

# Transaction Cost Case Studies for Six Iowa Food Producers

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# Introduction

This document is part of a longer report summarizing the results from the project “Case Studies and Benchmark Transaction Costs for Select Food Products” (M2006-02) funded by the Marketing and Food Systems Initiative of the Leopold Center for Sustainable Agriculture at Iowa State University.

The focus of the project was to illustrate, through six case studies, the transaction costs incurred by Iowa-based food producers who distribute to in-state and regional markets. Two producers or producer groups were selected from each of three product categories of meat, dairy, and fresh fruit or vegetables. Transaction costs, also referred to as logistics costs, include cash payments and amortized costs associated with post-production handling, packaging, storage, inventory carrying, and transportation functions.

With little information to benchmark against, it may not be unusual for direct market or networked farmers to overlook or fail to appreciate the significance that transaction costs can have on profitability. The project illustrated key issues that small and midsize Iowa farmers and producer networks should be aware of when evaluating distribution efficiency. Transaction costs may be both too large to be ignored and large enough to provide opportunities for alternative delivery systems—but only if the providers of these alternatives understand the total amount of resources required, as measured in cost terms. It was envisioned that the case studies will be reviewed by producers of similar scope for insights and lessons regarding appropriate scaling of distribution infrastructure.

## **GROWN Locally Fresh Vegetables and Other Products**

GROWN Locally<sup>1</sup> (GL) is a northeast Iowa farmers' cooperative that distributes the products grown on 15 farms in five counties. Its market includes 190 households that have purchased, in advance for 20 weeks, boxes of produce, to be delivered either at a drop-off site or to their homes up to 40 miles away (for a \$60 delivery fee; i.e., \$3 per week).<sup>2</sup> The drop-off sites (for customer pickup) include a wellness center, two coffee shops, and a garden store (which also sells GL products on consignment), in addition to the coordinating farm.



These sites provide space to GL to build traffic to their business. GL recognizes that the alternative delivery points are less personalized but more fuel-efficient than the home delivery option. GL also sells to two restaurants, two hospitals, three nursing homes, and four other non-household customers. Sales to consumers (including through the consignment retail store) account for 84 percent of the total, with institutional sales contributing the remaining 16 percent.<sup>3</sup>

The products are listed in Table 1, which shows that nearly two-thirds of the revenue is supplied by sales of vegetables. Meat products account for about 14 percent, with "other" products (including non-food items, such as candles) providing nearly 11 percent of the income. GL's revenue for a recent 12-month period was \$70,927.

**Table 1: GROWN Locally Product Sales**

1.3 percent	<b>Dairy</b>
8.4 percent	<b>Fruit</b>
13. percent	<b>Meat</b>
65.7 percent	<b>Vegetable</b>
10.7 percent	<b>Other</b>

### **Transportation Costs**

Produce is delivered to GL from its 15 growers either by the farmers' own vehicles or as backhauls during the deliveries to customers. Thus, while there are no records of the cost of inbound transportation for GL, these costs are considered low if it is assumed the delivery drivers do not change their routings greatly to make the inbound pickups. Deliveries are made along 10 delivery routes that have been mapped out to connect with both customers and suppliers. Five of the routes are handled by drivers Jeremy, Bob, Paul, and two paid employees, and the remaining five are driven by Solveig or Michael, the chief administrators of GROWN Locally. Drivers using their own mini-vans are paid

a portion of the delivery fee, based on the IRS reimbursement rate per mile (i.e., 44.5 cents per mile in 2006).

The mini-vans would have a capacity limit of 146.7 cu. ft. (for 2004 and 2005 Dodge Caravans) up to 160.7 cu. ft. (2007 Grand Caravan).<sup>4</sup> The cargo weight limit can be estimated as the difference of the gross vehicle weight (GVW), published as 5,600 pounds for a 2005 Caravan, and the maximum curb weight for an identically sized 2004 Caravan of 3,862 pounds, or 1,738 pounds. Although dimensions and weights of individual orders were not collected, the likelihood of GL's deliveries approaching these limits is small. These vehicles get about 20 miles per gallon (m.p.g.).

Solveig and Michael also own a 9-ton capacity truck (estimated 15 m.p.g.) and a refrigerated truck (estimated 11 m.p.g. of diesel fuel, with a compressor that would take 1/2 gallon per hour). There were concerns about driving the refrigerated truck on some of the gravel roads in this part of Iowa and a preference was expressed for a Dodge Sprinter (i.e., a truck similar to a FedEx delivery vehicle). Additional cost information (e.g., maintenance, depreciation, financing, licensing) is not collected at this time by GL since all the vehicles used also are considered to be farm and personal vehicles.



It is possible to estimate the delivery costs based on the known limits of the delivery area. If 40 miles is the furthest that GL will deliver, and not every one of the 10 routes will go that distance, and a short route is likely to be something on the order of 20 miles out and back, then a conservative estimate might be 30 miles out and 30 miles back, in a loop to include as many subscribers as feasible. Therefore, each week's deliveries would consume approximately 600 miles, for which GL pays the vehicle owners \$267 (at the IRS rate); the season of 20 weeks would cost \$5,340.

