

## **Narrative Summaries of Seven Upper Midwest Post-Harvest Handling Systems**

### ***Hog's Back Farm, David Van Eeckhout, Arkansaw, WI***

#### ***“Efficiency is more important than diversity of items or markets”***

David Van Eeckhout started Hog's Back Farm in 2003 at a farm five miles south of its current location. Prior to starting his own operation, David worked for several leaders in the local and organic foods movement, including Pennsylvania's New Morning Farm; Stillwater, Minnesota's, Red Cardinal Farm; and Delano, Minnesota's, Riverbend Farm, where he spent three growing seasons. Despite David's ample and broad experience, Hog's Back Farm started small, and grew slowly, using his available capital to finance new investments in equipment and infrastructure.

In 2006, David moved the farm to its current location, where he has five acres in vegetable production at any given time, with about 20 acres in rotation. Almost all of Hog's Back's production goes to its Community Supported Agriculture subscription program, which currently sells 165 shares, almost all of them delivered to the Twin Cities. Hog's Back's focus on the CSA allows the farm to excel in that marketing and production model; occasional surpluses are sold through small natural food stores and restaurant connections.

In addition to David, Hog's Back employs one full-time worker from March through November. During the growing season, David adds one additional full-time and two part-time workers.

Hog's Back's Thursday-only delivery schedule dictates the pace of the harvest and packing work on the farm, and requires some additional investment in systems and storage. On Tuesday, the crew harvest time-intensive crops, such as peas, beans, and tomatoes; on Wednesday, they harvest, wash, and pack everything else. On Thursday mornings, CSA shares are packed and rolled directly onto an un-refrigerated delivery truck.

#### **Facilities**

In time for the 2007 growing season, David remodeled the thirty-foot by sixty-foot lower level of a stanchion dairy barn to serve as a packing facility. The stanchions were removed, and the floor and gutters were filled with sand to provide a level surface, then covered with concrete. Circular floor drains provide ample drainage directly to the outdoors. The packing area has a metal ceiling and fiberglass reinforced plastic (FRP, commonly referred to as “dairy board”) wall coverings, all of which are washable. Currently, about forty feet of the barn's sixty-foot length is used for washing and packing operations, while the rest of the area houses farm storage and a household summer kitchen.

Raising the floor has presented some challenges due to the newly-limited ceiling height, including the need to cut the tops off of the used walk-in coolers David installed. Hog's Back currently runs two coolers: the cold and wet cooler, with a temperature of 34°F, measures eight by fourteen feet; the cool and wet cooler, maintained at 55°F, measures eight by ten feet. Crops that must be kept in a lower humidity environment are stored in the packing shed. The two coolers have doors that are too narrow to accept a standard 40-inch by 48-inch pallet; David has built some narrow pallets, but they are not convenient to use.

Large openings in the northwest and southeast corners, as well as the truck-loading door on the south wall, provide for generous airflow and cooling capacity. David has plans to install doors at these openings. Product enters the packing facility through a ground-height door at the northwest corner; most crops are washed before they go into storage in the walk-in coolers on the east wall. CSA boxes get packed assembly-line fashion on roller track, stacked onto home-made metal carts, and rolled out the south door directly onto Hog's Back's dock-height truck.

Hog's Back washes all of its fall root crops before they go into storage. The silty-loam soil tends to stain the roots, and Hog's Back only delivers up until Thanksgiving, so the minor damage sustained during the washing process is more than offset by the ability to avoid dirt-stains on the roots. This does, however, create a large point load for labor needed at harvest time, making the speed of operations at that time of year extremely important.

Because Hog's Back does not use wax boxes for packing outbound product, a large amount of space in the packing area is devoted to storage of a variety of plastic totes used for harvest, storage, and delivery.

Until 2009, restroom and hand wash facilities were located in the farmhouse, which is less than one hundred feet from the packing facility. In 2009, the hand wash was moved into the packing facility. Blue nitrile gloves remain an important sanitation tool.

## **Handling Equipment**

Hog's Back Farm does not have an extensive or expensive array of post-harvest handling equipment. Rubbermaid stock tanks, hoses, a brush washer, and a variety of tables provide the necessary tools to get their work done.

