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OCTOBER 2022, VOL.28, NO.6

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RECIPE INDEX

RECIPE STANDARDIZATION

EXTRACT EFFICIENCY: 65%
(i.e. — 1 pound of 2-row malt, which has a potential extract value of 1.037 in one U.S. gallon of water, would yield a wort of 1.024.)

EXTRACT VALUES FOR MALT EXTRACT:
liquid malt extract (LME) = 1.033–1.037
dried malt extract (DME) = 1.045

POTENTIAL EXTRACT FOR GRAINS:
2-row base malts = 1.037–1.038
wheat malt = 1.037
6-row base malts = 1.035
Munich malt = 1.035
Vienna malt = 1.035
crystal malts = 1.033–1.035
chocolate malts = 1.034
dark roasted grains = 1.024–1.026
flaked maize and rice = 1.037–1.038

HOPS:
We calculate IBUs based on 25% hop utilization for a one-hour boil of hop pellets at specific gravities less than 1.050. For post-boil hop stands, we calculate IBUs based on 10% hop utilization for 30-minute hop stands at specific gravities less than 1.050. Increase hop dosage 10% if using whole leaf hops.

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We use U.S. gallons whenever gallons are mentioned.

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Cover Photo:
Charles A. Parker/Images Plus

Q What is your dream mixed 6-pack of beer?

My dream mixed 6-pack of beer are mostly slow sippers. They include the following: Pliny the Younger from Russian River, Olde School from Dogfish Head, Edward from Hill Farmstead, Abraxas from Perennial Artisan Ales, Anabasis from Side Project, and Haze from Treehouse. I spend a lot of time reflecting and being introspective, so these beers are perfect for such pondering.

My desert island 6-pack is going to include some comfort beers. The kind mom used to make when I was growing up. So definitely there will be a Sierra Nevada Pale Ale. For nostalgia, give me Anchor Liberty. It still impresses me. I never would say no to classic Duvel Belgian Golden. Might want a good lawnmower beer in there too, so I'll take a Pabst Blue Ribbon. Going to need something before bed … Vintage Thomas Hardy's Ale. That leaves one more, which will be my default preference whenever I'm stuck. That is to ask my bartender/friend to pour something new I might enjoy. If I can plan my last meal, that would be my 6-pack.

I always enjoy mixed 6-packs where there are beers to compare, contrast, and learn from. The same IPA dry hopped with six different varieties. The same Belgian Pale conditioned with six different *Brett* strains, etc. The interaction of fermentation character and hopping in hazy IPAs is something that still lacks clarity. I'd love to see the same IPA, brewed with hops from the same lots, fermented with six different yeast strains! Really taste and smell differences between Conan vs. English vs. thiolized vs. ester-driven, etc.

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Brewing with Corn

Macro lagers aren't the only beers that benefit from the addition of corn (maize). Today's homebrewers can use corn as a unique ingredient to help make better beer just as you would use any other specialty malt or adjunct. Learn about the different forms and benefits corn can have on your homebrew. https://byo.com/article/brewing-with-corn/

MEMBERS ONLY

Dark Mild

Mild ales have a long and rich brewing history in England. Learn from Gordon Strong about its path to the modern take on the style and how to brew a top-quality mild in your homebrewery. https://byo.com/article/dark-mild-im-mad-about-mild/

Cheap and Easy Batch Sparging

While it takes more time than no-sparge brewing, batch sparging can often be done in less time than fly sparging. Learn the technique and how to build an inexpensive mash/lauter tun for batch sparging. https://byo.com/article/cheap-and-easy-batch-sparging/

MEMBERS ONLY

7 Great Group Projects

Being a part of a homebrew club allows homebrewers to participate in projects that would be difficult by oneself. We searched out seven of our favorite club projects and asked the clubs behind them to share the details. https://byo.com/article/7-great-group-projects/

MEMBERS ONLY

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MAIL

SOURCING SWEET BRIAR

In the May-June 2022 issue of *BYO*, the recipe in Paul Crowther's article "The Queen's Mead" calls for sweet briar or *Rosa rubiginosa/Rosa eglanteria*. Where did he get it? I can't find it anywhere. Frontier Herbs said they would put it in their catalogue but they don't ship to Canada.

