

INGREDIENT TRENDS

Gut Check: Gauging the Potential of Probiotic Beer

Functional beverages—those that claim a positive effect, usually health-related—are booming. It's a challenging area for beer, legally and scientifically, but could gut-friendly, probiotic beers win people over? **BY COURTNEY ISEMAN**

WITH TODAY'S DRINKERS PULLED IN more directions than ever, brewers can stay the course with beer or branch out to seek new sales opportunities in such categories as wine, spirits, cider, or even malt-based ready-to-drink cocktails.

Yet there's another hot category in the drinks world, though it's a trickier one for alcoholic-beverage makers to navigate: functional beverages. The same rising wellness focus that's driving the growth of nonalcoholic beer also motivates shoppers to seek out drinks with electrolytes for energy, adaptogens for mental clarity, and probiotics for gut health, among other things.

Allied Market Research valued the functional-beverage market at \$110

million in 2020, estimating that it would hit \$200 million by 2030. And according to Innova Marketing Insights, beverages aimed at improving gut health make up the biggest portion of the functional-beverage market, at 26 percent.

Most of us may associate probiotics with yogurt and similar fermented foods, but they should be especially familiar to craft brewers. There are different genera of microbes touted as gastrointestinal aids, and one of the best known is *Lactobacillus*—the same often used for kettle acidification or included in mixed cultures.

So, does that mean it's within easy reach to brew a probiotic beer—and to tout its wellness benefits to potentially grab new

customers? The answer is complicated, both scientifically and legally.

In the liquid, probiotics face a ton of competition from other bacteria, hops' iso-alpha acids, and ethanol, so ending up with a beer that you're sure has some effective level of probiotics left is far from simple. Then, if you invest the time and resources into making a probiotic beer, marketing it is murky territory. To what degree can you communicate health benefits when you're selling an alcoholic beverage?

Here we speak with brewers, marketers, and experts on the science of fermentation to get more insight into the obstacles to brewing and selling gut-healthy beer.

TEST, TEST, AND TEST SOME MORE

Some lambic brewers and enthusiasts like to say that spontaneously fermented beer, for example, is good for the gastrointestinal system—specifically, the colon. However, the reality is more complex.

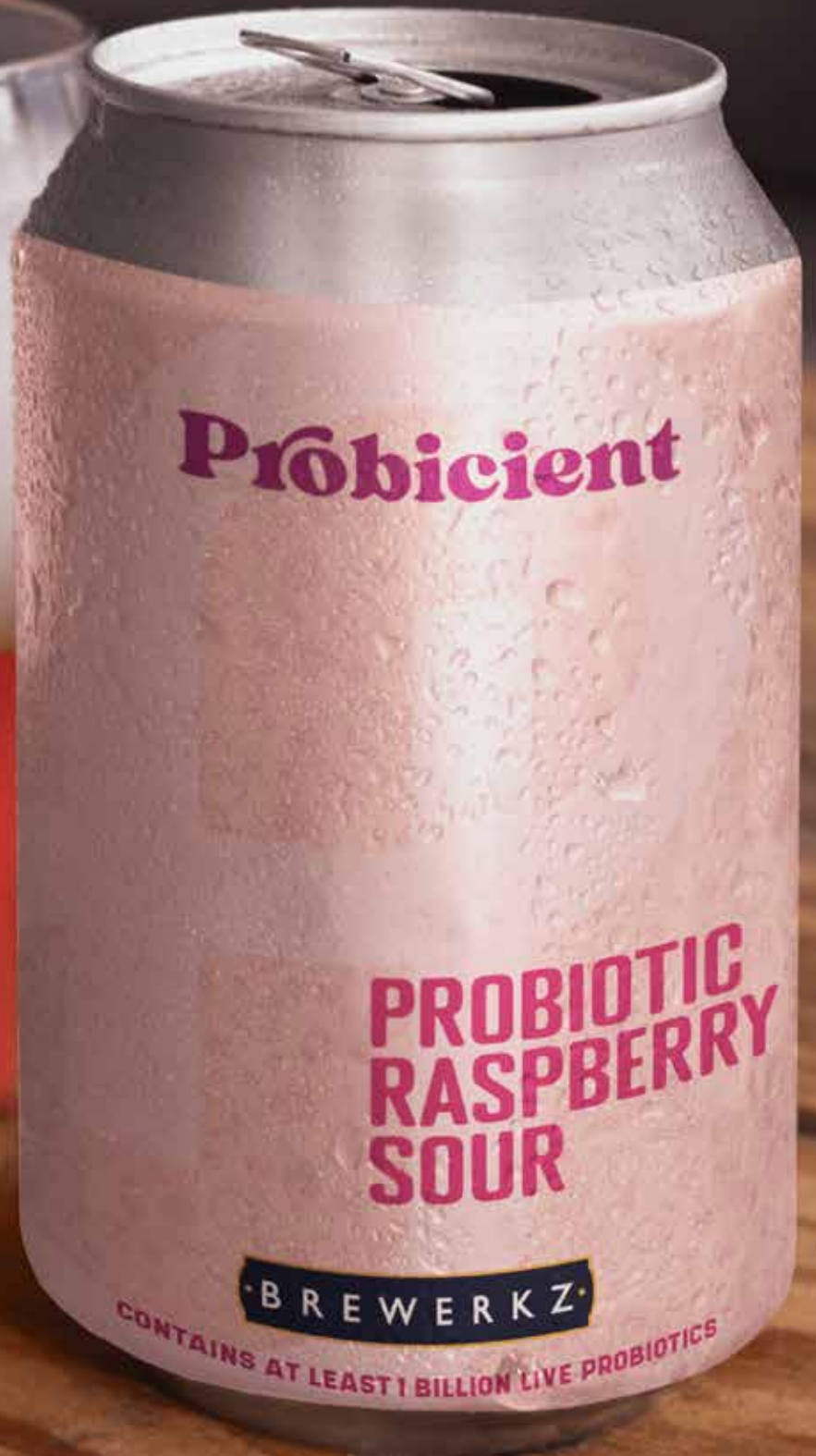
Gut-friendly *Lactobacillus* isn't the only microbe at work in spontaneously fermented beer, says Frances Tietje-Wang, cofounder and lead scientist at Fermly, a QA/QC consultancy for breweries.

