and "other revenue" reported in Tables 4 and 5.

Tables 6 and 7 show total industry outlays decomposed into non-payroll purchased inputs, such as feed and utilities, and "value added" components, which are disaggregated in Tables 6 and 7 as employee compensation, proprietary income, and indirect business taxes. We allocate the operating expenses in Tables 4 and 5, as reported in industry accounting tables, among the IMPLAN input-expense categories shown in Tables 6 and 7. In instances where IMPLAN industry definitions are more specific than the reported accounting data, we allocate expenditures across these categories in proportion to IMPLAN proxy industry spending patterns.

We undertake two additional steps, not shown in Tables 6 and 7, prior to calculating economic impacts. First, IMPLAN requires that prices be converted from purchaser prices to producer prices. To make this conversion, we allocate expenditures for each input among the producing, wholesale, retail, and transportation-service sectors by proportions determined by IMPLAN's standard margining coefficients. Second, we multiply industry input expenditures by the local purchase percentage for each input to develop state-specific results.

Estimating Dairy Employment

The FINBIN collects data on the number of hours worked in the dairy sector, but not on the number of employees in a dairy. In order to arrive at employment estimates on Minnesota dairy farms, we summed the number of paid and unpaid hours worked on the dairies. We then converted paid and unpaid hours worked into full-time equivalent job estimates by dividing by 2,080 (the nominal number of an individual's work hours in a year, assuming he or she was a full-time employee). However, some of the labor on dairy farms is part-time, and assuming that all of the workers are full-time will underestimate the number of jobs created. To correct for this, we divided the number of full-time equivalent workers by the percentage of full-time equivalent jobs in the dairy sector.[4] We used a similar approach for Vermont's organic dairies, in which data supplied by Robert Parsons was reported in total hours worked. For Northeast conventional dairies, we relied on employment data collected by the NDFS.

The on-farm employment estimates we provided did not distinguish between immigrant and United States-born labor. As discussed earlier, immigrant labor is not as prevalent on smaller dairies, so this distinction is unlikely to be meaningful in the organic dairy sector. However, immigrant workers on large confinement dairies are more likely to send a proportion of their wages as remittance payments back to their home country, thereby resulting in lower regional induced effects. Because we did not account for such remittance payments, our comparisons were likely to overstate conventional dairies' induced effects.

Estimating Statewide Dairy-Farm Sales

We obtained the statewide organic-milk dairy-farm sales revenue in Vermont and Minnesota from Table 1. To calculate the statewide organic dairy-farm revenue from *non*-milk sales, we divided the statewide organic-milk dairy-farm sales revenue by the ratio of two measures reported in Tables 4 and 5: milk sales and total farm revenue. To justify this calculation, we assumed that the proportion of milk sales to total dairy revenue of organic dairy farms not in the sample were equivalent to those organic dairy farms included in the sample.

Developing Expansion Scenarios

We examined the economic implications of expanding dairy production by considering the impacts of a hypothetical $5-million expansion in revenue for each type of dairy farm: organic, conventional, and small conventional. Using the same level of revenue for the different dairy sectors allows us to compare these dairies' region-specific economic impacts. Revenue is similarly the metric used in other dairy economic-impact assessments (Deller 2007) and in studies that have compared the economic impacts of conventional and organic crop production (Swenson, Eathington, and Chase 2007; Mon and Holland 2005). Examining the impacts of a revenue expansion by equivalent amounts in each sector implies that conventional dairies, which

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[4] This is 0.85 for the dairy sector. See *http://implan.com/V4/index.php?option=com_multicategories&view=article&id=628:628&Itemid=10*, accessed on May 30, 2012.

receive lower per-unit milk prices, will increase milk production by a relatively greater amount than organic dairies to attain the same level of revenue.

The relative economic impacts of these three types of dairy farms, and the corresponding multipliers, are independent of the hypothetical sales level selected. While the selection of $5 million is arbitrary, our calculations have a degree of realism in that the revenue increase is relatively modest.