Peter Helmer • *Okanagan, British Columbia*

Story author Paul Crowther responds: "I just picked some myself. I have a bush in my garden that I picked a couple of leaves from. For a 1-gallon (4-L) recipe I only needed a couple of leaves so even if you're scaling up to a 5-gallon (19-L) batch you'll only need a handful. I've seen specialist Etsy stores selling dried rose leaf too. If you're still stuck I'd just substitute more bay leaves."

In addition to Paul's advice, we'd recommend putting out a call on social media to see if any friends within driving distance have sweet briar growing on their property, as it is a pretty common, hardy plant. If you are really dedicated, you could always grow some yourself as many plant nurseries across North America (and elsewhere) sell it. In addition to the occasional historic mead recipe, it's also a pretty shrub to decorate the property with!

SOAKING OAK CHIPS

A while back I read an article and the writer referenced that one of their favorite dry hop/finishing vessels was gin barrels — yum! Typically gin is distilled in stainless steel but I am very interested to learn more. I am creating a pale ale (formerly finished and dry hopped with juniper berries) but I am very interested in the gin barrel comment.

Can you help me understand more about this? Could I soak oak chips in gin and "dry hop" with those? If yes, can you please give me some basic direction on how and when to do that, please? I'm excited to "follow your lead" and venture in this direction.

Chris Price • *via email*

Your idea of soaking oak chips (or other oak alternative products) in gin is exactly what we'd recommend. Follow the same process as you would with Bourbon . . . soak the chips in a Mason jar with gin

contributors

Paul Crowther is a beer writer and homebrewer based in Newcastle, England. He has a regular homebrew piece in *Pellicle Mag* and bylines in *Vittles* and *Ferment*. He enjoys pushing the boundaries of homebrew and making innovative and unusual new brews. Paul lives with his wife, son, and three rescue dogs. He is a keen gamer and loves long walks in the country. He can often be found wittering about beer and politics through his twitter persona the mad brewer (@themadbrewery).

Beginning on page 28, Paul takes a trip through the history of English mild with tips for brewing three distinctly different versions of the easy-drinking ale.

Vito Delucchi started homebrewing in the late 90s and really got into the hobby around 2009. Besides brewing new and classic styles, he really enjoys the competition side as well. This competitive spirit has resulted in a plethora of ribbons and multiple national medals over the years, and driven him to become a Beer Judge Certification Program (BJCP) certified judge. Vito has worked in the beer industry in several capacities, from teaching homebrewing classes and being a general manager at a beer distributor to being head brewer at a commercial brewery. He is also a past president of the Diablo Order of Zymiracle Enthusiasts (DOZE) homebrew club for several years.

Starting on page 34, Vito shares the nuts and bolts of canning your own homebrew (which requires zero nuts nor bolts — just aluminum cans and a seamer), plus a comparison of the single-can seamers on the market ideal for homebrewers.

Dr. Brad Smith is the author of BeerSmith homebrewing software, as well as host of the BeerSmith Podcast, blog, and forum. Brad has written over 500 articles on brewing, published over 260 podcast episodes, and also hosts the BeerSmithRecipes.com website featuring 1.6 million beer recipes. Brad is a retired Air Force Colonel, and holds a PhD in computer engineering.

In this issue, beginning on page 40, Brad gives the lowdown on lautering — a task that appears simple on the surface but has a very important job and can be more efficient if you know what you are doing.

THE BIG BOOK IS BACK

Get Your *BYO Big Book of Homebrewing* Today!

Homebrewers around the world have turned to the experts at *Brew Your Own* magazine for more than two decades. Now, the editors known for publishing the best information on making incredible beer at home have updated their brewing bible. In this edition, you'll find:

