

CAUTION

Food Safety and Quality Concerns for the Growing Market

BY EMILY PURO

OLD-BREW as a specialty coffee market segment is blowing up this year, and many roasters and retailers are eager to get into the game while it's booming. But ready-to-drink (RTD) cold-brew differs from roasted coffee in many ways, with an entirely different set of production challenges, costs and risks. This is especially true when it comes to food safety.

Whether brewed hot or cold, coffee typically has a pH value of greater than 4.6, which the Food and Drug Administration (FDA) categorizes as a low-acid food. That means it's at risk for contamination and is regulated accordingly.

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"We can create a huge second category for specialty coffee, and if we do that, it can create a significant value chain for the industry" says Diane Aylsworth of Stumptown Coffee Roasters, participating in a presentation on cold-brew at Re:Co Symposium in April. | Photo courtesy of the Specialty Coffee Association of America (SCAA)



"We have just started to scratch the surface in terms of getting real data," says Maya Zuniga of S&D Coffee & Tea, speaking at Re:Co Symposium in April. "We need more research to ensure not only a safe product, but a great tasting one."





LEFT Slingshot Coffee recently launched a new 64-ounce "bag in a box" cold-brew to serve"on tap" from your refrigerator.

RIGHT The company worked with Cornell University and the North Carolina Department of Agriculture to develop food-safe processes for its cold-brew coffee and cascara tea products. | Photos courtesy of Slingshot Coffee

With roasted whole-bean or ground coffee, food safety risks are minimized because the beans are heated to such a high temperature that any potential contaminants are killed, and the resulting product is low in moisture. With coffee served hot, brewing acts as an additional "kill step"—killing pathogens and other contaminants—immediately before consumption.

In most cases, there is no equivalent kill step with cold-brew. This leads to a number of important questions: How can one ensure the safety of cold-brew coffee? What are the current best practices, and what type of regulatory compliance is required?

UNCHARTED WATERS

As vice president of cold brew at Stumptown Coffee Roasters, based in Portland, Oregon, Diane Aylsworth spends a lot of time thinking about the growing

"It's a great industry initiative for driving specialty coffee and consumption forward in a new way," she says, "but it definitely adds new complexity."

Central to that complexity is the fact that coldbrew is not clearly defined within the industry. There are at least three common methods for making cold-brew, explains Maya Zuniga, who holds a Ph.D. in food science and serves as director of product innovation at S&D Coffee & Tea, headquartered in Concord, North Carolina. One is to steep ground coffee in room-temperature water for an extended period of time. (Guidelines from Toddy, a leading cold-brew equipment manufacturer, recommend steeping for 12 to 24 hours at room temperature.) Another is to keep the mixture refrigerated during steeping. A third method, which some industry professionals don't consider a true cold-brew, uses a "hot bloom" method, in which the grounds are briefly saturated with hot water before steeping in cold or room-temperature

Government regulators seem equally unsure about what constitutes cold-brew coffee. When Jenny Bonchak founded Slingshot Coffee in Raleigh, North Carolina, for example, she found the state Department of Agriculture completely unfamiliar with the product.

"We worked closely with our state officials to go through our entire process," says Bonchak, "to explain what we did and how we did it." Together, they developed approval guidelines for the company's manufacturing processes and facility. Local regulations can vary, and the FDA provides no specific guidelines for cold-brew coffee.

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PATHOGENS VS. SPOILAGE AGENTS

The two main concerns for producers of cold-brew coffee are foodborne pathogens, which can cause illness or, in extreme cases, death; and spoilage organisms, which mainly affect flavor. Available research is scarce, partly because testing conducted by or for cold-brew manufacturers typically is considered proprietary.

Stumptown recently partnered with the Food Science and Technology Department at Oregon State University (OSU) to perform a challenge study on its cold-brew, and that report is expected to be published later this year. The researchers introduced a number of foodborne pathogens into Stumptown cold-brew, documenting the growth, survival or death of each organism at room temperature and under refrigeration.

"Based on the work we did using some of the major foodborne pathogens, we do not see any growth," reports Mark Daeschel, a professor of food safety and microbiology at OSU and the lead researcher on the study. "In fact, we see a die-off. It's not an environment that's hospitable to these types of microorganisms."