"These beers are getting all kinds of bacteria—good gut bacteria, bad gut bacteria, everything in the atmosphere," Tietje-Wang

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Probiocient



Probiocient

**PROBIOTIC
RASPBERRY
SOUR**

BREWERKZ

CONTAINS AT LEAST 1 BILLION LIVE PROBIOTICS

“YOU DEFINITELY WANT TO HAVE YOUR ALPHA ACIDS STUPID LOW. A LOT OF AMERICAN SOUR BREWERS OXIDIZE THEIR HOPS TO GET RID OF THOSE OILS AND STILL USE THEM AS NATURAL PRESERVATIVE. ... IT’S A WAY OF NOT HAVING HIGH ENOUGH ACID TO KILL THE GOOD BUGS.”

says. “Probiotics can get out-competed by microbes better suited to be in the beer. Then, the moment you start having alcohol content, the pH starts to drop, and oxygen levels start changing. It all makes the space not great for a lot of bacteria to survive.”

Most probiotics thrive at a pH of around 4.5 to 6.5, Tietje-Wang says, and many beers lean more acidic—around 3.8 to 4.2.

Brewing a beer with a probiotic end-goal therefore requires manipulation, either in choosing the right inoculation strains and then testing, testing, testing, or by developing a process to add probiotics at the end—which still demands testing, testing, testing.

Brewers can zero in on a culture that promotes gut-friendly microbes—Tietje-Wang cites *Lactobacillus acidophilus*, commonly used in probiotic foods, for example—but to ensure consistent results and avoid cross-contamination, it would be wise to maintain separation from other beers. Quality-assurance testing can then ensure that the finished beer doesn’t contain any harmful bacteria that would defeat the purpose.

Whatever your method, testing is necessary to confirm that those probiotics are surviving the acidity and alcohol. To make any claims about probiotics in the beer, it would be best to be able to communicate which microbes are in there, and how much, and you’d have to test a batch over time to verify that the probiotics don’t quickly die off.

Take kombucha, for instance, says Laura Burns, R&D director at Omega Yeast. Kombucha brands, she says, “have to support a probiotic claim with the type of bacteria in there because that strain has to have shown some clinical benefits to human health. It also has to survive in the product. ... There has to be a lasting shelf life of these products.”

PROBIOTICS IN WILD ALES—PRESUMED, NOT GUARANTEED

Bold City Brewery in Jacksonville, Florida, occasionally releases a beer called Psychotic Probiotic—a mixed-culture

golden ale that spends at least a year in port wine barrels. However, head brewer Alex Johnson says the name isn’t meant to make any sort of wellness claim—instead, the idea is to draw attention to the beer’s complex fermentation.

That may be a path that other brewers could follow: Rather than explicitly touting health benefits, the word “probiotic” could be a way to convey the magic of fermentation, potentially engaging customers intrigued by the process.

Psychotic Probiotic is a passion project for Johnson. It began when he and a friend collected a handful of gold-standard, spontaneously fermented beers, from Cantillon to Jester King. They used those bottle dregs to inoculate the port barrel then racked fresh wort on top. He’s kept the barrel going for six years now, solera-style, pulling off all but five gallons once per year.