The state-specific impacts of expanding dairy farm production will depend on whether increased milk production is purchased within the state or exported. These impacts will be attenuated if consumers in the state increase their milk consumption at the expense of consumption of other goods and services. However, because Vermont and Minnesota have small populations relative to the size of their dairy sectors, it is reasonable to assume that increased milk production would predominately be shipped out of the state to non-milk-producing areas; this implies an expansion of the dairy sector would have positive economic impacts within those two states.

Economic-Impact Analysis Results

Total Statewide Economic Value of Organic Dairies

Table 8 shows that in Vermont, the organic dairy farm sector contributes $76.3 million in output to the state's economy with an output multiplier of 1.7. It also contributes $34.1 million in gross state product with a multiplier of 2.3, $26.3 million in labor income with a multiplier of 1.8, and 1,009 jobs with a multiplier of 1.5. In Minnesota, the organic dairy farm sector contributes $77.7 million in output to the state's economy with an output multiplier of 2.1, $32.1 million in gross state product with a multiplier of 3.9, $21 million in labor income with a multiplier of 2.7, and 660 jobs with a multiplier of 1.8. Minnesota's organic dairy farm sector has greater multipliers than the corresponding ones of Vermont partly because a greater percentage of purchased grains are produced in Minnesota than in Vermont.

Economic Impacts of Organic Dairy Production Relative to Conventional Dairy Production

Tables 9 and 10 show the economic impacts of a hypothetical $5-million increase in revenue to organic dairy, conventional dairy, and small conventional dairy farms in Vermont and Minnesota, respectively. In Vermont, increasing organic dairy farm sales by $5 million leads to a total increase in output that is 3 percent greater than the increase in output that would occur from an equivalent level of sales to conventional dairy farms and 2 percent greater than in the small conventional sector, as shown in Table 9. While the indirect effects of the conventional and small conventional sectors are greater than those of organic dairies (given the latter's greater dependence on purchased inputs), the organic sector's induced effects are sufficiently large that its total economic impacts are greater.

The hypothetical increase in Vermont's labor income is 39 percent greater for organic dairy farm revenue relative to the corresponding level of conventional dairy farm revenue and 41 percent greater than in the small conventional dairy sector. The resulting increase in Vermont's gross state product from expanded organic dairy farm sales is 33 percent greater than from conventional sales and 29 percent greater than from small conventional sales. Employment impacts in Vermont are also highest from organic dairy farm sales—by 83 percent and 47 percent—compared with conventional and small conventional dairies, respectively.

Just as in Vermont, an expansion of $5 million in sales revenue for organic dairy farms in Minnesota has greater economic impacts on the state's economy relative to an equivalent level of sales revenue to conventional or small conventional dairy farm sectors, as shown in Table 10. Also similar is that in Minnesota the organic dairy farm sector has greater induced effects than in the conventional and small conventional sectors. For the organic sector, a $5-million revenue expansion would lead to a 4 percent greater increase in output, a 9 percent greater increase in labor income, an 11 percent greater increase in gross state product, and a 14 percent in employment relative to corresponding measures in conventional dairy farms. Compared with the small conventional sector, the organic sector's increases are 3 percent, 35 percent, 26 percent, and 5 percent greater, respectively. In Vermont and Minnesota alike, organic dairy farms have a higher output multiplier than the conventional and small conventional farms for the same level of sales revenue, with smaller employment, labor-income, and gross-state-product multipliers.

Table 4. Financial Performance of Vermont Dairy Sector (Average values from 2008 to 2010)

