Agilent Case Study: 374 Labs

How 374 Labs Turned Cannabis Heavy Metals Analysis into a Money Making Assay

In many states across the US, cannabis cultivation and testing businesses are in the process of transforming into a mature—and highly regulated—industry. These businesses face growing pressure to evolve their business models and skill sets to keep up

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Jason Strull
Founding Partner and Lab Manager
374 Labs

Agilent recently spoke with Jason Strull, founding partner and lab manager at 374 Labs—a Nevada-based commercial analytical lab focused on ensuring the quality and safety of cannabis products in that state. We discussed his experiences and philosophy of starting and operating a successful testing lab in a such a rapidly changing market.

Q. How did 374 Labs come to be? What were your goals and vision as you first set up operations?

374 Labs began in 2014 with four partners looking to serve the medical industry in Nevada, by providing testing rooted in compliance, convenience, and safety. We had expertise in environmental and clinical toxicology, as well as sales and project management—it was a great mix for starting a commercial testing laboratory.

Beyond simply offering testing services, our vision was to become a business partner to our customers to help them improve their operations and products. We saw accurate testing as vital for the peace of mind of cannabis consumers, particularly in a medicinal context. We hoped that testing would de-stigmatize what we viewed as a potentially beneficial option.

Q. What does 374 Labs do specifically? What products do you test, and why is testing these products important?

We test all types of cannabis products to ensure the state of Nevada can give its residents accurate information about product quality and safety. Among the products we test are things like cannabis flower and concentrates, as well as vapes, edibles, and tinctures. Testing is essential to ensure the safety of these products; beyond ensuring there are no harmful chemicals or elements, there are important questions around accurate dosing and the ratios of cannabinoids and terpenes present.

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Cannabis cultivation isn't always an exact science, and it's important that any variability in the plant isn't passed on to the end user. As with any product, medicinal or otherwise, consumers have a right to know exactly what they're consuming. Working with the growers and regulatory bodies, we feel like we share a responsibility to help provide those answers.

Q. As a startup in a competitive and fast-changing industry, what were some of the challenges you faced? What approach did you follow to overcome these challenges?

Like most tech startups, we were under immense financial pressure to get operational as soon as possible. Initial setbacks with our facility, in terms of finding the right location and getting the permits in order, cost us a lot more time and money than we anticipated.

With our timeline compressed, we found ourselves facing some hard decisions, and one decision we made was to purchase used equipment from third-party vendors to reduce costs. In hindsight, this turned out to be a mistake. Some instruments didn't work to manufacturer specifications, and it was a struggle to get spare parts and repairs.

What we thought would be a five-month process ended up taking closer to eight months. We saved a bit of money up front but lost valuable time—months where we weren't generating revenue. Had we purchased new or manufacturer-refurbished equipment at the start, we would have been much better off.

Q. How did you recover? How did Agilent enter the picture?

Several of us had previous experience with Agilent in graduate school and at previous jobs. When we eventually decided to start replacing equipment, we went with refurbished instruments from Agilent, because we knew they were going to work, and Agilent was going to be there to make sure. If we'd gone with Agilent refurbished instruments at the very beginning, we feel like we'd have been off and running, whereas with the third-party vendors, we ended up stumbling.

Agilent has been a great partner on both the equipment and the service side. We are now a complete Agilent laboratory and have complete redundancy, all of which really helps reduce the stress of meeting the testing needs of our customers.

Q. How important is metals testing in the cannabis industry? Tell us about your metals testing process, and some surprises you've encountered along the way.

High levels of heavy metals in cannabis have serious safety implications and so heavy metals testing is required for every cannabis sample sold in the state of Nevada.

Prior to bringing the Agilent ICP-MS into our lab, we used a graphite furnace atomic absorption spectrophotometer, which copes well with samples that have high dissolved solids. Our sample throughput increased dramatically with the implementation of the ICP-MS; our sample run times are much quicker, and we gained much more freedom and control over our analytical runs with the Agilent MassHunter software, which is very user friendly.

Our current process involves digesting different sample matrices by microwave digestion. Then the samples are diluted to get the acid concentration of the solution right for running on the ICP-MS. We can run an entire day on the same calibration, but we do calibration checks every 30 samples to ensure data quality.

The major surprises we've encountered have been related to the extreme sensitivity of the assay. Cannabis plants are very good at absorbing heavy metals; we have found all of the "big four" heavy metals – arsenic, cadmium, lead, and mercury—in cannabis products we've tested . Needless to say, when a product fails heavy metals testing, it's a big concern for our customers. We work with them to identify the root cause of the contamination—soil or grow media, water or nutrients, or any materials used in the cultivation—even broken lights or sensors.

Q. Are there particular features of the Agilent ICP-MS that have brought value to your workflow?

We use the Early Maintenance Feedback (EMF) feature to help us know when to inspect the cones, change oil, change tubing, and clean glass pieces within the instrument. It's a great tool for keeping the instrument up and running and minimizing service calls. And in general, the enhanced throughput of the ICP-MS has been a game changer for our laboratory in terms of the profitability of our heavy metals testing.

Q. Describe your relationship with the Agilent ICP-MS team.

We have a great relationship with the Agilent team. They provide the customer service we need for any questions that come up, or in the event we are having instrument issues. They showed us how to calibrate the instrument to deliver better day-to-day analysis with the accuracy our customers need. They also helped set us up with a great QC system for each type of analysis.

Agilent is an integral piece of our metals analysis, as well as for many other assays that our lab uses every day. From the applications team to the service team and technical reps, we always get a quick response. But the bottom line is that I am very confident in the quality of our data, and the instrumentation, validations, and QC systems that Agilent has helped put in place are a big part of that.

Q. What sets 374 Labs apart from the competition? What excites you about the present state of the cannabis testing industry, and where do you see things heading?

We try to set ourselves apart from other labs by being a quality partner for our clients. Our clients come to us and rely on our lab results to help troubleshoot their facility, process and product problems. We are instrumental in helping our clients improve their operations.

You can't manage what you aren't measuring, and laboratory testing helps provide root cause analysis and find out quantitatively what is really going on. The numbers don't lie, but sometimes it can be a challenge to decipher what they're telling you. In such a new industry, we often see customers encountering issues that we have never seen before. It keeps us humble and encourages us to continue learning and understanding the industry and the plant.

The cannabis industry is exploding, but at the same time it's still in its infancy in many ways. There are a lot of unknowns and misconceptions about products and testing, and there are also very basic questions, such as correct nutrient levels in plant tissue, that remain unanswered.

The ability to work in such a fast-paced and evolving industry is very exciting – it allows us to be at the cutting edge of the science and work on novel projects with our customers. One day we may be developing new assays; the next day we're testing matrices not commonly tested. There is always a new problem to work on and help solve, and it's really satisfying to have the knowledge and tools to be a part of that.

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