The rinsing tanks at Hog's Back included several 100-gallon tanks, and two 50-gallon tanks. The 100-gallon tanks are the most used, frequently placed on top of an overturned 50-gallon tank to achieve an ergonomic working height (the 50- and 100-gallon tanks have the same footprint). The crew uses these for washing bunched greens, removing the greens, giving them a shake, and packing them directly into plastic totes for storage.

During the harvest season, Hog's Back bunches all root crops to avoid the additional labor of bagging them in the packing facility. Bunched roots are

dumped into a tank to soak before washing. To wash the roots, workers use a shut-off valve at the end of a hose to provide a pressurized spray - similar to putting one's thumb over the end of a hose - to wash the roots. "I tell people to count one, two, three, while rotating the bunch in their hand, then set it aside," David notes. Washed bunches are tossed into a rinse tub, then removed, shaken, and packed.

Many farms drain washed greens on a screen table to remove excess water, but Hog's Back doesn't. David notes that bunched greens, and bunched roots with their tops still attached, get packed into CSA boxes and shipped fairly quickly, so the decay that can result from standing water doesn't present the same issues it might for farms selling into a retail store or warehouse.

Hog's Back's packing area has several tall tables, with wooden legs and PolyMax bench panels on top. The PolyMax bench panels are rigid, black plastic designed for greenhouse benches. They have fairly wide ribs, and a one-inch grid for copious drainage. Hog's Back also has several shorter stainless steel tables for weighing and staging product. Some of these stainless steel tables are on wheels to make them easy to move into an optimal position.

The major handling investment that Hog's Back has made is a used brush washer. In the spring of 2009, this was a much pared down model, with no in-feed belt and no absorber to remove water; workers wheeled a stainless steel table into position to put a tote of dirty product on, and feed crops such as beets, potatoes, and winter squash through the machine. At the outfeed end was a slanted table covered with a washable, green surface similar to that found in the produce section of many grocery stores. By the fall of 2009, David had invested in a circular sorting table and drying donuts to improve efficiency and storability of crops.

Hog's Back recently invested in a used stainless steel barrel washer for cleaning bulk roots. It was deemed ineffective by David.

### ***Spring Hill Community Farm, Patty Wright and Mike Racette, Prairie Farm, Wisconsin***

***“This is driving me nuts’ is the big motivator for upgrading systems.”***

For Mike Racette and Patty Wright, 2009 will be the eighteenth year they've grown vegetables for their Community Supported Agriculture farm. With no experience in commercial vegetable production, and a farm distinctly lacking in flat ground, Mike and Patty have developed a farm that provides a comfortable living with a minimum of hired help.

With five acres in vegetable production, in addition to cover crops, Spring Hill produces 150 shares each week, which go to the Twin Cities in two separate deliveries. CSA members help with the harvest, washing, and packing operations, and manage all of the deliveries in their own vehicles. Each

delivery day, four or five cars, with a total of up to ten CSA members, come to the farm to participate in the farmwork. A single coordinator manages the scheduling through web-based calendar, and Mike and Patty have enough familiarity with their members that they know what sort of work to plan for a given day; for example, if several families are coming with children, Mike and Patty would structure the harvest schedule so that potatoes would be harvested that day for the next several deliveries.

Patty notes that this membership involvement means that Spring Hill needs to provide meaningful work, because people are “smart enough to know when they are just engaged in busy work.” Spring Hill also needs to provide work that is appropriate to the available skill level: members don’t pick tomatoes because that crop requires too much judgment; they don’t pick beans or peas because unskilled workers are just too slow. Typical member tasks would include bunching herbs and greens, digging potatoes, and cleaning dried alliums, all undertakings that involve several people at a time, with a high rate of success.

A crew of five or six people working half time helps Mike and Patty with most of the harvest; work crews don’t come in on member days. Greens are harvested ahead of member days so that they have time to pre-chill in Spring Hill’s modest walk-in cooler. The efficiency loss that results from having members perform much of the work is offset by members taking deliveries to sites in the Twin Cities, saving not only labor expense but also the need to invest in a delivery vehicle.

On the other hand, Mike notes that new farmers should, “be careful what [they] start with, because it’s hard to change.” For Spring Hill Community Farm, scaling up would require new land and a change in their delivery and membership systems.