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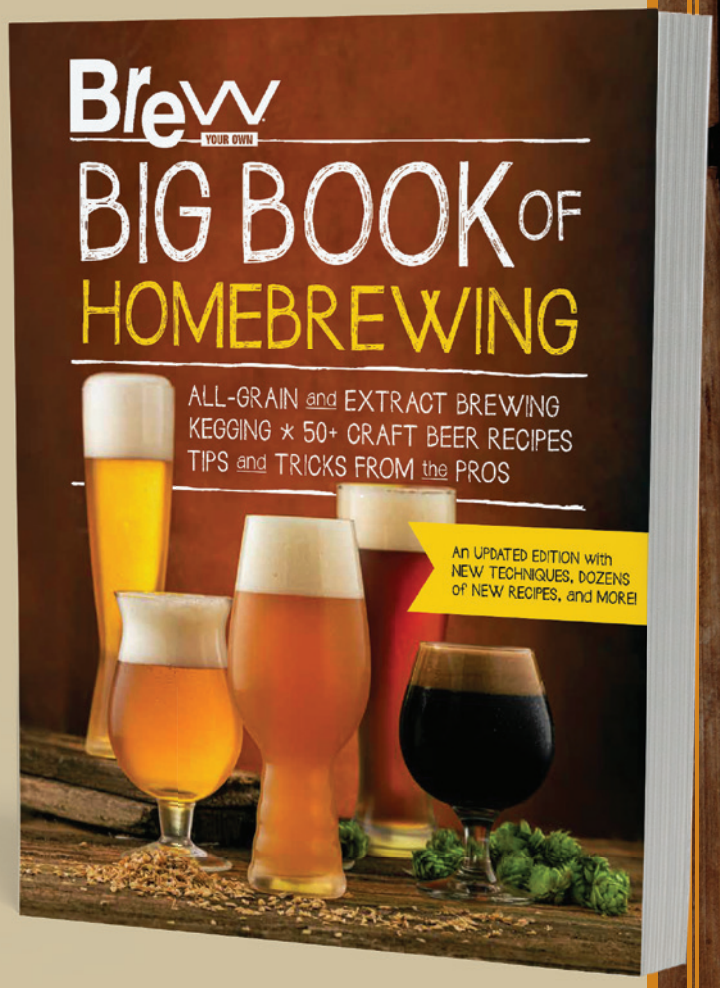

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Brew YOUR OWN — THE HOW-TO HOMEBREW BEER MAGAZINE

MAIL

(just enough to cover the chips) for a week or two and then add the chips (and gin, if you'd like) to the beer in secondary. You should get everything you're after from the chips within a week or two. If you go with oak cubes or something more substantial, then you may want to let taste be your guide on when to rack off of them (or pull the oak out) as they can continue contributing flavors for a longer period of time.

For more information, this story from 2019 has an IPA recipe that calls for chips soaked in gin and then wine (and a lot of other useful info on the range of oak alternatives available to homebrewers) that you may find helpful: https://byo.com/article/beyond-the-barrel/

HOP EXTRACTS

I love the weekly newsletter emails. Looking at a recent newsletter that includes the clone recipe for the Alchemist's Focal Banger, what HopShot™ are y'all recommending? I'm seeing everything from Columbus and CTZ, to "herbal" and "citrus." I would assume IBUs matter most, because bitter is bitter, but I didn't know if it really makes a difference when selecting between varieties (I've never used hop extract before).

Andrew Fields • *via email*

BYO *Recipe Editor Dave Green responds: "This recipe was written at a time before HopShots™ were hop variety specific. That said, a general bittering hop would be a good choice — CTZ or Warrior, something along those lines, but I agree that bittering would be the most important aspect. While Focal Banger and Heady Topper were considered 'juicy' and 'soft' back 10 years ago, by today's standard they are quite bitter when compared to the more modern juicy IPAs (though still not in the same realm of bitterness as many West Coast IPAs)."*

SHOUT OUT TO FERMENTATION INITIATIVE

I just got done reading the story in the May-June 2022 issue about local homebrew shops who are also breweries. Here in Tacoma, Washington we have Fermentation Initiative. They are great people always willing to help homebrewers, and they also brew a fantastic barleywine! I thought I'd make a point to let everyone know about them. Cheers!

Fred Fraase • *Tacoma, Washington*

Thanks for the tip, Fred! The story certainly wasn't intended to be all-inclusive, but we're happy to include this mention in with our "Mail" so the Fermentation Initiative can get some love. Next time we're in the area we'll have to keep them in mind. Who doesn't love a high-quality barleywine this time of year? BYO

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BEGINNER'S BLOCK

BY DAVE GREEN

BREWING WITH RYE

Along with barley, wheat, and oat; rye is one of the staple grains used by brewers. Today you can find it in many forms thanks to its popularity: Flaked rye, malted rye, crystal rye, and chocolate rye. Roggenbier is one of the most common styles to see rye associated with, but rye IPAs and American rye beers are not uncommon. Finnish sahti and other farmhouse styles are commonly associated with the use of rye as well. Of course, stylistically speaking, rye can make an appearance in a vast array of different beer types. For brewers, the grain comes with both positives and negatives, so there are going to be some best practices that will help guide your process when brewing with rye.

