

# Clover Food Lab's secret ingredient? Data. Lots of it.

By Eric Moskowitz JULY 28, 2014

YOU COULD BE forgiven for thinking [Clover Food Lab](#) had figured out its chickpea fritter sandwich by the spring of 2014. Five and a half years after Ayr Muir sold the first one from a truck parked across from MIT's health center, customers had ordered more than 1 million of Clover's take on falafel: a whole wheat pita spread with hummus, stuffed with fried chickpea balls and pickled vegetables, and drizzled in tahini sauce.

It was the \$6 sandwich on which a menu, a philosophy, and an empire were being built, with six trucks, five brick-and-mortar restaurants (so far), a looming expansion to Washington, D.C., and a deal to carry branded items at Boston-area Whole Foods stores — all in service of Muir's vision of selling locally sourced, largely organic vegetarian fast food from thousands of Clovers nationwide.

Already Clover had garnered near-fanatical loyalty at its outposts in and around Boston. Internal surveys show 90 percent of first-timers return within four weeks and 1 in 4 customers visits more than once a day, popping in for breakfast or lunch, lingering over a cup of coffee, later grabbing something to take home. For them, Clover — with its clean white visuals, hip young employees, and indie-rock background music — is like the office cafeteria mated with the Apple Store.

And the chickpea fritter has been at the heart of it all, ever since those first weeks when Muir stopped calling it falafel, trying to simplify the menu that was drawing in a mix of Kendall Square construction, biotech, and software workers.

But something was gnawing at Muir this spring as he evaluated the more than 3,000 comments a month that Clover gathers both in formal surveys and quick notes tapped out by employees while chatting with customers, as well as what he calls “eavesdropping” on Twitter. “Too oniony,” said one customer who had eaten the sandwich, and then another, and someone else.

Muir looked into it, discovering that his organic white vinegar supplier had changed formulas — decreasing its potency — without notice, making the

pickled onions less pickled. He switched suppliers in early June, but instead of restoring the old recipe, adopted an even more concentrated vinegar.

“The pickled onions have never been better,” Muir declares, sipping a peppermint tea in his Harvard Square restaurant on a recent morning. Overhead, a slide show is playing Clover highlights on a video display. There’s a close-up of juicy tomatoes, a picture of the Saran-wrapped netbook that Muir rigged to run the original truck’s checkout software, a shot of Muir holding his infant daughter and leaning on that first truck.

NEW VINEGAR was not the first change to the chickpea fritter sandwich. It was the 34th Muir has counted, after a flurry of untallied changes in Clover’s first weeks. Consistency is supposed to be key in fast food; most chains lock down a recipe and serve it that way forever, says Daniel Newcomb of Atlantic Restaurant Group, a Boston-area industry consultant, calling Clover both “fun to watch” and highly unusual. “Most operators are too lazy and egotistical to want to change things” or their focus is elsewhere, he says.

But change is in Muir’s DNA. The “iterative process” he learned studying materials science at MIT — before going on to Harvard Business School and the management-consulting giant McKinsey — fuels his lab approach here. Ninety percent of the ingredients and the steps that go into making the chickpea fritter sandwich have changed just in the past 12 months. The original falafel was good, he says proudly, but today’s is better.

Some recipe changes, like the pickled onions, are subtle, and others are major. Recently, Clover switched from cooked to raw organic chickpeas in the falafel batter; that along with doing the chopping in a meat grinder instead of a giant food processor significantly changed the consistency. At the same time it replaced its creamy hummus with a rougher-textured and more acidic version.

Like many of the changes, that one reached the menu only after extensive employee tasting and side-by-side customer comparison tests, with careful review of the resulting data.

That’s true of most everything on Clover’s menu, whether it’s the items that appear for just a few weeks a year — like the strawberry soda, strawberry-topped granola, and strawberry whoopee pies made only during peak strawberry season — or the year-round staples, like the rosemary french fries and the barbecued seitan sandwich.