## **Facilities**

The packing facility at Spring Hill Community Farm is the definition of simple, an east-facing ten-foot by forty-foot gravel area covered by a shed roof extending off of a machine shed. A supplemental building provides community space for members, as well as a kitchen and a bathroom. The packing area has antibacterial soap to supplement the handwashing facilities in the community building. The farm has a limited need for storage of boxes and totes because they pack shares twice each week, reducing the amount of product they have on hand at any given time. Shares are packed into canvas bags for delivery.

Packing of product happens concurrently with the harvest. A four-wheeler with a trailer moves the harvest to the packing shed, and crops are cleaned before going into to the eight-foot by six-foot walk-in cooler inside the machine shed. Because the pole-style space is open to the air, it’s easy to access with the trailer. Cleaned product is hand-carried to the walk-in cooler.

## **Handling Equipment**

Because they rely on less-skilled labor, and because the twice-weekly harvest schedule means they manage less product at a time, Mike and Patty have kept their handling equipment to a minimum.

Four 50-gallon Rubbermaid stock tanks are supported on wooden sawhorses to bring them to an appropriate working height. The small tanks refill quickly, requiring less management than a single tank that took longer to fill; members and workers can easily continue washing in one tank while another fills. These tanks are used for bunched greens and peppers. Bunched greens are drained on a screen table before packing.

Spring Hill uses an electric pressure washer to clean their carrots, which are an important signature crop for the farm. The pressure washer has a variable pressure adjustment so crops don't get shredded. Carrots are topped in the field and put into totes for transport to the packing shed, where they are dumped into an empty stock tank and batch-washed with the pressure washer. Rutabagas, parsnips, and bulk turnips are handled in the same way.

Potatoes and topped beets are harvested directly into 25-pound mesh bags, then agitated in a tub of water and sorted on a grading table.

Bunched beets get dunked in a tank and scrubbed with a brush, while bunched turnips are stacked and washed with a pressure washer on a stand.

## ***Gardens of Eagan, Linda Halley, Farmington, Minnesota***

***“Your kale is so much better and lasts so much longer than kale from the other local producers.”***

Martin Diffley started Gardens of Eagan in 1973 on five rented acres in Eagan, Minnesota; he was joined in 1985 by Atina as his wife and farming partner. In the mid-1990's, Martin and Atina moved the operation to Farmington as the old land-base succumbed to suburbanization. In the fall of 2007, the farming business was sold to Minneapolis' Wedge Community Co-op.

With over twenty years of experience in organic vegetable production on both large and small farms in Wisconsin and California, Linda Halley took over management of the 65 acres of vegetable production in January of 2008.

Gardens of Eagan has narrowed its focus over the years to selling only to retail stores and wholesale distributors in the Twin Cities, which has a large number of cooperative natural foods stores. Martin and Atina also focused their attention on a limited number of crops: cucumbers, tomatoes, broccoli, cabbage, kale, cauliflower, bell peppers, watermelons, and sweet corn. This has allowed Gardens of Eagan to develop very efficient systems for the production and handling of these crops.

Crops are delivered three days each week during the main part of the season, on Tuesday, Thursday, and Saturday. Most of the harvest, washing, packing

take place on Monday, Wednesday, and Friday, with the refrigerated truck loaded on the same night for early-morning departure on delivery mornings. In the peak of the season, Linda may choose to harvest an additional day ahead, making decisions based on how well things keep and the optimal time of day for harvesting; occasionally this is necessary because there is simply too much crop to harvest in a single day.

Gardens of Eagan has a very large crew to conduct and manage the entire operation. On the harvest-wash-and-pack side of the operation, farm manager Linda Halley is assisted by a production and harvest manager as well as a packing coordinator. Additional harvest labor is provided by a crew of five to eight persons. Three more employees work seasonally full time to cover other farm operations.

## **Facilities**

A converted farm shop provides an ample space for washing and packing the produce at Gardens of Eagan. High ceilings and large sliding doors on the south and the west sides make the forty-foot by forty-foot main packing area a pleasant and accessible space, with plenty of room for storage of boxes and harvest totes, a brush washer, a sorting table, and a break and organizational area.

A shed roof over the north side of the building provides a ten-foot wide by forty-foot long space for crisping tanks and pallet jack access to the sixteen-foot by twenty-foot walk-in cooler. Bird netting in the rafters prevents nesting in this open-air portion of the facility. A twelve-foot overhead door separates the shed area from the main packing area, leaving ample access for the flow of product and personnel from one space to the other.