	NE conventional	VT organic	NE & NY conventional, 89 cows or fewer
Average # of cows/dairy	287	63	66
Average # of dairies	135	33	129
Average per-cow production (lbs/year)	21,769	13,154	19,535
Revenue	**($/cow)**	**($/cow)**	**($/cow)**
Milk sales	$3,800	$4,046	$3,277
Cattle/cow/calf sales	$181	$177	$209
Crop sales	$143	$28	$181
Inventory and transfer adjustments	$50	$83	$4
Other	$323	$229	$279
TOTAL FARM REVENUE	$4,497	$4,563	$3,950
Operating Expenses	**($/cow)**	**($/cow)**	**($/cow)**
Chemicals and sprays	$39	$1	$45
Custom hire	$154	$160	$73
Feed	$1,423	$1,190	$1,111
Fertilizer and lime	$145	$37	$144
Freight and trucking (marketing)	$223	$92	$208
Gasoline, fuel, and oil	$197	$144	$190
Insurance	$71	$82	$75
Interest	$130	$155	$138
Labor	$647	$359	$284
Rent	$77	$73	$51
Repairs	$251	$277	$259
Seed and plants	$53	$25	$85
Supplies	$260	$241	$216
Taxes (real estate)	$47	$52	$100
Utilities	$110	$138	$137
Veterinary, medicine, breeding	$140	$100	$110
Other	$120	$169	$123
Cow replacements	$25	$0	$15
Depreciation	$266	$446	$431
TOTAL FARM EXPENSES	$4,377	$3,741	$3,795
NET FARM REVENUE	$120	$822	$154
Labor and management charge	$175	$640	$506
NET EARNINGS	-$55	$182	-$351

Sources: Northeast Dairy Farm Summary 2008, 2009, 2010*;* Robert Parsons.

Table 5. Financial Performance of Minnesota Dairy Sector (Average values from 2009 to 2011)

	Conventional	**Organic**	**Conventional, 200 cows or fewer**
Average # of cows/dairy	148	80	84
Average # of Dairies	469	32	379
Average per-cow production (lbs/year)	22,041	12,399	19,823
Revenue	**($/cow)**	**($/cow)**	**($/cow)**
Milk sales	$3,605	$3,160	$3,198
Cattle/cow/calf sales	$151	$135	$201
Crop sales	$483	$93	$417
Total inventory change	$197	$129	$102
Other	$520	$251	$314
TOTAL FARM REVENUE	$4,955	$3,767	$4,232
Operating expenses	**($/cow)**	**($/cow)**	**($/cow)**
Chemicals and sprays	$56	$3	$71
Custom hire	$153	$152	$141
Feed	$1,182	$608	$1,069
Fertilizer and lime	$144	$133	$189
Freight and trucking (marketing)	$101	$97	$109
Gasoline, fuel, and oil	$194	$193	$205
Insurance	$86	$69	$101
Interest	$222	$230	$257
Labor	$440	$368	$252
Rent	$257	$306	$223
Repairs	$271	$335	$300
Seed and plants	$139	$101	$175
Supplies	$129	$119	$131
Taxes (real estate)	$29	$38	$39
Utilities	$113	$106	$138
Veterinary, medicine, breeding	$176	$62	$162
Other	$353	$214	$274
Cow replacements	$12	$4	$22
Depreciation	$262	$238	$290
TOTAL FARM EXPENSES	$4,318	$3,378	$4,150
NET FARM REVENUE	$637	$389	$82

Source: FINBIN

Table 6. Vermont's Dairy Production Function in Input-Output Accounting Framework (Before margining)

Inputs	Conventional ($/cow)	Organic ($/cow)	Conventional, 89 cows or fewer ($/cow)
Grains	$1,332	$1,115	$1,041
All other crop-farming products	$91	$76	$71
Cattle from ranches and farms	$25	$0	$15
Agriculture and forestry support services	$327	$354	$281
Electricity, and distribution services	$102	$129	$128
Natural gas, and distribution services	$4	$5	$5
Water, sewage treatment, and other utility services	$3	$4	$4
Maintained and repaired nonresidential structures	$194	$214	$199
Automotive repair and maintenance, except car washes	$54	$60	$56
Commercial and industrial machinery repairs and maintenance	$4	$4	$4
Farm machinery and equipment	$260	$241	$216
Fertilizer	$145	$37	$144
Pesticides and other agricultural chemicals	$39	$1	$45
Retail Services—gasoline stations	$0	$0	$0
Refined petroleum	$196	$143	$190
Motor vehicle and parts dealers	$3	$1	$3
Truck transportation	$220	$91	$205
Monetary authorities	$130	$155	$138
Real estate establishments	$77	$73	$51
Veterinary services	$140	$100	$110
Insurance carriers and related	$71	$82	$75
TOTAL INPUTS	$3,417	$2,885	$2,980
VALUE ADDED			
Employee compensation	$647	$359	$284
Proprietary income	$63	$1,039	$306
Indirect business tax	$47	$52	$100
TOTAL VALUE ADDED	$757	$1,449	$690
TOTAL INDUSTRY OUTLAY	$4,174	$4,335	$3,671