Muir, who is 36 and a father of three, is as obsessive about data-driven improvements as his resume suggests. In a time when many of his customers track their footsteps and sleep patterns with Fitbits and apps, Clover is the fast-food restaurant version of the life-hacking quantified self.

He uses technology in two major ways: to make the business more efficient, and to innovate, doing some things that weren't possible even five years earlier. Almost anything that happens at Clover is gauged, tracked, and beamed through the cloud to management in real time, giving Muir and his team up-to-date metrics on everything from average wait times and order amounts to refrigerator temperatures, rendered in vividly colored graphs and charts on their iPhones. In a quiet corner of the Harvard Square Clover, it might look like Muir is checking a personal banking app, but he is running a company with nearly 200 employees (he won't share revenue figures).

“The trucks are kicking ass right now,” Muir says during the 8 a.m. egg sandwich and pour-over coffee rush; average wait times at some of the restaurants are lagging this morning, but orders are being filled at the truck on the Greenway at Dewey Square every minute and a half. “It's hard to manage what you can't measure,” he says.

Cloud-based automated scheduling software allows managers to spend more time working with employees and less time calling or texting their way down a staff list. Sensors and computers monitor the soil-moisture levels of restaurant plants and water them automatically, sparing workers a menial task and giving them time better spent interacting with customers or honing kitchen skills. Every corporate document that comes in is scanned and shredded, allowing Muir and Clover's managers to call up anything — an employee's kitchen safety training certification, a produce order from 2009 — on their phones from anywhere.

Clover uses Google Docs and [YouTube to share recipes and training videos](#) across the company. If the supply kit delivered in the morning from the central hub in Inman Square includes an ingredient pack for a new chilled roasted-tomato soup, employees at any truck or restaurant can easily check the visuals for what the tomatoes should look like caramelized or how to garnish the finished soup with cilantro and sour cream.

A decade ago, that training would have required binders of paper and time-consuming trips to headquarters. Little hassle for a small chain or a restaurant with a fixed menu, but Muir says he would not have bothered to start Clover

without modern technology, wanting from the start to build something that could stay nimble while getting big.

Muir, a Western Massachusetts native loosely related to the naturalist John Muir, was still at McKinsey when he hatched the idea of selling fast food with a pared-down menu excluding meat and built from mostly local, freshly picked ingredients. He was less interested in reaching the converted — those like him concerned with the billions of tons of greenhouse gases generated by the livestock industry each year — than the wider audience he believes is likely to bypass Clover if it ever included the word “vegetarian” in its marketing materials.

Muir had no food-service experience, though, so he banked his time off at McKinsey and spent six weeks of vacation in early 2008 working part-time at Burger King and Panera. Everywhere, he saw areas for improvement, at Burger King especially. The computerized registers might as well have been typewriters, he says, spitting out order tickets in tiny type the way customers dictated them instead of grouping items — three small fries, two medium Diet Cokes — prompting mistakes among workers scrambling to read and fill them quickly. And the average order-completion times satisfied corporate standards but did not reflect consumer reality, with long lunchtime waits offset by quick orders for a soda at 3:30 in the afternoon.

That September Muir hired an executive chef; in October, he purchased a used truck and scored a spot on MIT’s Carleton Street. He never intended it to be the first of many trucks but instead a test lab for dishes he would serve at the first of many restaurants. He had looked at traditional focus groups and concluded the truck was a cheaper and better way to generate information and ideas. At first, he filled handwritten notebooks not just with orders but with customer comments as well as spot checks of wait times, transcribing and crunching data at home after long days cooking and serving food.

As the first truck’s popularity grew, Muir discovered a bottleneck: He could see that the lines were getting longer, but his sales weren’t growing equivalently. Though he knew that he could not eclipse two-customers-served-a-minute without an expensive new order-processing system, he thought he might be able to encourage customers to “redistribute” themselves. He started drawing charts on the side of the truck showing the previous week’s average wait times — an arc curving from 3 minutes at 11 a.m. to 12 minutes at noon to 25 minutes at 12:30 — and people responded, spacing out their arrivals and allowing Muir to sell more food without making any other changes.