Estimates based on the IRS mileage rate tend to understate transportation cost when compared with vehicle costs such as shown on the Federal Highway Administration (FHA) website (based on 2001 data), which indicate that a mini-van costs 50.7 cents per mile to operate (based on 70,000 miles of use over five years).<sup>5</sup> At the higher level, the 20-week cost would be \$6,084 for the vehicles, including depreciation, financing, insurance, registration fees, taxes, fuel, and maintenance. The FHA costs are somewhat higher in part because its published fuel mileage of 17 m.p.g. is based on city driving, rather than highway driving.

Driver costs would add between \$7 and 8.50 per hour (the rates GL's paid employees received). If drivers could average 30 miles per hour, including stops, they would take 20 hours per week to make their deliveries and be paid \$155 (using the midpoint of the

hourly rates). Therefore, this estimate of transportation cost alone becomes \$407 per week for delivering 1,735 pounds of produce, or \$0.243 per pound.

By comparison, GL's delivery charge of \$3 per week generates \$0.21 per pound (based on the weighted average box size as shown in Table 2, and assuming that the portions for each box size were the same for 190 customers as they were for a reported sample of 123), meaning that GL's actual transportation costs may be 14 percent higher than it charges.

**Table 2: Estimated Weights and Revenues by Product Category**

<b>Box Size</b>	<b>Pounds (Average)</b>	<b>Price (20 wks)</b>	<b>Quantity</b>	<b>% of Units</b>	<b>% x 190</b>	<b>Income</b>	<b>% of Income</b>
<b>Small</b>	7	\$145.00	61	49.6%	94	\$13,663	19.3%
<b>Medium</b>	10.5	\$200.00	53	43.1%	82	\$16,374	23.1%
<b>Large</b>	15.5	\$255.00	9	7.3%	14	\$3,545	5.0%
<b>Delivery</b>		\$60.00	123	100.0%	190	\$7,380	10.4%
<b>Institutional</b>						\$11,171	15.7%
<b>Other</b>						\$29,965	42.2%
<b>Totals</b>						\$70,927	100.0%

### **Packaging**

Deliveries are made in boxes of three different sizes. The small box is packed with seven pounds of produce, the medium holds 10 to 11 pounds, and the larger box holds 15 to 16 pounds. Actual costs of packaging will vary, depending on the boxes used and on the number of times they are re-used.

### **Handling Cost**

Products were handled several times after picking. Initial packing of the product being picked was estimated to take 22 hours for each day crops were picked (assumed to be two days per week). The next handling step was washing, which took 16 hours per week, with washers being paid \$7 per hour. Finally, the packing of assortments for delivery after washing took 10 hours (i.e., four people for 2 1/2 hr. each). People other than washers were paid between \$7 and 8.50 per hour, or a median rate of \$7.75. The 20-week payroll costs for handling are estimated in Table 3.

**Table 3: Handling Cost Estimates**

<b>Activity</b>	<b>Hr/Week</b>	<b>Rate</b>	<b>Cost/Wk.</b>	<b>Cost/20 Wks.</b>
Pack after Picking	22	\$7.75	\$170.50	\$3,410.00
Washing	16	\$7.00	\$112.00	\$2,240.00
Pack Out	10	\$7.75	\$77.50	\$1,550.00
<b>Totals</b>	<b>48</b>		<b>\$360.00</b>	<b>\$7,200.00</b>

### **Inventory Carrying Cost**

Although inventory carrying costs for agricultural equipment have been estimated at about 14 percent annually,<sup>6</sup> they are ignored in this case because the produce is considered to have a brief shelf life of less than a week.

### **Administrative Cost**

The time spent arranging pickups, packing and deliveries was not enumerated but was considerable. Comments during the interview indicated the coordinator spent much time arranging to deliver small amounts to many locations. While the principals wished to spend more time on production, there also was recognized need for marketing advice which would help attract more customers.



### **Conclusions Regarding Grown Locally**

GROWN Locally demonstrated familiarity with post-transaction costs, as evidenced by their instituting a separate charge for fresh produce deliveries to individual homes. The estimates derived above suggest their delivery fee may be lower than their actual transportation costs, which is not a viable situation for the long term. In other words, by providing a premium product and service at a price below break-even, GL is, in effect, subsidizing its customers.

Likewise, the administrative effort required to coordinate inbound products from 15 producers and arrange for nearly 200 separate deliveries each week during the growing season appeared to be a “free good” for the farmers who were being subsidized by the coordinators of the cooperative. It may be necessary for the growers, distributors and customers to review the concept of “value added” and better quantify, through the pricing structure, the values represented by each step of the production and distribution processes.