GRANULAR BACKGROUND

Some homebrewers that have been around a while may fear rye due to its association with stuck mashes — when during the lautering phase the wort coming out of the mash/lauter tun is cut down to a trickle. A stuck mash creates an especially long brew day . . . so it's no wonder that some folks who have had a bad experience may avoid it.

Rye is a huskless grain that provides plenty of beta glucans, highly viscous cereal gums/compounds, when mashed; a combination that makes it especially difficult to work with in traditional lauter tuns. But there are two easy workarounds for this: Rice hulls and brew-in-a-bag (BIAB) systems. Rice hulls can be purchased from homebrew supply shops or from many garden or farm supply stores. They're cheap and highly effective at creating micro gaps in your mash for wort to move. They can be helpful in both brew-in-a-bag systems and traditional lauter tuns. I like to add mine to the bottom of the mash tun before adding the grains to try to have the highest concentration of hulls near the false bottom after mixing the mash. And I will use up to 1 lb. (0.45 kg) in a 5-gallon (19-L) batch when brewing with a high percentage of rye, like a roggenbier, where the mash can be over 50% rye malt.

Those who already use a BIAB system are at a particular advantage when it comes to dealing with viscous and huskless grains like rye. The ability to quickly drain wort out from the bag may make some homebrewers who still use a 2- or 3-vessel system give the spargeless option a try when working with a higher percentage.

RYE'S GUYS

When it comes to adding rye character to your beer, rye malt is what you want to reach for. Opinion on rye malt character varies, but generally you will hear about zesty/peppery notes, adding a little sharpness, and even a fruity quality. In brewing rye IPAs, I always like to add a little Chinook hops to the flavor and aroma profile as I've found it complements rye malt nicely. Rye malt will also add to the body and mouthfeel of beer.

It will be a little bit darker in color compared to your standard pale barley malt . . . closer to Vienna malt. If you crush your own grain, you may want the crush gap setting a little tighter since it is a narrower grain. Rye malt can add a gummy character to beer along with a haze, so generally I use 20% or less when brewing with rye malt, with roggenbier being the lone exception. And I always add rice hulls when my grain bill is more than 10% rye malt just to be on the safe side.

Flaked rye has a slightly milder flavor impact compared to the malted version. The main reason brewers may use the flaked version over the malted is in building a beer's body while adding a slight rye flavor. Most of the rules that apply to rye malt apply to flaked rye as well.

There are a few specialty rye malts such as chocolate rye malt, which is actually more traditionally used in certain breads, but can be substituted for chocolate barley or wheat malts in brewing. Since this grain is huskless, it doesn't have the astringency that some chocolate barley malts provide. I recommend trying it in your next Czech dark lager.

Several maltsters will also provide brewers the option of a crystal rye malt. The production process and roast level of the crystal malt will dictate the flavor impacts on the beer. Some of the product descriptions include toffee, licorice, dark fruit, spicy, and "great for red ale production." On another positive note, both chocolate and crystal rye malts can be utilized by extract brewers to get a little rye character into their beer without needing to mash.

THE RYE-T STUFF

If you are interested in producing a roggenbier of your own, I highly recommend Gordon Strong's "Style Profile" found in the September 2020 issue or here: https://byo.com/article/roggenbier-a-rye-twist-on-a-dunkelweizen/

One of my favorite uses of rye malt is in an American pale ale. It's nothing fancy, but a 15% swap out of the 2-row pale malt with rye malt adds a certain complexity that I enjoy. Some light crystal malt (~40 °L) is added for a bit of sweetness to balance the rye addition. As mentioned earlier, I'll use Chinook hops at the end of the boil (roughly 25% of the final hop addition) along with Centennial and Amarillo® hops (or a good aroma combo I have on hand). Ferment it with a favorite ale yeast of yours, maybe Conan or Chico strain. One of my favorites is the Anchor ale strain. Happy brewing!