The packing facility has a handwashing sink with hot and cold water, and a portable toilet with a handwash station about one hundred feet away.

Crops are harvested into a fleet of old U-Haul trucks, which provide easy shade and a convenient height during the harvest. Full trucks back up to the packing facility, and dirty product is washed prior to storage. Often, crops are put directly from the truck into crisping tanks or the brush washer, with no additional stacking or handling. Because of the large scale of the harvest, the harvest crew will frequently bring in half of the harvest, back the truck up to the packing facility, and take another truck out to the field as the packing process begins.

## **Handling Equipment**

Gardens of Eagan uses two 180-gallon Rubbermaid-style stock tanks supported by welded steel frames for crisping their greens. Because of their large size, the tanks have been retrofitted with PVC drains on the bottom of the tank, rather than the standard side plugs positioned an inch above the bottom of a stock tank. Although Linda would prefer a stainless steel milk tank for the ease

of cleaning it would provide, the two long, skinny tanks work very well in their location.

An ice machine provides flaked ice that can be added to the top of boxes for additional cooling for the kale, and also a topping for the broccoli, which does not get washed. Two wheeled bins provide storage for ice beyond that available in the machine itself. Crops are topped with ice prior to being moved into storage.

The crisped kale, combined with the ice treatment, lasts much longer than kale that hasn't gone through a dunk tank, but it does have the disadvantage that it needs to be packed into a larger-than-standard box than it would if the ice was allowed to provide the humidity to firm up the leaves. In a smaller box, the kale would get shredded if it wasn't slightly wilted.

A twenty-inch wide brush washer provides fast cleaning of peppers and cucumbers. Gardens of Eagan doesn't have an in-feed belt, so overturned totes position a full tote of produce for manual movement into the washer. Drying donuts remove surface moisture at the outlet, and a circular sorting table rotates at the end of the drying donuts to provide easy access for sorting and packing, as well as a place for product to build up without overflowing.

A washable-laminate covered table, approximately four by eight feet, provides ample space for sorting, grading, and packing tomatoes. A shelf under the table stores tomato boxes for quick and easy access.

The extensive use of concrete at Gardens of Eagan makes the use of pallet jacks almost mandatory for moving clean and packed product into the cooler, and from there onto the truck. The scale of the operation makes it practically mandatory.

### ***Featherstone Fruits and Vegetables, Jack Hedin, Rushford, MN***

***“I enjoy working with people, and envisioned from the start a farm with people around me.”***

Jack Hedin and his wife, Jenny Hughes, started Featherstone Fruits and Vegetables in 1995, working off the farm while building greenhouses and cover cropping to build the soil. Prior to starting their own operation, Jack and Jenny worked at a number of farms in Massachusetts, Pennsylvania, and California, including a five-acre CSA, a 25-acre market farm, and the very large Full Belly Farm in California. They also rented two acres from another farmer on the outskirts of Madison for two years before coming to the Rushford area.

Unlike many beginning farmers, Jack envisioned a farm with employees. He likes working with people and planned a farm operation from the start with enough cash flow to hire a crew. Featherstone began on a land-cooperative near Rushford, Minnesota. The packing shed started with a gravel floor in a steel building at a time when Jack and his partners considered a two-wheeled hand cart to be a big investment. As the farm operation grew, Featherstone's

crew traveled up to ten miles to harvest produce, frequently transporting water for field packing operations.

The farm grew steadily up until the 1997 floods that devastated the town of Rushford and much of southeast Minnesota. The following year, Featherstone began moving its operations closer to the town of Rushford, and began construction of a new packing facility and warehouse at the new site.

Featherstone currently delivers produce five days each week. With 880 CSA members and a nearly-equivalent amount of produce sold to stores and wholesale distributors, harvest and packing operations are an ongoing daily operation.

## **Facilities**

At Featherstone Farm, everybody refers to the packing house as the warehouse. At its core, a temperature-controlled packing area is surrounded by coolers, dry storage, and supplemental washing areas.

Product is received and shipped out through large garage doors. The warehouse has two semi-height loading docks, plus two garage doors at ground level. This enables product to be received from field trucks and wagons, and loaded onto large box trucks and semi-trailers. The shipping and receiving area also serves as a storage and staging area for pallets, bins, and packing equipment.