## Black's Heritage Farm Fresh Vegetables

Black's Heritage Farm, located south of Ames in Story County, is run by Norine and Duane Black. As they are planning their retirement, their product mix recently has been 100 percent vegetables; they have long been active in local and regional farmers' markets. Their operations include farming, picking and packing (i.e., processing), and distribution for their one farm. They also have provided market transportation for products from other farms.



Blacks' number of employees varies from two to 10; they are hired for the season (May to October) and all are part-time. They also have used four to six interns or other volunteers. Between two and eight employees or volunteers perform packing and delivery tasks during the season. Most of their revenues (estimated 95 percent) in recent years has come from consumers (i.e., visitors to the farm or at farmers markets), with 5 percent from wholesalers (principally Loffredo Fresh Produce of Des Moines). The Blacks had worked with Loffredo in 2004 in developing a "Scraps for Feed" program, with unprocessed food scraps being hauled back to the farm and fed to the cattle, horses, goats, sheep, ducks and chickens that they raised at the time.<sup>7</sup>

### Market Information

Their consumers currently are located up to 10 miles away. However, Norine Black has participated in farmers' markets as far away as Omaha, Nebraska and Bloomington, Illinois. These were sponsored by food companies (i.e., Eurest and Guckenheimers) so some of the vendors' costs may have been covered. Duane commented about the distance from Ames (170 miles and 330 miles from Ames, respectively), an indication that transportation costs had been considered but given lower priority than participating as a means of promoting the business or to maintain networking and social contacts.



When delivering, Black's uses farm-owned or leased trucks. Duane commented that sometimes they leased the right vehicle for the job; this matching of the equipment with the load was not mentioned in any of the other case interviews. It is a tactic that provides efficient transportation and complete cost information (i.e., the amounts indicated on the lease transaction documents).

### Transportation Costs

Black's Heritage Farm owns a 1997 GMC Durango pickup truck and a 12-foot trailer. The farm has used a milk truck to provide refrigerated service. The costs of running the truck (mainly fuel costs) are included in general overhead cost accounts. They had not been calculating a cost per mile. The FHA cost estimates (not counting the driver's time)





listed \$0.477 per mile for a full-size pickup, eight-cylinder truck (averaging 13 m.p.g.), probably a reasonable “ballpark estimate” for the Blacks. The Blacks did keep track of the amounts of products hauled for each trip, so the trucking costs could be developed into calculations of the cost per mile per pound or the cost per mile per dollar of product value.

If the \$0.477 per mile figure were spread over the 1,000 pound payload (assuming all capacity is used to provide the most conservative cost estimate), the equipment and fuel cost per mile per 100 pounds (i.e., cost per CWT) becomes \$0.0477. Adding just the minimum hourly wage for the driver (i.e., \$5.15) and assuming an overall speed of 45 m.p.h., the cost per mile per CWT jumps to \$.059 or 14 times the cost per mile per CWT for a semi-trailer. Raising the hourly wage to the future minimum of \$7.25 results in a cost of \$.067 per mile per CWT, or 16 times the semi-trailer cost.<sup>8</sup>

### **Packaging and Handling Costs**

Boxes of various sizes are used for packaging. Cleanliness was a problem in reusing boxes. The costs of packaging could be determined, but had not been to date. Handling costs had been calculated in past years, as much of the part-time labor was assigned handling and packaging tasks.

### **Inventory Carrying Cost**

Likewise, inventory carrying costs were assumed to be low, given the short shelf life of produce, although the refrigerated storage generated considerable electric bills that would be factored in.

### **Administrative Cost**

Administrative costs were significant in time expended, as Duane noted that he needed to visit the wholesalers “every other day.” While it would take additional record-keeping, a comparison of dollars of sales or pounds of product moved with an estimated cost of administrative time might prove enlightening.

### **Farmers Market Administration**

Preparing for and tearing down from a farmers market typically consumes four hours of time. Organizing and packing are given two hours, setup after arrival takes one hour, and there is another hour to unpack and keep records upon return.

The Blacks appreciated the opportunities at farmers markets to advertise their other products and services (e.g., they also operate a “pick your own” pumpkin patch), and called the markets the cheapest advertising medium available. They also noted that, unlike delivering to wholesalers who would accept only blemish-free produce, at farmers markets they could sell seconds because shoppers could see the products and compare prices.

### **Conclusions Regarding Blacks Heritage Farm**

The Blacks were certainly aware of the existence of logistics costs if not their magnitude. These costs were part of the process that limited their usual markets to nearby locations.

They also understood the concept of matching the right equipment with the transportation requirements for maximum efficiency. It would not be too much of an extension to suggest that they develop an analytical worksheet or spreadsheet that allows them to evaluate, for example, packaging costs (materials and time), administrative time, and transportation costs (and distance), along with volumes of products carried. They would need to indicate a wage level for their time, as well (the minimum wage amounts given above establish only the lower limit on costs).

