

Work Smarter, Not Harder

PHOTOS BY SHAWNDRRA MILLER



Ben Hartman and his son Arlo work in the hoop house transplanting month-old onion plants.

Clay Bottom Farm Turns Lean Principles into Profit

by SHAWNDRRA MILLER

It's a frigid March day in northern Indiana, but inside Clay Bottom Farm's hoop house, Ben Hartman is planting onion sets. The work is done quickly with a Japanese paper pot transplanter – a wheeled cart with a slanted chute. A tray holds a honeycombed square of paper pots that unspool as a linked chain of seedlings slides down the red chute as Hartman wheels it down the bed.

"Origami designers developed this tool," he explains, as each paper pot slips into the soft furrow at evenly spaced intervals, to be tucked in by the transplanter's slanted rear wheels.

At the end of the row Hartman tears the damp paper linking the pots and turns the implement for another pass. The first seedling in a row gets planted by hand, but the rest are hands-off. "You're supposed to use a used chopstick," he says, staking the first paper pot with tongs to keep the line in place, "but we didn't have any on hand."

Hartman straightens up and grasps the handlebars, steadily drawing the tool down the length of the hoop house as his young son Arlo accompanies him. "The name of this tool – its literal translation is 'your little pulling buddy,'" he says. In addition to alliums, it allows easy transplanting of several crops that are traditionally seeded, like beets, turnips, radishes, baby lettuce and spinach.

"Previously we'd have to put each one in by hand. This takes literally a fraction of the effort. It tills them in too." Another advantage is beating out weeds with well-established seedlings.

Labor-saving tools like these are just one aspect of the efficiency that Goshen, Indiana, farmers Ben Hartman and Rachel Hershberger find essential in managing their farm. As a "lean" operation, Clay Bottom Farm thrives from the couple's commitment to several key principles, as Hartman details in his book, *The Lean Farm*.

With two greenhouses and two hoop houses covering a total of a quarter-acre of land – along with an additional quarter-acre of beds in the open – Hartman and Hershberger get high productivity out of a fraction of their 5 acres of clay soil. They grow 30 produce varieties, focusing on their customers' preferences.

The minimum-till farm's only source of fertility is compost made on-site. "The soil is very loose, very high fertility. You can plant about anything."

Clay Bottom Farm is one of a handful of year-round farm operations in the region, which is Zone 5b. Since there's little competition in winter for local produce, the markets are eager. Half of the farm's produce goes to direct-customer sales, either through a CSA that runs April through October, or year-round at the Goshen Farmers' Market. The other half goes to wholesale markets like

restaurants and Maple City Market, Goshen's food cooperative.

Maple City Market produce manager Annie Mininger says the farm's salad offerings "fly off the shelf." She said Clay Bottom Farm is one of her top suppliers because of availability and quality.

"Ben and Rachel always have really high-quality product. They started growing salad greens in the greenhouse so they could provide us with salad in winter, while our other provider doesn't supply that. Salad mix and spinach, it's always in the top 10 of any produce section, so it's a big deal to have access to it over the winter months."

The farm also grows several varieties of Asian greens due to their hardiness. At this week's market, the farm stand offers kale florets, mizuna florets, bok choy, spinach and salad mix.

The greenhouses give the couple a jump on summer produce as well: tomatoes they started in January are ready to plant under cover in early March, filling a bed where carrots were just harvested. Indeterminate varieties will be spaced every 9 inches and trellised on diagonal strings to allow them to grow 20-30 feet upward.

A natural gas heater will maintain the temperature at 55-60 degrees, insulated by air blown between two

layers of plastic sheeting. Roll-up curtains and mechanized in-wall vents will keep the greenhouse from overheating as the weather warms.

'YOU SHOULD FARM'

The couple has been farming since just after their graduation from Goshen College, starting with four years at a successful Michigan microgreens farm that sold to high-end restaurants in Chicago. After that, they started an urban farm where they lived in Goshen at the time.

Hershberger spent childhood summers helping tend a large garden as

"I thought I was on an academic track," he recalls. However, when he told a professor he was interested in farming – and that he felt a little guilty for not wanting to continue on to graduate school – she advised him well. "She said, 'You should farm. There are enough people out there in academia and not enough people growing food.'"

After three growing seasons in town – where the farm got its name from the clay bottom tennis court that they tilled in to plant vegetables – the couple hankered for more space. They rented plots at various locations around town, but they wanted contiguous land. After a year of looking, an Amish-Mennonite dairy farm came up for auction.

The former pastureland and repurposed milking parlor have housed Clay Bottom Farm for a decade. The farm moved from transitional organic to certified organic over the course of three years.

The couple knew they wanted to reevaluate their choice after 10 years to see how the farm was working. They recently decided to make a shift as a result of that assessment.