Another area houses pallet racking for box storage, and access to more storage above the packing area. A forklift provides access to stored items, plus bins of onions and squash held in an insulated room above the packing area. This insulated room features temporary wall panels that can be removed to provide access for a pallet jack when needed.

The ground level of this storage area also provides overflow space for produce packing operations that do not require the temperature control provided by the main packing area.

Every area that has water in it has generous trench drains that funnel water to a below-ground settling tank to capture sediment before the water reaches a pond, where it is stored for use as irrigation water.

The temperature-controlled packing area features generous windows opening onto the storage area, situated quite high on the wall; more windows on the exterior wall admit ample daylight to the storage and packing areas. As the operation ebbs and flows in terms of the space needed throughout the four seasons, different elements shift into different spaces. A key factor in the design of the facility was natural lighting, which Jack sees as being an important element of worker sustainability.

The packing room measures 16 ft. x 75 ft. This long, skinny arrangement accommodates the linear flow of most packing operations, a good practice for workflow as well as for food safety, where separating the get-it-clean functions

from the keep-it-clean functions provides an important step for reducing potential pathogen contamination of the finished product.

Surface-mounted high-capacity 2-inch water lines provide ample water for tank filling, as well as for washing crops. Because of the controlled temperature in the packing area, condensation is not an issue. Electrical service is also surface mounted.

Shielded fluorescent lamps provide ample lighting with no concern for breakage and contamination.

Sliding doors on the two walk-in coolers maximize accessibility for the lift truck used to move bins and pallets of produce around the packing facility. The spacious coolers have twelve-foot ceilings to accommodate tall stacks of bins moved with a forklift.

The warehouse also features a generous break room and employee kitchen, as well as office space for key staff. Restrooms and handwash sinks are also located in this area. A handwash sink will be installed closer to the packing area in 2010.

## **Handling Equipment**

Featherstone Farm uses 300-gallon Rubbermaid-style stock tanks to crisp and rinse their greens, and to pre-soak and pre-wash their root crops. The crew elevates the tank to an ergonomic height by placing them on a pallet, which also provides a ready way to move the tanks, even with water in them.

A brush washer, with an in-feed belt and drying donuts, provides cleaning for roots crops, squash, and peppers. To clean carrots, the roots are placed in a stock tank at the intake end. One worker sprays the roots with water, and another scrubs the roots with a push broom dedicated to that purpose. Roots are moved by hand into the brush washer, and sorted on the drying donuts before going directly into a clean bin. Featherstone intends to retire this method, but in the meantime processes about 150 pounds of carrots per person hour. Featherstone also has a round sorting table available when appropriate.

The brush washer has been modified with two-inch PVC water line to provide ample water for cleaning purposes.

A spray-type barrel washer was in use during the 2008 season, but was deemed to be too slow and ineffective, and was put aside for 2009.

Two ice machines, mounted high on a wall in the packing room, provide ice primarily for the broccoli crop. Manufactured ice drops down a stainless steel funnel into a stock tank. To ice the crop, Featherstone uses a small grain shovel dedicated for that purpose.

Featherstone also keeps a number of folding plastic tables available for setting up temporary work stations for activities such as staging boxes, and weighing packed boxes.

## ***Black's Heritage Farms, Norine and Duane Black, Ames, IA***

### ***"I'm in love with stainless steel."***

Located just two miles south of Ames, Iowa, Black's Heritage Farms raises vegetables on forty acres of black, flat ground, tiled for drainage and well-suited to vegetable production. Duane and Norine Black started raising sweet corn over thirty years ago for the Ames farmer's market. Business and family changes meant that the vegetable operation grew and contracted for a number of years. In 2001, Duane and Norine obtained land of their own, and since that time have grown sweet corn, pumpkins, tomatoes, and squash for sale to area stores, and a complete line of vegetables marketed at six farmers markets in the area.

A fifth-generation family farm, Black's has a large array of buildings and bins from its former incarnation as a seed plant for open-pollinated corn. Designed for easy access with wheeled equipment, these buildings provide tremendous potential for future expansion into value-added processing, which Norine has already begun piloting using off-site facilities.