Daeschel believes coffee may contain antimicrobial components that inhibit the growth of microorganisms. He and his team did not examine spoilage agents such as yeast and mold, however, nor did they look at cold-brew with added ingredients.



Stumptown partners with Sunshine Dairy to pasteurize and bottle its coldbrew products containing dairy. | Photo courtesy of Stumptown Coffee Roasters

While the results are encouraging, a single study cannot be taken as conclusive evidence that no foodborne pathogens can grow in cold-brew, and as Zuniga points out, results could vary depending on brewing and production processes followed by different companies. Adding sugar, dairy and other ingredients also changes the composition considerably.

Aside from the question of illness-causing pathogens, spoilage agents are a major concern for cold-brew producers. When Brooklynbased Gillies Coffee Co. had its popular cold-brew on tap product tested, the results raised significant concerns within the company.

"Mold count in this product increases very fast," says Donald Schoenholt, president of Gillies. He also cites yeast as a concern, noting that it causes pressure inside packaging, leads to fermentation and negatively affects taste. "Perhaps out of an excess of caution," Schoenholt says,
"Gillies considers it prudent that we suspend our Gillies Coffee
On Tap kegged cold-brew program while we learn more about
the chemistry of cold-brew iced coffee."

KEEP IT CLEAN, KEEP IT COLD

In developing guidelines for Slingshot Coffee's cold-brew operations, the North Carolina Department of Agriculture focused heavily on sanitation.

"They wanted to make sure the space we were using was sanitary," says Bonchak, "the way we were sanitizing our bottles was accurate and met standards. ... They wanted to make sure any kind of brewing equipment we were using was properly sanitized." Using clean, uncontaminated water also is essential.

Ensuring the product is brewed in a sanitary environment is the first step. Proper storage is the second. Unless your cold-brew is processed to be shelf-stable—which is an expensive proposition—refrigeration is key.

Like many companies, Stumptown relies on refrigeration to keep its black cold-brew items fresh.

"We keep the product refrigerated throughout the supply chain," says Aylsworth. "We do not heat-treat our black coffee items. It's all



"To do it right, it's very expensive," says Blackeye Roasting Co. founder Matt McGinn, of producing a quality cold-brew product. | Photo by Finnigan Delahanty

based on the refrigerated cold chain throughout distribution to keep it food-safe and tasting delicious."

Stumptown's cold-brew products with dairy are pasteurized. The company partners with a local dairy to process, package and transport those items.

Matt McGinn, founder of Blackeye Roasting Co., began bottling cold-brew in a commercial kitchen in the basement of a coffee shop. The St. Paul, Minnesota-based company now partners with a local brewery, using the brewery's equipment for production and bottling.

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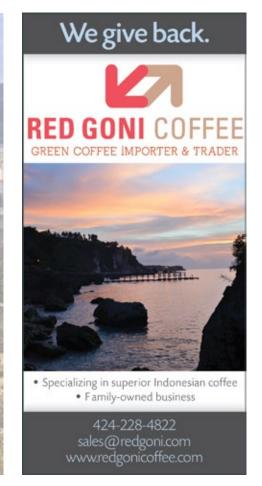
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Blackeye's cold-brew is flash pasteurized, meaning "it goes through tubing that heats it very high, then immediately chills it," says McGinn. He, like many in the industry, does not believe pasteurization compromises taste, asserting that flavor is locked in during brewing.

There are a number of companies that produce shelf-stable cold-brew products that do not require refrigeration. The processes

they follow are patented and/or proprietary, and therefore confidential, but according to Zuniga and coffee scientist Joseph Rivera, of coffeechemistry.com, there are several ways to achieve this. These include manipulating the pH level; processing and packaging in a sterile, aseptic environment; retorting the product, which relies on extreme heat; and high-pressure processing, a "cold pasteurization" technique that relies on

pressure to eliminate contaminants.

Research also is reportedly being conducted on the use of food-grade preservatives.

The challenge is to find a process that is not prohibitively expensive and does not adversely affect flavor.