Table 7. Minnesota's Dairy Production Function in Input-Output Accounting Framework (Before margining)

Inputs	Conventional ($/cow)	Organic ($/cow)	Conventional, 200 cows or fewer ($/cow)
Grains	$975	$371	$844
All other crop-farming products	$207	$237	$225
Cattle from ranches and farms	$12	$4	$22
Agriculture and forestry support services	$645	$468	$590
Electricity, and distribution services	$105	$99	$129
Natural gas, and distribution services	$4	$4	$5
Water, sewage treatment, and other utility services	$3	$3	$4
Maintained and repaired nonresidential structures	$209	$258	$231
Automotive repair and maintenance, except car washes	$59	$72	$65
Commercial and industrial machinery repairs and maintenance	$4	$5	$4
Farm machinery and equipment	$129	$119	$131
Fertilizer	$144	$133	$189
Pesticides and other agricultural chemicals	$56	$3	$71
Retail Services—gasoline stations	$0	$0	$0
Refined petroleum	$194	$192	$205
Motor vehicle and parts dealers	$1	$1	$1
Truck transportation	$100	$96	$108
Monetary authorities	$222	$230	$257
Real estate establishments	$257	$306	$223
Veterinary services	$176	$62	$162
Insurance carriers and related	$86	$69	$101
TOTAL INPUTS	$3,587	$2,733	$3,569
VALUE ADDED			
Employee compensation	$440	$368	$252
Proprietary income	$379	$376	$58
Indirect business tax	$29	$38	$39
TOTAL VALUE ADDED	$848	$783	$349
TOTAL INDUSTRY OUTLAY	$4,436	$3,516	$3,918

Table 8. Economic Value of Organic Dairy Sector in Vermont and Minnesota

Vermont Organic Dairy				
Impact type	Employment	Labor income	Gross state product	Output
Direct effect	675	$14,400,239	$14,934,053	$44,666,833
Indirect effect	182	$6,212,105	$9,197,895	$15,389,517
Induced effect	153	$5,649,545	$9,994,042	$16,216,070
Total effect	1,009	$26,261,889	$34,125,990	$76,272,420
Multiplier	1.50	1.82	2.29	1.71
Minnesota Organic Dairy				
Impact Type	Employment	Labor income	Gross state product	Output
Direct effect	361	$7,818,257	$8,221,423	$36,926,826
Indirect effect	171	$7,645,092	$13,911,915	$24,624,399
Induced effect	128	$5,490,899	$9,926,523	$16,147,802
Total effect	660	$20,954,248	$32,059,861	$77,699,026
Multiplier	1.83	2.68	3.90	2.10

Table 9. Economic Impacts in Vermont of a $5-Million Increase in Revenue

Conventional				
Impact type	Employment	Labor income	Gross state product	Output
Direct effect	27	$850,970	$906,876	$5,000,000
Indirect effect	23	$809,196	$1,159,426	$1,968,811
Induced effect	12	$455,286	$805,697	$1,306,982
Total effect	62	$2,115,452	$2,872,000	$8,275,794
Multiplier	2.34	2.49	3.17	1.66
Organic				
Impact type	Employment	Labor income	Gross state product	Output
Direct effect	76	$1,612,160	$1,671,923	$5,000,000
Indirect effect	20	$695,468	$1,029,738	$1,722,913
Induced effect	17	$632,487	$1,118,870	$1,815,449
Total effect	113	$2,940,116	$3,820,531	$8,538,362
Multiplier	1.50	1.82	2.29	1.71
Small conventional				
Impact type	Employment	Labor income	Gross state product	Output
Direct effect	41	$803,297	$939,972	$5,000,000
Indirect effect	23	$838,151	$1,231,193	$2,090,234
Induced effect	12	$450,170	$796,661	$1,292,305
Total effect	77	$2,091,618	$2,967,826	$8,382,539
Multiplier	1.86	2.60	3.16	1.68
Percentage comparison of total effects				
Sector comparison	Employment	Labor Income	Gross State Product	Output
Organic—conventional	83%	39%	33%	3%
Organic—small conventional	47%	41%	29%	2%