Because of its highly-perishable nature, sales of sweet corn to stores drives much of the organization of harvest and packing operations during the harvest season.

### **Facilities**

The main packing area is located in a vast building that used to serve as a seed plant. Fronted by a large gravel lot, a large garage door opens into the packing area. Product is moved in from the field on pallets, and moved with forklifts, pallets, and carts. The large concrete pad provides ample space for staging and working with produce.

The primary refrigerated storage is provided by what Norine refers to as her "Bud Box" cooler, an old fourteen-foot refrigerated box from a beer truck. A ramp up to the door provides access for wheeled carts, although not for standard pallets.

A reach-in cooler provides additional storage for smaller harvests.

The old seeds warehouse has been retrofitted to include areas for storing dry crops such as onions, which are hung in mesh bags to maximize air circulation. An insulated room with an air conditioner provides storage for winter squash that does very well into December.

### **Handling Equipment**

A large stainless steel sink sits next to the door for initial rinsing of produce. An overhead faucet of the type used for washing pots and pans in restaurant kitchens sits over a three-bay sink, making it easy to provide successive rinsing. Most dirt is removed outside working under awnings, while the area inside primarily serves to grade and pack product.

Two sixteen-foot stainless steel tables provide a large, food-safe surface for sorting and grading produce. Totes and unpacked produce slide easily along the smooth stainless steel surface.

The Blacks use a huge number of wheeled carts to move and store product. The carts are largely items that Norine has picked up at auction, or were left over from the seed plant.

Collapsible plastic totes provide easy-to-clean storage and transport for finished product.

### ***Rock Spring Farm, Chris Blanchard, Decorah, IA***

***“Food safety is not just a legal responsibility, but a moral and ethical obligation you have with your customers.”***

Chris Blanchard started Rock Spring Farm in 1999. Prior to starting his own operation, Chris worked for and managed farms in Wisconsin, Maine, and California from 1990 on. Rock Spring Farm started small, and for the first seven years grew rapidly but with only very strategic investments in infrastructure for post harvest handling.

The first winter on the farm, producing salad mix from unheated greenhouse, Chris and his partner packed greens using a stock tank and a hand-cranked restaurant salad spinner in the kitchen of the farmhouse; they used a sump pump and garden hoses to move the water outside. The following summer, they built a small walk-in cooler from scratch (“Very expensive in time and materials,” Chris notes.), and poured a concrete slab for a packing area. A farmer’s market awning provided shade until, in 2001, they put up a 22-foot by 36-foot hoop house over the slab; roll-up sides and shade cloth provided a pleasant summer environment, and a small heater warmed the space for winter work.

Rock Spring Farm delivers produce twice weekly to the Twin Cities and Rochester, with trucks leaving Monday and Thursday afternoons. During the summer season, 200 CSA boxes get packed on Thursdays. Wholesale vegetables and herbs to stores ship on Mondays and Thursdays.

With about fifteen acres of vegetables and herbs, about half of Rock Spring Farm’s business sales come through its CSA program, a quarter from the sale of fresh herbs, and a quarter from sales of vegetables, primarily root crops, to stores.

### **Facilities**

In 2006, Rock Spring moved into a new four-season packing facility, built from Structural Insulated Panels for energy efficiency and ease of construction. The panels arrived pre-laminated with Fiberglass Reinforced Plastic, so the building was completed in just over six weeks with a small professional crew. Interior

walls are covered with painted corrugated metal. Heat is provided using a hydronic floor system in the winter time.

The main packing area measures 30 x 40 feet. A wide garage door at ground level provides access from a covered porch. Product from the fields is received on the concrete porch, dunked in a tank of water as an initial rinse and for cooling and hydration, then palletized and moved into the walk-in cooler through a door on the opposite wall. Concrete loading docks extend from either side of the building, one a low dock suitable for pickup trucks and cargo vans, the other a full-height dock for larger trucks; both are accessible through garage doors.

A large trench drain is located in the middle of the packing house, with a heavy metal grate over it. This serves to settle out most of the soil washed off of the produce. Water runs out through perforated PVC pipe buried below the frost line.

Rock Spring tends to focus its harvest activities in the mornings, with washing and packing happening in the afternoons most days, although recent years have seen these activities happening more concurrently. "We'd like to reduce the handling by washing crops as they are harvested, rather than putting dirty produce away and pulling it back out," Chris notes, "but sometimes that just isn't practical from a time and management perspective."