In addition to eliminating the need for continuous refrigeration, shelf-stable cold-brew products have an extended shelf life. For example, Stumptown has set a maximum of 90 days for straight cold-brew, 50 days for cold-brew with dairy and 40 days (though the company was still testing that at press time) for cold-brew with coconut cream. On the other hand, Kohana Coffee's shelf-stable cold-brew concentrate and RTD cold-brew beverages—some of which contain sweeteners and dairy products—have a shelf life of 12 months.

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COLD-BREW ON TAP

While most companies that bottle or can cold-brew have done extensive research on safe manufacturing and quality control practices, there are countless coffee shops serving house-made cold-brew whose owners might not be as informed about the potential food safety concerns. For the most part, the same motto—keep it clean, keep it cold—applies.

Again, beginning with pure, uncontaminated water is essential. So is properly cleaning equipment between batches, as even minor contamination can grow if left in the brewing vessel. In short, cold-brew should be handled like any perishable item served in a cafe.

"I think it's clear to most cafe owners and baristas that you don't leave milk out on the counter for too long or serve it past the expiration date, or you don't mix meat and salad ingredients on the same shelf in the refrigerator," says Julia Leach, president of Toddy. "Those sorts of basic insights about food safety apply to cold-brew."

After brewing, cold-brew should be stored in an airtight container in the refrigerator. The concentrate, Leach says, should stay fresh for up to two weeks if proper brewing and storage guidelines are followed, though if you add any other ingredients, use those as your benchmark.

"The milk is going to go bad before the coffee," Leach explains. "Sugar acts as food for microbes. You need to go with the lowest common denominator."

Using food-grade equipment also is critical. Equipment manufactured for food applications and certified by a trusted third-party—typically the National Sanitation Foundation (NSF)—must adhere to specific guidelines for cleaning and materials.

"Not all plastics are created equal," says Leach. "Not even all stainless steel is created equal. ... A lot of things you're going to find in a hardware store that might work for cold brewing, they're just not safe, and the reasons are somewhat obscure. It might be that the crevices are too tight and you can't clean it well with a scrub brush. Even things like a scratch on some equipment—maybe it's a coating that gets scratched off that might release some toxic material. Your selection of equipment should be very well thought through."

"Don't use unapproved cleaning products," adds Bill Bremer, principal at the regulatory consulting firm Kestrel Management. "You want to use cleaning products that are food-grade and won't contaminate the product if they happen to get into it. That may not make the product desirable to drink, but no one's going to get sick."

KNOW THE RULES

Food safety is a high-profile issue as the FDA continues to implement and fine-tune the Food Safety Modernization Act (FSMA), the first major piece of federal legislation addressing the issue since 1938. Which regulations apply to your business depends on a number of factors.

A small cafe serving its own cold-brew in-house will be regulated by its local health department, while a company selling cold-brew to other retailers could fall under federal regulations.

"Retail food establishments are exempt from FDA food facility registration," says Rick Barham, a food safety specialist with Registrar Corp, a consulting firm that assists businesses with FDA compliance issues. "FDA defines a retail food establishment as one whose annual monetary value of food sold directly to consumers is greater than the annual monetary value of food sold to all other buyers. So a small cold-brew coffee business can have up to 49 percent of its total annual sales to other buyers, which could mean other cafes, without having to register. If 50 percent or more of the business's total annual sales go to cafes and other non-consumer buyers, the facility will need to register with FDA."

For companies falling under FDA

regulations, there are three main categories of compliance, says Marc C. Sanchez, a Washington, D.C.-based attorney and regulatory consultant who works exclusively on FDA and USDA issues.

The first is registering with the FDA. (Most roasters already should be registered.) If you pasteurize your product, Sanchez adds, there is an additional registration.

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Cold Brewing Tea and Cascara

HILE FOOD SAFETY considerations are important for makers of cold-brew coffee, they're likely even more important for makers of cold-brew tea and cascara (made from coffee cherries).

Cold-brew equipment manufacturer Toddy has performed tests on both coffee and tea.

"We've seen some teas perform just as well as coffees in microbial growth, yeast, that sort of thing," says Julia Leach, president of Toddy, "but other teas ... were not fit for cold brewing." One in particular, she notes, was found to be highly conducive to microbial growth when cold brewed.