Table 10. Economic Impacts in Minnesota of a $5-Million Increase in Revenue

Conventional				
Impact type	Employment	Labor income	Gross state product	Output
Direct effect	39	$923,271	$956,202	$5,000,000
Indirect effect	24	$1,005,668	$1,733,091	$3,134,680
Induced effect	16	$685,155	$1,238,701	$2,014,938
Total effect	79	$2,614,094	$3,927,995	$10,149,619
Multiplier	2.03	2.83	4.11	2.03
Organic				
Impact type	Employment	Labor income	Gross state product	Output
Direct effect	49	$1,058,615	$1,113,205	$5,000,000
Indirect effect	23	$1,035,168	$1,883,714	$3,334,215
Induced effect	17	$743,484	$1,344,080	$2,186,459
Total effect	89	$2,837,266	$4,340,998	$10,520,674
Multiplier	1.83	2.68	3.90	2.10
Small conventional				
Impact type	Employment	Labor income	Gross state product	Output
Direct effect	46	$395,571	$445,082	$5,000,000
Indirect effect	27	$1,156,900	$1,994,502	$3,620,493
Induced effect	13	$551,965	$998,081	$1,623,282
Total effect	85	$2,104,436	$3,437,665	$10,243,774
Multiplier	1.86	5.32	7.72	2.05
Percentage comparison of total effects				
Sector comparison	Employment	Labor income	Gross state product	Output
Organic—conventional	14%	9%	11%	4%
Organic—small conventional	5%	35%	26%	3%

Chapter 3. Recommendations

Operating a dairy farm is inherently risky. Further, the risks that organic dairy farms confront are different from the risks associated with conventional dairy farms. Because organic dairy cows graze outdoors (unlike conventional dairy cows), organic dairy farms are vulnerable to weather-related risks that could limit pasture access or decrease forage production. Another difference between organic and conventional dairy farms is that organic dairies have limitations on the use of antibiotics and pesticides; this implies that organic dairy farms are subject to biological risks that conventional dairy farms do not face. Although both conventional and organic dairy farms are subject to market-related risks caused by volatility in feed prices, we demonstrated in Chapter 2 that there are distinct markets for conventional and organic feed and that each are susceptible to their own unique supply and demand shocks.

Federal and state dairy programs exist, in part, to mitigate risks to dairies. They also are needed because milk production is highly diffuse, the supply and demand of milk do not always coincide, and milk is nutritionally important but also perishable. These dairy programs have multiple, and sometimes competing, objectives, which include stabilizing market conditions, supporting milk prices, and supplementing dairy incomes (Blayney and Normile 2004). Significant revisions to the dairy safety net have been proposed during 2012 Farm Bill deliberations (Balagtas 2011; Shields 2011; Dairy Policy Analysis Alliance 2010).

A full evaluation of federal dairy policy is beyond the scope of this report. Nevertheless, in this chapter we argue that new and existing programs must be better equipped to support organic dairy farms and satisfy the current excess demand that exists for organic milk. Our arguments are contained in the following specific recommendations:

The USDA should reform minimum-pricing orders to make them more effective for the organic dairy sector.

In the 1930s, dairies were much smaller and more numerous. Federal milk marketing orders (FMMOs) were established to ensure a consistent supply of product to consumers while also stipulating that all dairies in a region would receive the same minimum price for milk. FMMOs have been revised and consolidated in the ensuing decades, but they still serve the same fundamental purposes. First, they establish minimum prices that all processors and manufacturers in a defined region must pay dairy producers for Grade-A milk. Second, FMMOs ensure a steady supply of fluid milk to consumers, given that demand fluctuations for milk do not always coincide with on-farm milk-production schedules. Third, FMMOs collect audited-milk sales data, which are used by dairy farms, lenders, researchers, and the public to assess market conditions.