Sometimes the Blacks made location decisions based on factors other than easy-to-measure metrics such as cost. For example, the benefits of appearing at a farmers market, including those hundreds of miles from home (and with little likelihood of an immediate return trip for repeat customers) may have produced promotional or social benefits which were considered to outweigh the cost of fuel and time. However, over time the costs of participating in these markets need to be covered by the revenue generating activities, lest the farm owners be placed in the unintended position of subsidizing its customers.

## **Eden Natural Fresh Cut Berkshire Pork**

Eden Natural is described as "a coalition of independent family farmers<sup>9</sup> who specialize in the production of certified Berkshire pork. There are currently 25 Midwest farmer-owners of Eden Natural.

Berkshire Pork is a premium product, certified by the producers as having been raised in accordance with the standards of Eden Natural Certified Berkshire Pork, LLC. The standards specify the humane treatment of the pigs, maintenance of the Berkshire lineage, and the absence of antibiotic use during the animals' last 100 days. Berkshire hogs are market-ready at 291 to 294 pounds and seven months in age.

About 90 percent of the Eden Natural output is sold through 12 wholesalers to restaurants on the East and West Coasts; some of the distributors in New York and California sell to consumer markets, as well. The remaining 10 percent is sold locally to Midwest restaurants.

### **Transportation Costs**

Processing is handled by Pine Ridge Farms, a packer in Des Moines. Member farmers, mostly in Iowa and surrounding states, arrange transportation to Des Moines for processing (with assistance from the Eden Natural office).

An estimated 200 Berkshire hogs are butchered each Wednesday. Each loin cut is inspected by an Eden Natural employee. Packed product is kept refrigerated between 26 and 28 degrees Fahrenheit. Most shipments heading to the east coast are made on Thursdays and are routed to Chicago via ForeSure Transport of Des Moines. Recent rates have been \$3 per 100 pounds (CWT). Shipments are sent "freight collect," meaning the customers pay the freight bills. Shipments from Chicago to New York are handled by Destiny Trucking of Chicago, IL; the rate for this haul has been \$14/CWT. Shipments arrive in New York City the following Monday or Tuesday.



Shipments to California are currently being routed on a joint truck with another pork provider out of Des Moines (at \$17/CWT).

The shared truckload is to help both Eden Natural and the other niche pork provider with trucking costs to the same cities.

Eden Natural charges \$7 per CWT for making the transportation arrangements. The average transportation cost per hundred pounds is \$17 to \$20, for distances ranging from 1108 (Des Moines to New York) to 1686 (to Los Angeles) and 1802 (to San Francisco), respectively. When stated on an average per CWT per mile, the rates become 1.53 cents to New York and 1.18 cents to California.

### **Packaging and Handling Costs**

The processed pork loins are packaged using Cryovac®; i.e., a copyrighted product in which the meat is packaged in a vacuum-sealed plastic wrap. The cost ranges between 5 and 20 cents per pound depending on processed product.

### **Inventory Carrying Cost**

Inventory carrying costs would be charged for one week to 10 days for the typical shipment, since the product is still in the possession of Eden Natural while it is en route to East or West Coast wholesalers. If the previously mentioned annual estimate of 14 percent were applied, a single pallet of 2,000 pounds--the size of a typical customer's order of #411 loins (North American Meat Processing Association standard)--valued at \$7,000 (\$3.50/lb.) would add \$22.82 in logistics costs. Lower valued cuts, such as picnics, butts, bellies at \$1.10-\$1.30/lb., would generate correspondingly lower inventory carrying costs of \$8.44.

### **Administrative Cost**

The producer-owned business office in State Center, Iowa has two full-time employees, Nick Jones (left) and Kelly Biensen (right). In addition, a college-age intern is employed during the school year. While salary information was not requested, if logistics-related arrangements consumed \$100 worth of time for each full-time employee each day, the total would amount to \$1,000 per week or \$50,000 per year. As vital as the logistics duties are, the majority of their time is spent maintaining the business relationships with the supplier members and with customers, along with inspecting during the butchering process.



### **Conclusions Regarding Eden Natural**

Eden Natural has grown beyond the local geographic area in large part because it recognizes its transportation and logistics costs and has adopted more efficient means for handling these tasks. Primarily, Eden Natural uses carriers that specialize in long-distance refrigerated hauling. By consolidating Eden Natural shipments, all shippers obtain the benefits of economies of scale; i.e., their fixed costs will be spread over the largest volume the vehicle can handle. In addition, by recognizing that Berkshire hogs provide a premium value product, Eden Natural can price it at a level high enough to pay for the long-distance transportation.

## Delaware County Meats Fresh Pork and Sausage Products

Dave and Sherry Kronlage operate Delaware County Meats (DCM) on the west edge of Dyersville in northeast Iowa. DCM has two employees most of the time, consisting of sales and marketing director (Dave) and a part-time driver for delivery to retailers. A DCM specialty item is a line of gift boxes that are especially popular for Christmas presents; up to 20 volunteer workers assist in preparing these orders.