A number of factors are at play here. Some teas contain herbs, fruits or other ingredients that could be susceptible to foodborne pathogen growth. Even with cascara, which might possess some of the same antimicrobial properties as the coffee bean, it's difficult to ensure that any contaminants introduced during processing are killed without the heat of roasting.



"A lot of the institutions we talked to had no idea what a coffee cherry even was," says Slingshot Coffee founder Jenny Bonchak, of finding a lab to test her company's cold-brew cascara tea for quality and food safety. | Photo courtesy of Slingshot Coffee

Slingshot Coffee in Raleigh, North Carolina, produces ready-to-drink, cold-brew cascara tea in addition to cold-brew coffee. The food safety issues differ, in part, because "the pH level is different in cascara than it is in coffee," says Slingshot founder Jenny Bonchak. "We worked with Cornell University for quite a long time to come up with the proper recipe and process to produce the cascara."

Bonchak notes that research on cascara is extremely limited.

"A lot of the institutions we talked to had no idea what a coffee cherry even was," she says. "We ended up at Cornell because they did have some folks on their staff who were familiar with it."

"There are definitely great applications for cold brewing tea," says Leach, "[but] if you're brewing tea cold, you probably want to have some tests performed on your specific tea to make sure it is well-suited for cold brewing."

The second category is label review. This includes ensuring that required information—such as net quantity, statement of identity and other basic information—is present, but there are additional considerations as well.

"Food labeling mistakes are one of the most common violations of FDA regulations, and discovering a mistake after labeling thousands of products can quickly rack up costs due to recalls and/or reprinting," says Barham.

In addition, Sanchez cautions that the term "labeling" is defined in the Food and Drug Act as "anything that has a nexus to the product to explain or supplement the product," which includes a company's online communications. If you post a testimonial about your product on your website, Facebook page or Instagram account, for example, and that testimonial makes a health claim (asserting that the product is beneficial for a particular symptom or disease), or a structure/function claim (asserting that a product has some physical effect on consumers—such as "provides an energy boost"), or even retweet a comment making such a claim, that can be considered labeling.

The third category—good manufacturing practices (GMPs)—is probably the most critical, says Sanchez. GMPs set quality standards to ensure products are unadulterated, safe and appropriately labeled, including identifying allergens intended to be in the product and ensuring that allergens that should not be in the product are not present.

Especially challenging for many small businesses is the Hazard Analysis and Risk-Based Preventative Controls (HARPC) rule, which was finalized in September 2015.

"This rule requires all food firms that are required to register with FDA to establish science-based preventive control measures to reduce the risk of food contamination," Barham explains. Companies often are confused about the differences in requirements between a Hazard Analysis and Critical Control Points (HACCP) plan and the new HARPC plan, which includes the implementation of preventive controls, such as a supply-chain program, food allergen controls, sanitation controls and a recall plan, when warranted.

"The other change that would impact most businesses under the HARPC rule," Barham continues, "is that the GMPs have been updated to include mandatory training requirements and allergen controls to prevent cross-contact contamination."

There are exemptions and modified requirements for very small businesses, defined by the FDA based on annual sales, but some experts recommend complying

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Geoff Watts

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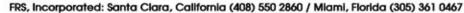






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The bottling line at Kohana Coffee. The company's shelf-stable concentrates and ready-to-drink beverages do not require refrigeration, and have a shelf life of 12 months. | Photo by Alva Wan

with the full preventive control rules rather than seeking an exemption because of the ongoing documentation required to maintain it.

Finally, Barham adds, "In terms of food safety, the greatest risk is a gap in compliance. You can have all the newest, ultracalibrated sanitation equipment and controls, but if there is a gap, such as an employee who didn't wash his or her hands before his or her shift, or one period where temperature controls were not effectively monitored, your whole production scheme is thrown off. Equipment has to be shut down and sanitized. You have to take corrective action and record it. You may even have to issue a recall. To sum it up, maintaining the integrity of your food safety system as a whole is the greatest risk for any company, small or large."

GFT YOUR DUCKS IN A ROW

There is no federal pre-approval process for beverages, Sanchez notes, unless the product is pasteurized. The FDA is required to perform "random periodic inspections," he adds, but there's no way to know when you will be inspected.

"They're supposed to get to facilities every one to three years," he says, "but the Congressional Research Office has found they're getting to facilities every seven to 10 years."