Instead of Bold City’s 20-barrel production system, Johnson uses a three-barrel pilot system to brew the wort, keeping the barrel apart. “I’m making this off-site and not having to worry about cross-contamination,” he says.

He also times the packaging of the beer to coincide with the cleaning schedule. “By the time the cycle comes around, I’m ready to do annual maintenance, revolving gaskets off tank,” he says. “Anything not stainless steel comes off after packaging, it all gets cleaned, and we get new rubber gaskets for everything.”

Because the goal isn’t to make claims about gut health, Johnson says they don’t test every batch to determine the viability of probiotic microbes in the beer. In the past, they have sent a crowler off to a lab to ensure some presence of probiotics, but it’s not economically feasible to do so for every batch.

However, he says he does aim to give probiotics their best chance of survival. “You definitely want to have your alpha acids stupid low,” he says. “A lot of American sour brewers oxidize their hops to get rid of those oils and still use them as natural

preservative. ... It’s a way of not having high enough acid to kill the good bugs.”

By using the name Psychotic Probiotic, Johnson says, the goal is to “convey the message this is a live beer, not a kettle sour fruited to hell. ... It explains to customers, ‘Yes, this has live culture in it, and also, you’ll have a good time drinking it.’”

If someone interested in probiotics finds and buys the beer, he says, that’s great—but Bold City is not marketing to a wellness crowd.

AN INTENTIONAL, CALCULATED APPROACH

Founded in 1997, Brewerkz is Singapore’s longest-running craft brewery, and it has a reputation for quality—winning Champion Medium-Sized Brewery of Asia twice, in 2022 and 2023, at the Asia Beer Championships.

Brewerkz produces two tart fruit beers explicitly promoted as probiotic: Red Billion, with raspberries; and Yellow Billion, with mango and passion fruit. The names are a nod to their ability to confirm one billion colony-forming units (CFUs) per serving. Head brewer Mitch Gribov says they have purposefully aimed to align these beers with functional-wellness beverages.

“In regions like Asia, this shift is becoming a significant market-driver,” Gribov says. “Probiotic beer taps into this trend by the enjoyment of beer with functional benefits, [appealing] to both wellness-oriented consumers like Gen Z ... and established beer drinkers who may be seeking a more mindful approach.”

It takes exacting methods to back up genuine gut-health claims. For Red Billion and Yellow Billion, Brewerkz collaborates with Probiocient, a company formed at the National University of Singapore to bring probiotic technologies to market.

Probiocient chief technical officer Chen Dai says that there were dozens of “scale-up brewing trials, shelf-life tests, and several rounds of sensory evaluation” behind the launch of Red Billion Raspberry Sour in March 2022. They released Yellow Billion about two months later. Since then, Gribov says they’ve sold about 200 hectoliters (170 barrels) of the probiotic beers.

Dai uses the word “probiotification” for the process of inoculating the beer with helpful microbes and ensuring their viability, describing it as “a major technological challenge.”

“Through evidence-based research, Probiocient’s technical team and NUS researchers ensure the probiotics’ survivability while maintaining the traditional methods of beer-brewing,” he says. Inoc-

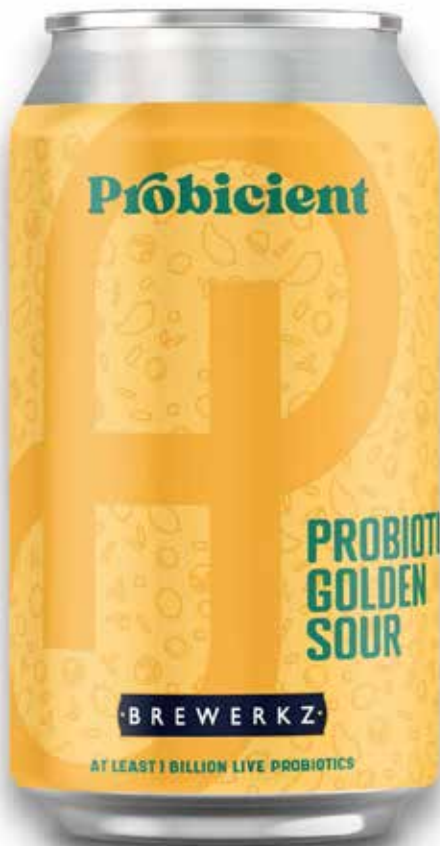
ulation is strategic, designed to guarantee certain results in terms of probiotic strain, amount, and shelf life.

“Both probiotic and brewer’s yeast are copitched and create a sort of symbiosis,” Gribov says. “The probiotics produce lactic acid while the yeast generates alcohol and carbon dioxide. It was not rocket science, but it took us more than a dozen attempts to find the golden ratio.”