All of the milk revenue received from processors in the marketing order's region is pooled, which allows each dairy producer within an FMMO to be guaranteed the same minimum price for milk. Dairies can receive payment greater than the minimum price, however, due to adjustments for milk quality, components, and location. FMMOs determine this minimum price as a weighted average of milk prices in the region for the various end-uses; the minimum price for fluid milk is established at a higher level than minimum prices for milk going into various manufactured products.[5]

[5] Suppose that 75 percent of milk in a region is sold to cheese plants and 25 percent is sold to fluid-milk bottlers. Further suppose that the fluid-milk floor price is $20 per hundredweight and the cheese floor price is $15 per hundredweight. In this example, the minimum blend price in the region is $16.25 (the weighted average) per hundredweight for all dairies, regardless of whether they sell their milk to cheese plants or to fluid-milk bottlers.

The FMMO uniform blend price is a historical relic that was established decades before the organic milk sector existed. The stipulation that all dairies receive an identical price was based on an equity principle—they were producing, after all, an identical product. **However, organic milk is produced using different farming practices, has a different nutritional content, and is perceived by consumers as distinct from conventional milk. They are not identical products, and thus it is inequitable for farm policy to fail to make such distinctions.**

Two issues previously discussed in this report make FMMOs problematic for the organic sector: (1) organic dairies sell a greater percentage of milk as fluid milk than do conventional dairies; and (2) organic milk prices are set, independently of the FMMO, at higher levels than the conventional fluid-milk minimum price. As a result, organic processors have to make payments into the FMMO pool of approximately $30 million annually (NODPA 2011); yet the FMMO payments provide no benefits to organic dairies, as the organic milk price is already established above the FMMO fluid-milk floor price.[6] Not only is this situation disadvantageous to organic processors, it is also problematic for organic dairy farms and organic milk consumers. FMMO payments could otherwise be factored into higher payments to dairy farms or into lower milk prices to consumers, which implies that **the current structure of the FMMO reduces the production and consumption of organic milk.**

There are two basic ways to rectify this situation: 1) organic milk could be removed from the FMMO entirely, and organic processors would only participate in the FMMO for organic milk sold as conventional; 2) organic milk could stay within the FMMO but establish its own classification, with minimum organic milk prices that are distinguished from minimum conventional milk prices. The relative merits of these two alternatives depend on how well some of the other FMMO features, such as data collection, auditing, and market oversight, could function independently of the FMMO, and in any case a thorough evaluation of these two alternatives is beyond the scope of this report. Nonetheless, significant revisions are needed to make the FMMO more effective for organic dairy producers, processors, and consumers.

An additional improvement is that the FMMO should report data on organic milk market conditions to the same level of detail as is done for conventional milk. Currently, the only organic-related data published are the volumes of organic milk sold as fluid milk. It would also be valuable to publish the percentages of organic milk used in manufactured milk products and the percentages of organic milk sold as conventional, as no reliable estimate of these figures exist.

Congress and the USDA should customize risk-management programs to reflect organic milk market conditions.

The version of the 2012 Farm Bill passed by the Senate Agricultural Committee proposes two new programs to support dairy incomes and milk prices. First, a subsidized margin-insurance program would provide dairies with indemnity payments when the difference between the average milk price (received by U.S. dairies) and average feed costs—based on futures contract prices for conventional corn, soybean meal, and alfalfa—became narrow. Second, the bill introduces a voluntary supply-management program that would withhold payments to dairies that produce in excess of an allocated quota when the national margin between milk prices and feed

[6] Returning to our simple example, suppose all of the organic milk in the region is sold as fluid milk. This means that organic processors have to pay $3.75 per hundredweight (the difference between the $20 fluid-milk price and $16.25 blend price) into the pool for the milk that they purchase even if they are paying a higher price (say, $30 per hundredweight) than the FMMO fluid-milk floor price for organic milk.

costs became narrow. The withheld revenue would be used to promote the demand for dairy products, such as by purchasing excess milk.