### Transportation Cost

DCM's market mix (i.e., the portions of revenue from each category) is: 70 percent grocery stores and wholesalers, 10 percent restaurants or other organizations, and 20 percent consumers. Consumers are mainly local, with an estimated 75 percent living between 10 and 25 miles away, 20 percent more than 25 miles away, and the remaining 5 percent, up to 10 miles away.

The DCM truck (a 2000 GMC) delivers directly to its business customers, such as Hy-Vee and Dahls. Deliveries are made on Wednesdays to the stores closest to Dyersville; most stores are served every go to 30 stores per week in DCM's "western route," including Cedar Rapids and Waterloo.



Truck costs are tracked by specific items purchased (e.g., fuel, maintenance costs). The cost information is used for a variety of purposes, including income statements (as part of overhead expenses), as well as in setting prices and determining which markets to serve. While DMC did not break down the number of trips or

amounts hauled on each trip, it did estimate that transportation consumed 10 percent of the selling price.

### Packaging and Handling Costs

DCM estimated that handling costs were 1 percent of the selling price and packaging accounted for 0.6 percent.

### Inventory Carrying Costs

Inventory carrying cost was estimated as 9 percent of the selling price. DCM was the only producer interviewed that had considered the inventory carrying cost category.

### **Administrative Costs**

DCM's administrative cost comprises another 10 percent of the selling price. Although these post-production costs are consolidated into the overhead account, it was apparent that some thought had gone into providing these figures for the project.

### **Conclusions Regarding Delaware County Meats**

Both pork producer groups maintained the high quality of their pork products and actively promoted their brand names as representative of premium quality. Unlike Eden Natural, who concentrated on upscale East and West Coast restaurants, Delaware County Meat served Iowa retailers and more widely dispersed individual gift box customers. DCM provided cost estimates that indicated it was quite aware of the logistics cost categories being discussed. A logical next step would be to express these costs on the basis of dollars per hundredweight per mile.

## Naturally Iowa Dairy Products

Naturally Iowa LLC (NI) of Clarinda, a new dairy started in 2006, processes milk for a group of farms. They forecast annual revenues in the \$3 to \$5 million range, and have 20 employees. NI products are labeled "natural," and meet U.S. Department of Agriculture requirements for minimally processed and additive-free foods.

Nearly all (95 percent) of NI's output of milk and Falk's ice cream is sold through retail groceries in five Midwestern states, ranging in size from independent grocers up to the Hy-Vee chain. The Costco wholesale warehouse chain has recently added Falk's Premium Organic Reduced Fat Ice Cream in its Chicago region stores. The remaining 5 percent of NI's volume is sold through restaurants or other on-site food providers. Steve Williams of NI estimated that 90 percent of its output is sold to customers located more than 25 miles from Clarinda.



### Transportation Costs

NI owns three vehicles: a pickup truck, a raw milk straight tank truck, and a refrigerated straight truck. Raw milk is delivered to NI's Clarinda dairy in its truck and in trucks owned by farmers. After processing, about one-half of the bottled milk is delivered by NI's vehicle; the remainder is picked up by trucks owned or arranged by customers.



Close to 80 percent of the ice cream was delivered by NI's refrigerated truck, with customers picking up the other 20 percent. NI maintains separate cost records for each vehicle, along with the number of trips and amounts of products hauled on each trip. This cost information is considered when setting prices and determining which markets to serve. For example, servicing an ice cream customer in the northeast part of the state posed a potential problem due to increasing fuel prices.

### Packaging and Handling Costs

Naturally Iowa has adopted corn-based biodegradable milk bottles made of polylactic acid (PLA). Each bottle arrives in compressed form (see photograph) and is then expanded through a heating process just prior to filling. The reduction in waste is consistent with Naturally Iowa's objective of leaving nothing behind to harm the environment. Nearly all (18 of 20) of NI's employees are involved with packaging operations, probably an expected situation for a business that produces bottled milk and packaged ice cream.

### **Inventory Carrying Costs**

While inventories were not high when the on-site visit was made, the addition of major customers (e.g., Costco) might necessitate the stockpiling of ice cream to meet immediate shipping needs. NI may want to calculate the costs of maintaining its freezer on a per-cubic-foot per hour basis, so it can better understand what the true inventory carrying costs are.



### **Administrative Costs**

As a developing business, Naturally Iowa will be in a better position at a later date to estimate the time required to oversee inventories and transportation.

### **Conclusions Regarding Naturally Iowa**

The nature of a liquid product requiring refrigeration dictates the importance of logistics activities and their associated costs. NI recognizes this cost structure and will be expected to include more extensive logistics cost analysis as it progresses. By maintaining a premium product line, priced with a higher gross margin than expected from more mass produced ice cream and milk suppliers, Naturally Iowa will be better able to cover its post-transaction storage and delivery costs.