"The farm is great," said Hartman. "The change is that we have two kids now." With a 1- and 2-year-old, they want to be closer to schools and family. Clay Bottom Farm is on the move again: "We just closed on 7 acres inside the city limits two days ago," he says. "So we're transitioning back to being an urban farm."

While being close to family and schools was their primary motivation, the move also offers a chance to stretch themselves anew. Hartman is looking forward to applying lean principles in building a farm from the ground up.

Rather than adapting buildings already in existence for new purposes, as they did when turning a milking parlor into a processing center, they can design for optimum flow and productivity.

Given the progress their farm has made since they adopted "lean," it's likely that the new setup will continue to streamline their work and make the farm even more profitable.



Ben Hartman uses a Japanese paper pot transplanter in a hoop house at Clay Bottom Farm with Arlo.

well as canning the harvest. Hartman, who grew up on a 500-acre corn and soybean farm, says farming is in the couple's genes. Even so, he didn't consider farming until well into the acquisition of his double degrees in English and philosophy.

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Hoop houses and greenhouses allow Clay Bottom Farm to grow year-round.

Their exploration into what they shorthand as lean began six years ago when a CSA member, owner of an aluminum trailer company in nearby Nappanee, Indiana, offered to coach them in the principles of lean manufacturing.

“At the time we were making it, but we were working pretty hard,” said Hartman.

ELIMINATING WASTE

What they learned from lean manufacturing principles – which were employed in Japan’s Toyota plants – revolutionized the way they farm.

“Essentially our business model is to notice waste and get rid of it so that everything we’re doing is delivering value.”

He calls lean a coin with two sides. On one side is value – and a commitment to precisely identifying what that means for the customer. On the other side is waste, all 10 types of it (see box on page 19).

When it comes to value, three questions ascertain customers’ desires: What do they want? When do they want it? And how much? “The more precisely you can answer those questions and deliver on those, the longer

you’ll be in business, the more profitable you’ll be and the easier it will be to retain customers.”

Hartman shares a story from Toyota. Charged with redesigning the Sienna minivan for the American market, a Toyota engineer spent many months observing how Americans use the Sienna. His findings led to specific recommendations for improvement, including greater numbers of cup holders, a roomier interior for hauling and tighter turning axis.

Similarly, Hartman actively seeks detailed information on what his customers want.

Each winter he meets with the chefs who purchase produce from Clay Bottom Farm to find out what’s new on the menu and how to better meet their needs.

He surveys CSA members each year to determine likes, dislikes and ways to improve convenience of pick-up. With the installation of refrigeration units at drop locations, members benefit from extended pickup hours, for example.

This investigation continues when interns work the farmers’ market booth; part of their job is to report on customer response. The result? Hartman and Hershberger know precisely where the demand for specific varieties lies. For instance, they know that market customers prize orange tomatoes, while restaurateurs want big red slicers.

Which brings the other side of the lean coin into view: the systematic elimination of waste.



Seedlings ready for transplanting.

Precisely identifying value helps cut down on overproduction, which is one of the most prevalent types of waste on a farm. But waste also takes many other forms, such as motion and transportation inefficiency, overprocessing and “any good idea that goes unspoken,” says Hartman.

Rooting out all manifestations of waste is an ongoing project at Clay Bottom Farm, where the watchword is continuous improvement.

“Every year, we want to understand more about value and get rid of more waste. So there’s never a plateau. Lean is an ongoing system, not something you apply in one season.”

Decluttering the farm is a continual process. Hartman and Hershberger had bought countless tools and had a barn full of implements they didn’t necessarily need. Letting go of the excess increased their efficiency.

Now they take time twice a year to evaluate the property and assess every item. Hartman encourages all farmers to do this, asking themselves of each tool: “How did you add value for me last year? How were you useful?” If you struggle with the answer, get rid of it.” There will be cost savings from knowing where everything is.

LESS WORK, MORE RESULTS

Contrary to what some assume, the system results in less work, not more

— for example, tools are stored near their point of use.

“One of the myths about lean is that it’s just designed to make you work harder and faster to produce more,” said Hartman. In actuality, the goal is the exact opposite: making the work easier to do. He gives the example of overburden, a form of waste that they address every winter. By asking, “Where were we overburdened the most?” and then choosing a project or two to make changes, they can cut their workload each year.

One winter they automated the greenhouse so they could leave the property and not worry about plants overheating. Now they can go camping on the coast of Michigan, leaving the farm in their interns’ hands. Another year they remodeled greenhouse entryways with 8-square-foot openings to allow the skid loader easier entrance.

They also enlisted the help of an Amish machine shop in designing a carrot-digging implement using the tip of a skid loader bucket. “We put the tip on posts so the skid loader bucket digs underground 10 inches, just under our carrots. We had been prying each carrot up by hand one by one with forks.”

Hartman calls these upgrades “muri projects,” using the Japanese word for overburden. For the past six years

they’ve worked steadily to reduce “muri.” He says this is key to making their chosen vocation sustainable in the long haul.