Pallet racking in the packing area provides storage for boxes and other packing supplies. Water and electricity are surface mounted throughout the packing area.

The walk-in cooler has two bays to accommodate wet and dry storage, separated by a plastic strip door. With nearly seven-hundred square feet of space, the coolers are still too small, and root crops had to be stored off site this past winter. "We should have built them taller and bigger," Chris notes. The dry cooler also serves as storage for crop and cover crop seeds, providing longevity and rodent control.

Next to the cooler, a "packaging room" provides the central hub for packaging herbs, bagging product for the CSA and wholesale, and packaging cherry tomatoes for the CSA. Double bi-swing doors allow pallet access and quick entry and exit. This separation of the get-it-clean function from the keep-it-clean function was an important element of the packing house design; it also reduces the space where the heat is turned up for these relatively sedentary activities in the winter time.

Outside of the packaging room, a handwash sink is outfitted with a small electric hot water heater. Chris feels that warm water encourages better handwashing, even though it doesn't increase its effectiveness, and the proximity of the water heater gets hot water to the sink fast.

Restroom and additional handwash facilities are located in the packing house, immediately accessible from outdoors and from the interior. A break room provides cooking facilities for the employees.

## **Handling Equipment**

For the initial rinsing and hydrocooling of crops, and for handling small quantities, Rock Spring Farm uses 100-gallon Rubbermaid-style stock tanks, elevated where appropriate with wooden apple crates.

A stainless steel dairy bulk tank, about 300-gallons, provides secondary cleaning. Chris especially appreciates the ease of cleaning and draining water from it. This is used for bunched greens, bulk salad greens, and pre-soaking bunched roots. A pallet underneath makes it easy to move around the packing area to accommodate different operations.

An old washing machine serves as a salad spinner. In use for nine years now, it was purchased for five dollars from an appliance store; only the spin cycle works. Washed greens are placed in custom-made mesh bags, similar to onion bags, then spun in the clothes washer.

An 8-foot long barrel washer is used for washing all bulk roots, which exit onto a mesh table for further washing, grading, and sorting. A pipe runs through the barrel washer to spray the crop with water as they agitate before coming out the other end.

Carrots and celery root that have been run through the barrel washer are further “polished” using an electric pressure washer with a short wand and variable water pressure. The same tool is used to clean bunched roots, although Chris feels that the barrel washer is so efficient that Rock Spring has moved away from bunched roots, especially for the CSA.

## ***Driftless Organics, Josh Engel, Noah Engel, and Mike Lind, Soldiers Grove, WI***

***“When you sell to stores, you’ve got to have perfect looking stuff or it’s not going to go anywhere.”***

Driftless Organics started as an offshoot of Josh and Noah Engels’ family’s organic dairy farm in the Driftless Region of southwest Wisconsin. From humble beginnings in 1994, Driftless Organics has grown to include 350 CSA members, and an equal volume of sales to stores and warehouses, with produce grown on 80 acres of valley ground.

From first filing a schedule F in 1994, Josh and Noah slowly grew their operation. Noah spent time working for other successful organic produce growers in the region, as well as at a Twin Cities food co-op. In 2001, they began an earnest effort to up to meet increased demand at the Dane County Farmers Market. At this time, they also started marketing their CSA shares in the Twin Cities and Madison. Mike Lind joined the partnership in 2005.

Driftless Organics built their produce reputation on potatoes, filling an important niche for local, organic potatoes. Potatoes still make up a significant

portion of the farm's acreage and income, and the partner's have invested in specialized production and handling equipment for that crop.

The packing operation at Driftless started humbly, carving out a corner of their father's shop. They currently rent an unused creamery for a packing house. Driftless delivers twice weekly, with trucks leaving on Thursdays and Saturdays.

## **Facilities**

Driftless Organics currently rents an old grade-B dairy processing facility for a packing house. "It's less than ideal," Josh notes, "But it's providing a good intermediate step between Dad's shop and the ideal piece of land."

Designed for stationary dairy processing equipment, with the milk flowing through pipes, the packing house is full of nooks and turns, rather than the large, rectangular layout typical of a packing facility built for vegetables. Driftless has made the best of this, sheltering the office space off to one edge, and tucking their potato packing line into another.