## Picket Fence Creamery

From their farm outside of Woodward (in Dallas County), the Burkhart family produces and distributes Picket Fence Creamery milk, cream, ice cream, butter, and cheese. Its products are labeled 100 percent natural, "no artificial hormones," "antibiotic-free," "chemical-free," and "pasture-raised cows on a local family farm." About 10 percent of its annual revenue is from sales to a small number of premium restaurants, while 90 percent comes through retail stores. About 25 percent of the retail volume comes



from dairy sales through its on-farm store, with the remaining 75 percent from purchases made at retail outlets, including Hy-Vee and Fareway stores, within a 25 mile radius. Nearly all (99 percent) of the revenue to Picket Fence Creamery is from dairy products; an estimated 1 percent was from meat products.

The on-farm retail store markets products that are purchased wholesale from 76 families within a 50-mile radius. Most of these products were delivered by the seller, relieving Picket Fence of the expense of arranging for numerous small shipments. About one-half the store's revenues are from dairy products, 25 percent from meat, 5 percent from vegetables, and the remaining 20 percent are a variety of products, including wine, bakery and snack products. The Burkhart family thus handles the farming, processing and distribution for their own farm, and distribution for a sizable group of farms. In addition to the full-time work of the two owners, Picket Fence employs one full-time person and two to three part-time people (from 8 hr. per week up to 20 hr.) For six weeks during the summer, an intern is employed for 30 hr. per week.



### Transportation Costs

Picket Fence Creamery is about as vertically integrated as a firm can get, since it raises the dairy cows, grows the grass and other feed they are fed, bottles the milk and processes some into other products, retails part of the output directly and transports



the rest to their wholesale customers. Picket Fence owns a 1993 Dodge 3/4 ton truck with a refrigeration unit. Its cost basis was \$8,000. Cost records are kept for fuel and oil changes; the only maintenance required so far has been brakes. Although the running costs have not been computed on a per-mile basis, this could be done in the future.

Dairy products are transported twice per week. One route serves Woodward, Slater (16 miles) and Ames (15 miles), a round trip of 62 miles. The other route is to Grimes (15



miles), then back to the farm to reload, and then to Perry (10 miles), for a total of 50 miles round trip. Applying national averages<sup>10</sup> to these routes, the weekly trips would cost \$13.70 and \$11.05, respectively, or \$24.75 total (not including driver's time).

The Burkharts indicated that transportation costs and time were considered when the decisions were made to serve these specific markets and not to establish a presence at local farmers markets, such as the Downtown Farmers Market in Des Moines. Pricing also was influenced by transportation cost, an important consideration because the weekly deliveries need to generate an additional \$25 in margin to breakeven.

### **Packaging and Handling Costs**

Processed milk is packaged into standard gallon and one-half gallon plastic containers; ice cream is packaged in plastic tubs costing between 25 cents (1/2 pint) up to \$3 (for a 2 1/2 gallon pail). About 25 percent of the output is sold at the retail outlet located in the dairy building at the Picket Fence farm. This retail store contains refrigerated display units, identical to those in many grocery stores. Handling of the dairy products is mostly manual, from moving containers around the processing area to loading into the Dodge truck. An output of 1200 gallons per week would weigh an average of 12,360 pounds.

### **Inventory Carrying Costs**

Since dairy products are delivered weekly throughout most of the year, inventory carrying costs are considered to be minimal.

### **Administrative Costs**

The Burkharts provide the administrative support for Picket Fence. As with many small business owners, their lives are intertwined with their business and the returns are not in the form of hourly wages. The Picket Fence retail store hours are posted as 8 a.m. to 8 p.m., Monday through Saturday. While other processing and administrative tasks are performed during these hours, the store requires at least minimal monitoring during 48 hours per week.

### **Conclusions Regarding Picket Fence Creamery**

Picket Fence appears to be successful in both local sourcing and local selling of its products. A major reason for that success may be that the Burkharts have not extended their territory beyond their "comfort zone;" i.e., they restrict their operations to distances that may be served at reasonable cost. Picket Fence's records for dairy production contain the data needed for expressing transaction costs on a per-mile or per mile per hundred-weight basis with a minimum of calculations. This exercise could help them make market decisions in the future.

## Conclusions and Recommendations

“Buying local” is perceived by many consumers as benefiting the economy as well as themselves, both in terms of obtaining quality foods and supporting local producers. Another basis for supporting local foods may be that food distributed locally is viewed as more energy-efficient because it has been hauled fewer miles. This perception led to the question asked in this study: do local food producers know their transaction costs (also called logistics costs)? These conclusions emerged from the interviews conducted for the six case studies.

**Conclusion 1.** Farmers or groups of growers and processors gave some consideration to the individual cost components that are considered to be transaction or logistics costs when they determined which customer groups to serve and which to forego. However, few made a conscientious effort to compile or measure separately the costs involved in physically fulfilling a transaction. Also, as the Black’s Heritage Farm owners indicated, sometimes the value of the farmers’ physical presence at a market outweighed the short-run costs.