The margin-insurance program being proposed is conceptually identical to the USDA's Dairy Cattle Livestock Gross Margin Insurance policy ("LGM Dairy"). Previously, the only insurance policies offered by the USDA that dairy farms could purchase were Adjusted Gross Revenue or Adjusted Gross Revenue-Lite insurance (AGR), two conceptually identical insurance policies that the Union of Concerned Scientists has extensively documented (O'Hara 2012). A critical reason why AGR has been ineffective for dairy farms is that it is designed for farmers to insure against variations in revenue; it doesn't account for fluctuations in the difference between revenue and feed costs. LGM Dairy is designed to rectify this shortcoming.

Triggers for the proposed margin-insurance and supply-management programs are based on the differences between conventional milk and feed prices. The policies are designed this way in part because futures contracts exist for conventional dairy products, grains, and oilseeds. The USDA can use these data to create pricing indices needed to calculate the margins for the insurance policy. There is not an equivalent pricing-data source for organic milk or feed—a situation that has been an impediment to the development of insurance policies for organic crops (O'Hara 2012). However, as our discussion about feed prices demonstrates, market conditions for organic dairy farms are not always correlated with market conditions for conventional dairy farms. This implies that even though organic dairy farms can purchase LGM Dairy, the conditions under which the insurance policy would be effective are not representative of organic milk market conditions on a consistent basis. **Having an insurance policy based on one type of production method also reduces incentives for dairies to reduce production costs, given that taxpayers are subsidizing the entrenchment of one production technique**. Developing a federal risk-management program that could be helpful to organic dairy farms is thus a priority.

If these programs for margin insurance and supply management are to be adopted, they should be amended to be effective for organic dairies. First, the money withheld from organic dairies when overproduction occurs should be used to boost the demand for organic milk specifically. Second, thresholds by which these programs are initiated for organic dairies should be based on organic-milk market conditions. For example, the threshold would be reached if the difference between organic milk and organic feed prices became smaller than a given amount. The Union of Concerned Scientists has already proposed that the USDA could utilize existing data collected by its Agricultural Marketing Service and the National Agricultural Statistics Service to improve insurance policies for fruit and vegetable farms and organic-crop farms (O'Hara 2012), and it could develop pricing indices for use as well in margin-insurance and supply-management programs for organic dairy farms. The proposed organic insurance policies may be more effective if designed at a regional level, which would account for regional variation in market conditions.

Congress should maintain or increase funding for programs that support organic agriculture.

Programs in support of organic agriculture, while not specific to the dairy sector, could still be accessed and utilized by organic dairies. Examples of such programs include: the organic cost-share certification program, which provides financial assistance to farms obtaining organic certification; and programs that fund organic-research initiatives, including those that support classical plant and animal breeding and forage-based nutrition. Other important organic dairy opportunities exist in conservation programs, such as the Environmental Quality Incentives Program, which provides farmers with technical assistance in the development of grazing plans and with cost-share assistance in the construction of cattle lanes, stream-bank fencing, and stream crossings.

Congress should fund, and the USDA should implement, programs that support regional food-system development.

Programs that support the expansion of local and regional food systems could also help the organic dairy sector. For example, rural development programs, such as value-added producer grants, could help organic dairies establish their own milk-bottling plants. And farm-to-school programs that give schools the option of sourcing from regional producers could also allow them the latitude to source organic milk.

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CREAM OF THE CROP

The Economic Benefits of Organic Dairy Farms

Consumers are drinking more organic milk due to a growing recognition of its nutritional advantages and the environmental consequences of producing milk on large, confined dairy operations. The organic dairy sector has emerged to supply this milk and has provided a prominent alternative for smaller, pasture-based dairy farms that do not want to "get big or get out" of farming.

Cream of the Crop is the first study to calculate the economic value associated with organic dairy farming, and demonstrates that organic dairy farms are an important contributor of opportunities and jobs in rural economies. However, smart, forward-thinking farm policies are needed to help organic dairy farmers deal with the unique risks and challenges they confront. The Union of Concerned Scientists identifies principles for reforming farm policy so that organic dairy farms can continue to produce the milk that consumers demand.

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