Swinging double doors provide the primary access to the facility. A concrete ramp goes down about one foot from this entryway to the floor of the old creamery. The crew uses a forklift, kept outside, to bring pallets and bins into the creamery, but the facility doesn't have room to use the forklift inside.

The walk-in cooler door opens directly across from the entry. Shaped like a L, the cooler is, Noah notes, "less than ideal." As with many buildings of this vintage, bits and pieces were added on over the years. The cooler also has a large door opening directly to the outdoors, on the other leg of the L; this leg has a significant upwards slope to it.

To the right, a small nook accommodates a desk and small office space, as well as dry storage for packing supplies. An attached building houses boxes and more supplies, and more of these are stored at the Engel's parent's farm, just a few miles up the road.

An ice machine with an insulated, stationary bin is situated next to the cooler, providing easy access for top-icing product that is field packed, or for icing handled product that is ready to head to the cooler.

To the left of the door, a narrow galvanized stock tank sits against the wall for primary rinsing and crisping of greens and other crops. Past that, the potato packing setup is tucked into a large bay so that the center of the building remains open for use. A handwash sink is next to the people door entrance, and a brush washer is situated against the opposite wall. A restroom is located in the farmhouse, about 100 feet away, and a portable toilet is maintained outside the creamery.

The tile floor has numerous drains, resulting in an uneven surface; it also slopes away from the entrance. Noah has compensated for this with an electric pallet jack; otherwise, it took three people to move a pallet of cleaned and boxed potatoes across the floor and into the cooler.

Water pipes are surface mounted on the walls and overhead, with dedicated water lines to each piece of equipment. Lines are routed to prevent condensation from dripping on produce or other equipment.

## **Handling Equipment**

For the initial rinsing and hydrocooling of crops, Driftless uses a permanently-set up 200-gallon galvanized tank. Long and narrow, this tank is situated against a wall immediately adjacent to the primary entrance to the packing house. It is elevated with wooden apple crates to an ergonomic height.

Arugula and spinach, the only salad greens grown at Driftless, are washed using black bulb trays. Greens are placed in one tray, another tray placed on top of that, and the whole thing swished around in the tank to remove any field dirt. In cases of weedy crops or questionable quality, washed greens are sorted at a table by pouring from one tray into another and picking out the cull leaves and plants. Driftless has two old washing machines for spinning greens dry.

A brush washer provides cleaning for roots, squash, and peppers. Equipped with an infeed belt, drying donuts, and a round packing table, the brush washer is an important tool for cleaning and grading produce at Driftless. . Although Driftless has a large brush washer for their potato line, this smaller brush washer provides handling for the many smaller-volume crops they direct towards their CSA, farmers market, and retail store accounts.

A significant portion of the packing area is devoted to handling equipment dedicated solely to washing and packing potatoes. While the heaviest and largest pieces of the potato packing line are permanently in place, many of the smaller pieces are placed in position each time potatoes are washed and packed. A bin dumper handles pallet-bins of potatoes, pouring them into a conveyor that elevates the tubers to a large Lockwood brush washer. This brush washer sits about six feet off the ground so that it can feed roots into a holding bin, where the outfeed rate can be controlled onto the sorting table. The sorting table has rollers that move the tubers along and tumble them over, so that a crew can remove culls.

From the sorting table, tubers go into a Northern bagger. This two-head bagger has twin conveyors that move the potatoes from a holding bin onto a tray that is connected to a scale. When the tray has the designated weight, the conveyor stops, and the tray can be tipped into a bag by hand; when the tray is tipped back, the conveyor automatically begins running again.

An ice machine provides top ice primarily for kale. Kale is field packed into wax cartons, then brought into the packing house for icing. A layer of cartons is removed from the field pallet and placed onto another pallet, then opened. Ice is applied, boxes are closed, and the process repeated with the next layer.

Folding plastic tables, purchased from an office supply store, provide temporary work stations throughout the packing house.

For handling vegetable waste, Driftless uses a material end dump positioned outside of the packing house doors. This metal bin is designed to be picked up by a forklift. A trip lever releases the bin to dump forward, emptying its contents. Most of the farms visited for this study either moved waste by hand or used pallet bins, which require some skill in handling to dump without breaking.