Meanwhile, he began shopping around for an ordering system. Restaurant industry mainstays would have charged him \$60,000 for registers running software he could not easily tweak. So he designed his own system — iPods that record orders and send them to work stations, allowing any employee with a change belt and a device in hand to serve as a sidewalk cashier — and hired a young customer to program it, talking him down from \$5,000 for one good version to \$500 for a cruder test model, with a promise to pay for upgrades. They worked through six versions, and more than \$5,000, before Muir hired another engineer to move the system into the cloud, allowing it to work across multiple locations.

It's the same as the perpetual-refinement approach he brings to Clover's menu. "I think everything we're doing could be better," he says, even as he insists that if he stopped at chickpea fritter 34.0, it would stand up to any falafel sandwich in a blind taste test.

A FOOD-INDUSTRY MAXIM holds that quality will slip when a popular local outfit expands. But the engineer in Muir says the opposite can be true, that lab results are better when there are more data points to evaluate.

And that is only part of his vision. Around the same time Muir was studying fry management at Burger King, he noticed a sign at a 7-Eleven advertising "fresh" soup and did a double take, wondering how he could distinguish his chain's claims of freshness. He decided transparency was the answer. That means open kitchens, blog posts about mistakes as well as triumphs, online access for customers to employee-training manuals and ingredient lists, and even knife-skills classes that are offered to the community.

Mistake posts can make mildly interesting reading, like when a "bread disaster" last month meant company compost cans were stuffed with hundreds of leaden pita loaves (the restaurants and trucks served chickpea platters). They can also be alarming, like when last summer Muir posted about the kind of problem another restaurant might obscure with "vacation" or "closed for repairs" signs on their doors — [a voluntary closure](#) after public-health officials discovered that at least 12 people with salmonella had recently eaten at Clover, among other places.

The state records more than 1,000 confirmed salmonella cases most years, but Muir's disclosure about a suspected link triggered two dozen Clover-and-salmonella stories in local media. Fans and foes debated the company's reaction on its website with Muir, with one angry-sounding customer posting a link to a less-than-stellar health inspector's report, and Muir countering with

blogs about testing every surface and every employee. He also used the blog to promise free fries to returning customers and full pay to idled workers, and later to suggest Clover was not to blame for the outbreak.

A few people took to Twitter and Clover's blog with accusations of self-importance. "WHO CARES? You are just a food truck/restaurant company — you aren't saving the world!" someone wrote.

"We are saving the world," Muir replied. "Small steps."

And many customers rallied around him. For every negative comment, Muir says, there were exactly 50.4 neutral or positive comments. "Kudos to you guys for putting the safety of the public over your bottom line," wrote a fan. "The rest of American enterprise should take lessons."

Muir envisions a time soon when this transparency means he will not only be able to track every ingredient from farm to sale — through shipping, handling, prep, and cooking, with notes on conditions along the way — but also beam relevant real-time images from a specific plot to a restaurant video board when a customer makes a transaction, "so you could watch your lettuce grow that you're eating."

"How many people want to do that? I don't know," he admits, guessing it might be the same couple of fanatics who have offered editing suggestions on his employee-training manuals. But the mere existence in the background would shout transparency in ways that no one else is doing yet, and that he believes will matter more in the future to diners.

For now, screens placed prominently in the restaurants simply show slides on a repeat loop. And the screen in the modest "World HQ" office above the Harvard Square cafe offers just a low-resolution prototype of what Muir hopes will one day be two-way displays linking customers and employees in separate, distant Clovers as if they were looking through a window. To the left of his office monitor, Muir has hung one of the rare printed documents he has not shredded. It shows the results of Clover's first-ever [Zagat review](#), published in this year's guide.

They are solid numbers across the board; for the \$10 price point, the 24 of 30 food rating is especially good. But those metrics reflect what Clover served months ago. Everything on the menu has changed since. And as with everything they do, Muir says, the numbers could be better.