“The thing about small-scale growing is people time out early,” he says. “It’s a physically rigorous profession. If you’re not conscious of the burden on your body, you won’t be in the profession for long. So our goal is to make our work easier.”

Similarly, rooting out the type of waste called “defect” adds to their bottom line. Farms often lose money due to defective products. The investigation begins with the question: “When does produce become defective?” Hartman has considered this question from the point a seed is received in the mail to the point at which a carrot or bag of spinach lands in a customer’s hand.

He found that much of the loss came about in the first weeks after the seed arrived. “That’s when we were losing crops. Every seed should turn into food.”

To that end, he built two steam-generated germination chambers. One is a converted freezer and another an old bakery cart. Both have a pan of water with an electric hot water heater element. With thermocouples and probes, temperatures can be set to the various crops’ exact needs.

“We get close to 100 percent germination in here,” he says, opening the door to show the shelves above the water pan. “So this took care of the week 1 defect.”

During weeks two through four, plants continued to be vulnerable, so he set up a greenhouse within the greenhouse with extra heat and protection for heat-loving crops like peppers, tomatoes and figs. This helped mitigate crop loss at this stage.

COLLABORATION FOR SUCCESS

But Hartman doesn’t claim origination of all the improvements on the farm. One of the principles of lean is to enlist every mind involved in production, so that ideas come from the people closest to the potential waste.

“One of things we do with interns as soon as they come is show them that list of 10 types of waste.” Helpers know that if they see waste in

Going Lean: 10 Types of Waste

Overproduction: Is all product being sold?

Waiting: Are workers able to work without unneeded interruption?

Are products stored longer than they need to be?

Transportation: How efficient are delivery routes and vehicle use?

Overprocessing: Are you doing more for customers than they want to pay for, such as bagging produce that could be sold unpackaged or creating expensive websites?

Inventory: Are more supplies and finished goods kept on hand than absolutely necessary?

Motion: How many times are items handled, and how efficient is the farm layout?

Defect: How much unsellable or discounted/poor quality food results from farm practices?

Overburden: Are workers or equipment overstretched?

Uneven work: Is the work standardized and predictable to the extent possible?

Unused talent: Are good ideas going unspoken?



About half of the farm's produce is sold through direct-to-customer sales through a CSA that runs April through October and year-round at the Goshen Farmers' Market.

any form, Hartman and Hershberger expect to be the first to know.

"Some of the best ideas come from our interns," he says. He points to two hosing tables suspended by chains from the overhang outside the processing room. The tables used to rest on legs. Charged with hosing and squeegeeing the cement floor under these tables, a worker suggested eliminating the legs and hanging the tables to make cleaning under them easier.

Another suggestion involved packing CSA boxes. Every week interns would reach into a bulk tote of carrots, for example, to lift the vegetables into a member's box in front of the tote. That resulted in fatigue and motion waste – until workers recommended lowering the front part of the table. Now, the CSA boxes sit lower than the bulk totes, making it easier to transfer the produce.

While these small changes save only minutes a week, such measures have an impact over time, says Hartman. He doesn't discount the human factor involved here, either. "When workers see us implement their ideas it encourages them to come up with more." Like the Toyota manufacturers who hire people not to build cars but to think, Hartman says he doesn't want workers to just put their heads down and toil, but to bring their minds to the farm as well.

It's a rewarding opportunity for nearby Goshen College students who commit to an internship. And the smooth workflows and efficient practices add up, though as intern Zach Waltz says, it's still "dirty, messy, sweaty work. But I'm learning something new every day," he said.

Hartman stokes learning not just among interns but also at farm conferences, where he speaks about lean farming. He's appeared at conferences in Wisconsin, Pennsylvania, Indiana, Oregon, North Carolina and elsewhere, and he has been interviewed by European and Canadian media outlets.

The interest is unsurprising, since the farm grows more profitable each year.

"Lean is all about strategic contraction. As you eliminate waste, you get smaller. We started on 3 acres, and now we farm on less than 1. We got rid of more than half our tools, and we work half the hours that we used to. Every year that we've contracted our business we made more profit. That's what's surprising. The mindset I grew up with is that you have to grow through constant expansion."

Spreading the lean message has become a mission for Hartman, who was named one of *Grist* magazine's 50 "fixers" – innovators addressing humanity's biggest challenges – for his work helping small farmers stay

competitive. His second book, *The Lean Farm Guide to Growing Vegetables*, is now available.

"It's time for the industry to mature. Those who want to stay in it for the long haul can't rely on continuous expansion anymore. It's time to focus our efforts on delivering value for long-term success."

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For more information about Clay Bottom Farm, visit claybottom-farm.com. To order Ben Hartman's *The Lean Farm Guide to Growing Vegetables: More In-Depth Lean Techniques for Efficient Organic Production*, visit acresusa.com or call 800-355-5313.