Gribov credits NUS researchers for finding the right probiotic strain to survive the low pH and alcohol—the Billion beers are 4.5 percent ABV—while also proliferating to maintain the high CFU target. Brewerkz, for its part, worked on finding the right yeast strain, pitch rate, and pitching time, besides shaping the character of the final beers.

That last component is important; however rigorous the science, the gut-health claims won’t matter if the beer doesn’t taste great. “From a brewer’s perspective, the flavor comes first, and no magical properties will sell the beer if the flavor expectation is not met,” Gribov says.

Brewerkz appears to have met those expectations, with Red Billion winning a gold medal in the Sour Beer category at the 2024 Asia Beer Championships. More importantly, from a business standpoint, the beers are popular with customers in Singapore.



MARKETING CONSIDERATIONS

Getting the science right is one thing; selling a beer with purported health benefits is another. Marketing a beer as probiotic may work well enough in Singapore, but doing so in the United States presents a different sort of challenge.

“I feel like this is really toeing the line of claiming that a product that contains alcohol could bring physical health benefits in some way,” says Julie Rhodes, the consultant behind Not Your Hobby Marketing Solutions. “The TTB will allow health claims, but you really have to jump through a lot of hoops to get them validated.”

The evidence needed for health claims in a beer likely requires collaboration on the scale of Brewerkz and Probiocient, where experts help develop a system of what strain you’re using and why, when it’s being added, and ensuring its viability in packaged beer. For any brewery that gets to that point, Rhodes says she would recommend adding a panel of clear information on packaging.

“Consumers are used to reading labels for most consumer-packaged goods,” she says, “so I feel like that would be good real estate on a can or bottle, to explain the contents of the beer and how it could impact your health.”

When deciding whether the undertaking is worthwhile, consider your customer. Gribov, for example, says that Brewerkz saw Asian consumers shifting toward wellness beverages. Depending on your regional audience, it may make more sense to limit any wellness claims to nonalcoholic beer or hop water.

Functional beer “sounds like a classic answer searching for a question,” says David Bower, cofounder of beverage-marketing firm Bowerbird Strategy Partners. “There are wonderful beers out there, and wonderful probiotic foods and beverages. Is there a need to combine these two? We’ve seen this come up with hybridization, and the end result is a Frankenstein product no one asked for.”

Today’s American consumer is already used to shopping for beer for some occasions and functional beverages for others—the niche consumer base wanting both factors in one beverage might not be large enough to warrant the hurdles a beer making health claims will face.

Instead of marketing your beer as gut-healthy, for example, Bower cites a precedent of marketing a beer as *less harmful* compared to other alcoholic drinks—i.e., less alcohol, fewer calories, fewer carbs, more natural ingredients, and so on.

In that way, it should be possible to nod toward probiotics—Bold City’s Johnson

aims to bring attention to the fermentation process—while stopping short of any real health claims.

YES TO PROBIOTICS, NO TO ALCOHOL?

A final puzzle piece to consider is whether a more feasible route would be probiotic, nonalcoholic beer.

NA beer and functional beverages both occupy space that appeals to wellness-focused customers. Without alcohol, the minefield of marketing booze as healthy vanishes—and there’s no need to worry about alcohol killing off the probiotics.

That doesn’t mean it would be easy.

“The biggest challenge brewers face right now for nonalcoholic beers is ensuring microbial stability because of the bigger threat of foodborne pathogens making it in,” says Burns at Omega. “But if they could make sure that was tied up, they could potentially explore probiotics. The *Lactobacillus* provides acidity and could survive in the absence of ethanol, allowing the beer to be an acidified food—that is one of the barriers for food pathogens, making sure the beer is below a certain pH.”

The caveat, however, is that NA beers generally must be pasteurized to be food-safe. Thus, pasteurizing without killing off the probiotics may be the biggest hurdle, technically.

And, again, ensuring food safety as well as probiotic viability requires substantial testing. Rhodes also notes that NA beers fall under the purview of the FDA instead of the TTB, and the FDA has different rules about health claims.

“They would definitely need an ingredient panel and probably a QR code or similar vehicle to link consumers to the substantiated health claims verified by the FDA,” Rhodes says. “The FDA also has some pretty strict verbiage guidelines that they would need to adhere to.”

As functional beverages boom, it’s inevitable that some brewers will test the market—but the case of probiotic beer shows that it’s not as simple as kettle-souring or pitching a mixed culture with *Lacto*. On the other hand, there may be an avenue for smaller breweries that can’t afford extensive testing—assuming they also avoid any wellness claims.

Yet the category of functional drinks is relatively new, and craft brewers are fully capable of experimenting and developing new methods of brewing, testing, and marketing. Brewerkz is showing that probiotic beer can be successful, but any brewers who follow a similar path will want to be sure that customers would be interested in that mashup of function and beer.