**Conclusion 2.** The locally grown label presents both an attractive selling point and a challenge in terms of logistics costs. Transportation costs for local foods are likely to be higher than those for food products delivered to grocery stores and restaurants by the semi-trailer-load. Because of the physical differences in delivery vehicles, transportation costs for local foods are likely to be higher than those for food products delivered to grocery stores and restaurants by the semi-truckload. The case studies demonstrated marked contrasts in delivery costs:

- GROWN Locally provided highly convenient and high-cost delivery service directly to consumers’ doors by using mini-vans, and
- Eden Natural delivered products employing semi-trucks on set routes running as far afield as the East and West Coasts.

Between these two extremes were groups that made deliveries, usually to retailers, in a variety of pickup trucks and delivery trucks.

**Conclusion 3.** Local producers often are providing superior products (in terms of taste, freshness, and variety or in perceived benefits, including "customized delivery") compared to mass-market grocery stores. Their pricing and promotion need to highlight the enhanced value of their products. An example might be Delaware County Meats, which promotes its gift boxes with apparent success. However, a gift product defies simple price comparison with supermarket meat counter fare that does not include the intangible attraction provided by a gourmet-quality, attractively packaged gift.

**Conclusion 4.** Given the apparent disadvantage in logistics costs when compared with national producers, local farmers and groups need to identify and carefully target both their customers and competitors. Despite local growers’ expressed concerns about discount outlets, additional analysis probably will show distinct product and service differences between the two types of businesses. In other words, aside from the observation that a meal served with ingredients purchased at a discount store is one not

provided locally, the local producer often is not in direct competition with the discounters.

**Recommendation 1 (measure transaction or logistics costs):** Farmers and processors need to be aware of their logistics costs and the changes in these costs. Most of them already collect the cost information (i.e., vehicle costs, maintenance, interest rates, fuel costs, packing costs, handling, and administration), although it tends to be relegated to a general “overhead” category. More difficult to gauge is the amount of product delivered to the next stage in the supply chain. These amounts may be stated in terms of weight, of cubic feet of space, and dollar value. The next step is to match the logistics costs with the volume of freight; then state costs as \$/mile or per 100 CWT/mile or per ton-mile. These figures may then be compared with the costs of other producers and with industry averages to identify activities that appear similar to other groups and those that appear out-of-line and require attention or explanation.

A good starting point would be transportation costs. As the estimates in the table below show, the per-mile cost per 100 pounds carried in a semi-trailer is about one-half of a cent (depending on the utilization of the capacity of the truck).

**Table 4: Delivery Transportation Cost Estimates**

Vehicle	Capacity (cu. ft.)	Ratio to semi	Capacity (pounds)	Cost/mi (\$)	Driver (\$/hr.)	Distance (miles)	Cost/mi /CWT	Ratio to semi
semi-trailer <sup>a</sup>	3392	1.00	50000	2.071	0	45	\$0.004	1.00
semi-trailer <sup>b</sup>	3392	1.00	33920	2.071	0	45	\$0.006	1.47
1/2 ton pickup <sup>c</sup>	162.5	0.05	1000	0.477	7.25	45	\$0.064	15.41
mini-van: sm <sup>d</sup>	148.7	0.04	1204	0.507	7.25	45	\$0.055	13.40
mini-van: lg <sup>e</sup>	167.9	0.05	1738	0.507	7.25	45	\$0.038	9.28

<sup>a</sup> Assumed 50,000 lb. load, 30,000 lb. vehicle (or 80,000 gross vehicle weight); capacities and costs (including labor) from: John J. Coyle, Edward J. Bardi, and Robert A. Novack, *Transportation*, 6th ed. (Mason, OH: South-Western, 2006), pp. 106, 113.

<sup>b</sup> Load assumed 10 lb./cu. ft.

<sup>c</sup> Capacities from: <http://www.meadowlandford.com/2005-f150-specs.htm>; assumed 6 ft. high load; cost from: <http://www.fhwa.dot.gov/ohim/onh00/onh2p3.htm>.

<sup>d</sup> Capacities from: <http://www.startribune.com/211/story/53776.html>; cost from: <http://www.fhwa.dot.gov/ohim/onh00/onh2p3.htm>

<sup>e</sup> Capacities from: <http://www.automotive.com/2005/dodge/grand-caravan/base-cargo-minivan/309/specification>; cost from: <http://www.fhwa.dot.gov/ohim/onh00/onh2p3.htm>.

To haul 100 pounds one mile, the vehicles typically used by farmers cost from 9 to 15 times the amount charged by a fully loaded, semi-truck-trailer combination with driver. These comparisons show the need for local producers to be keenly aware of their transportation costs, and to strive for cost improvements.