Still, both Sanchez and Barham recommend completing all the steps necessary to pass an inspection before launching your

"You could register with the FDA and have an inspection the following week," Sanchez says. If inspectors find minor violations, they will issue a warning and give you the opportunity to correct the violations within a specified time period. "If they find significant violations," he says, "they're going to issue a public warning letter, and they may even require you to recall product. If you don't have product liability insurance, that can be an expensive

Slingshot has been inspected on both the state and federal levels. While inspectors were most concerned with sanitation, Bonchak says, they also looked at storage temperatures and times, and made sure surfaces met the criteria for being "wipe-able," thermometers worked properly, and lights and light bulbs were properly covered.

"It's a laundry list of things," she says.

The FDA publishes a variety of documents to guide small businesses in food safety compliance and GMPs. Your local health department or state department of agriculture also should be able to provide guidelines, and food safety consulting firms can assist with compliance issues.

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basement of a local coffee shop. He now partners with a local brewery to produce and bottle his company's products. | Photo by Finnigan Delahanty



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46 roast July | August 2016 Cuvee Coffee, based in Austin, Texas, is currently building a new,

"To do it right, it's very expensive," says McGinn. "A lot of people have the dream of bottling their own cold-brew, like I had the dream in my basement, but I couldn't have made that

Much of the expense is directly related to food safety and spoilage. Most companies have their products tested by outside labs, often referred to as food process authorities, during product development and as an ongoing quality

"We do regular microbiology testing to test in-process and

finished products," says Aylsworth. "That's sent to a third-

party lab to ensure, on a consistent basis, that there are no pathogens or spoilage organisms in our cold-brew. ... We have

standard swabbing throughout production to monitor any

micro-activity, so there's quite a bit we do from a food safety

an annual audit. It really is multiple times daily that we're

and quality assurance perspective on a daily basis. It's not just

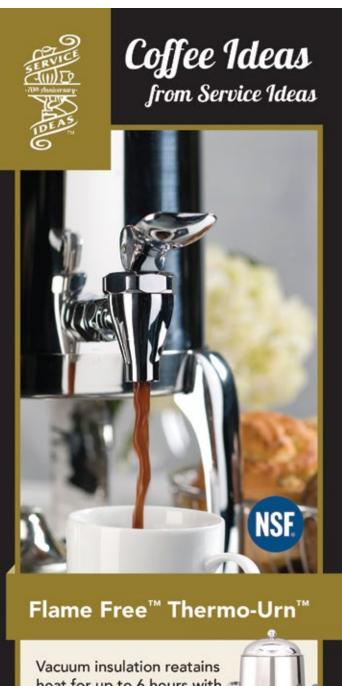
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"The majority of our costs this year were for research and development," says McGinn, whose company recently introduced a canned nitro cold-brew. "A new flavor costs us anywhere between \$20,000 and \$40,000 to research and develop." The company also has its own testing lab onsite to

analyze every batch it produces.

Cuvee Coffee founder Mike McKim echoes McGinn when he says, "To do it right, it's expensive."

Based in Austin, Texas, Cuvee is currently building a state-of-the-art brewery, which McKim estimates will cost \$1.5 million.

"Every time we change something, we send out a handful of samples in varying degrees of age, refrigerated and unrefrigerated, etc., and we get lab testing back," he says. Those test results have guided the design of Cuvee's new manufacturing equipment and production facility, which is expected to go online in 2017.



LOOKING AHEAD

A 2015 report by the market intelligence agency Mintel estimated a growth of 115 percent in cold-brew retail sales over 2014, with sales expected to reach \$7.9 million for the year.

"Growth has been steady since 2010, increasing 339 percent through estimated 2015," the report states, though it adds that cold-brew remains a small portion of the RTD coffee segment, "making up just 0.4 percent of sales in estimated 2015."

The growing category was the center of much discussion and debate at the Specialty Coffee Association of America's Re:Co Symposium and Expo in April, where participants seemed to agree that cold-brew has the potential to become a lucrative new avenue for specialty coffee sales. Still, it was widely acknowledged that more research is needed.

"We have just started to scratch the surface in terms of getting real data," Zuniga says. "We need more research to ensure not only a safe product, but a great tasting one."









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