**Recommendation 2 (cost to serve each customer):** Producers need to calculate the cost of serving a customer; i.e., compare revenue generated by a transaction with the cost of serving that customer. There will be an area within which local producers could afford to

grow and deliver food products and an area beyond that will not be profitable. One example was GROWN Locally which assesses a fee for home delivery. Their delivery fee, which was shared with drivers (who furnished their own vehicles), may not have been adequate to sustain the more distant delivery routes and still provide financial support for the administrative effort observed.

**Recommendation 3 (look for economies of scale):** Transportation economies are found in larger shipments. For example, Eden Natural employed a third-party packing plant and third-party motor carriers in their production and distribution process. Thus, Eden Natural shared in the economies of scale with other users of these facilities, rather than furnishing additional capital for more buildings and vehicles. Most of the other cases studied involved producer-supplied transportation resources that tend to be higher in cost per ton mile than the larger trucks used by motor carriers.

**Recommendation 4 (use or become a distribution specialist):** Local producers and groups can potentially reduce their distribution costs by using distribution specialists. The Burkhart family at Picket Fence Dairy offered one example. They operate a retail store to display other locally produced foods along with their dairy products. A variant of this option would be a wholesaler that consolidated the same products into assortments for delivery to more distant (possibly statewide) retailers.

**Recommendation 5 (work with regional retailers):** Since grocery chains tend to be regional, unlike the national discount store chains, there could be a natural tie-in, provided that retail sales met or exceeded expectations. The Naturally Iowa dairy in Clarinda is cooperating with a few major customers to distribute their specialized products in the Midwest. This is an instance of major distribution chains doing what they do best: efficiently providing transportation, handling, and display materials to consumers who are in the market for a large variety of products, a few of which might be the output of the local producers.

**Recommendation 6 (join others in locally identified shelf-space):** The majority of grocery transactions are handled by supermarket and discount store chains because they have comparative advantages in location, selection, pricing, promotion, and parking. Regardless of the existence of a locally grown foods wholesaler (as in Recommendation 4), producer groups may encourage one or more of these corporations to designate shelf space as "locally grown" or some similar label. (This idea is based on observations at the Burkhart's retail store, which has promoted "A Taste of Iowa" on its shelves, based on a program once sponsored by the Iowa Department of Economic Development and the Iowa Department of Agriculture and Land Stewardship.) An "Iowa grown" display area would be competing against other internal specialty shops already found in some groceries, such as gourmet foods, health foods, magazines or a bakery. For example, the Hy-Vee store chain in Iowa has labeled an organic foods "HealthMarket" area. Although this recommendation has a promotional slant, it was developed because of the observed inefficiencies in logistics operations and serves as an example of the interrelationships among the various business functions.

None of these recommendations are simplistic directions to “reduce your distribution costs” because the first step needs to be “recognize your distribution costs.” Next, producers need to determine if the costs are reasonable by comparing them with several benchmarks, most notably the post-production margins and some basic logistics costs. Cost categories that appear out of line then would become candidates for management attention.

### **Participant Websites**

GROWN Locally: <http://www.grownlocally.com/>

Black’s Heritage Farm: <http://www.localharvest.org/farms/M7301> (for contact information)

Eden Natural: <http://www.betterpork.com/>

Delaware County Meats: <http://www.delawarecountymeats.com>

Naturally Iowa: <http://www.naturallyiowa.com/>

Picket Fence Creamery: <http://www.picketfencecreamery.net/>

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<sup>1</sup> GROWN stands for Goods Raised Only With Nature

<sup>2</sup> [www.grownlocally.com/G12006/home.html](http://www.grownlocally.com/G12006/home.html), January 24, 2007, p. 2.

<sup>3</sup> Per email from GL accountant.

<sup>4</sup> Capacity and weight information from: [www.internetautoguide.com/reviews/01-int/dodge/index.html](http://www.internetautoguide.com/reviews/01-int/dodge/index.html).

<sup>5</sup> [www.fhwa.dot.gov/ohim/onh00/onh2p3.htm](http://www.fhwa.dot.gov/ohim/onh00/onh2p3.htm).

<sup>6</sup> Clyde Kenneth Walter, "The Inventory Carrying Cost Methodology: A Review and Application to Farm Equipment," *Logistics Spectrum*, Vol. 22 (Summer 1988), pp. 25-32.

<sup>7</sup> "What to Do with All Those Leftovers?" *WasteMatters*, Iowa Department of Natural Resources, May 2004, pp. 1, 6.

<sup>8</sup> Donnelle Eller, "Critics: Wage bump threatens jobs," *Des Moines Register*, January 23, 2007, p. 1D.

<sup>9</sup> <http://www.betterpork.com/edenfarms/edenfarms/about.htm>, October 2, 2006)

<sup>10</sup> Gary Barnes and Peter Langworthy, *The Per-mile Costs of Operating Automobiles and Trucks* (St. Paul: Minnesota Department of Transportation), June 2003, p. 22. Estimated from: 19.5 cents/mile plus 7.8/3 to adjustment for fuel costs of \$1.50/gallon when published and \$2.00 currently.