BYO POLL RESULTS

2022 BREWING GOALS

As the days grow shorter here in the Northern Hemisphere, many homebrewers' minds shift from crisp summer brews to more filling beer styles. We asked our social media followers what beer style(s) they are looking to brew this fall.

Jay Rich: I have a saison going now, next is likely a schwarzbier, then a fresh-hop beer with homegrown hops. Also, I have stuff for an imperial stout ready to go.

Kiev Rattee: Fresh-hop beer with my home-grown Cascade cones.

Daniel Kanter: Hazy IPA

Dragos Nastase: A Märzen of course!

Dre Bourbon: Another vote for Märzen

Christopher Thomas Constantino: Rauchbier

David Taylor: Wet-hop amber ale

Ashton Lewis: I'm not able to homebrew again until sometime after the 2022 hop harvest is complete, so that means something festive using this year's hop crop!

@Tuguerhawk: S'mores Milk Stout is first. But I do still have a case of my Pumpkin Ale from last fall. Also, Backin Back IPA and 11:00 Kick-off, which is a breakfast stout, for our Iowa Hawkeyes tailgate parties!

@MrPatch3: Thinking I'll start with a wheat ale.

@RouletteRun: I've got an American pale ale in the fermenter right now that I mash hopped. As soon as that leaves the fermenter, I'm brewing a Lutra Festbier, then I'm brewing my Sweet Potato Ale.

@Gutenhiemer: Going for a Dortmunder Export!

@PDXUBrew: Fall beers are coming. These are getting brewed today: Summer's Not Over Dammit, a British golden ale; and Yuzu American Pale Ale.

Will7299: Festbier, probably a Märzen or some other amber lager.

closetbeer: Bell's Amber clone. Thinking about doing two batches, one with Cosmic Punch or another thiolized yeast, just to see how the Cascade hops react comparatively.

daubringerhaellche: Historical Wiener Märzen

brian.w.welch: Just brewing a festbier today.

WHAT'S NEW

THE CLOVER IMMERSION WORT CHILLER

Available in both 5-gallon (19-L) and 1 gallon (4-L) batch-size options, the new Clover chiller from Craft A Brew has a specialty design meant to minimize temperature gradients and maximize your water's chilling capacity when using an immersion-style chiller. While the rate of chilling will be dependent upon your wort temperature and the chiller water temperature, the copper's 25 ft. (7.6 m) of ⅜-in. (9.5-mm) OD tubing and special design will deliver fast results to maximize your cold break material. https://craftabrew.com/products/clover-copper-wort-immersion-chiller

OXYGENATION KIT

Oxygen is a key resource for the healthy reproductive growth of yeast cells during the early stages of active fermentation when either re-pitching yeast cells or using liquid yeast strains. Spike Brewing has released a new oxygenation kit that allows homebrewers to use a hardware store bottle of oxygen and it delivers that oxygen in a precise manner thanks to a flow control meter. Hardware store tanks can last up to 2 hours of total use. There is an optional carbonation stone that can be purchased for use on conical fermenters. https://spikebrewing.com/products/spike-oxygenation-kit

HOPHAZE®

It can be a challenge for many brewers wanting to keep their hazy beers hazy over time. A new product from John I Haas is aimed at forming haze-stable beers that can remain so for the beer's lifespan. HopHaze® is a 100% hop-derived product that will add little to no flavor or odor to your beer and it allows brewers to adjust their level of haze based on quantity added. It's a low-viscosity liquid, does not cause beer loss, and no periodic agitation is needed. https://www.johnihaas.com/hop-haze/

Photo courtesy of Yakima Chief Hops

GROWING ENVIRONMENT AFFECTS HOP CHARACTERISTICS

Winemakers have talked about a specific grape vineyard's *terroir* playing a large role in the final wine's characteristics for centuries. Now it's hop growers' turn to show that *terroir* also plays an outsized role in the chemical make-up of hop cones grown in different regions and soils. Researchers from Oregon State University published a study that compared hop varieties grown in Oregon's Willamette Valley to the same varieties grown in Washington's Yakima Valley. They performed qualitative analysis on Cascade hops and Mosaic® hops taken from 39 hop farms within those regions. They found significant aroma profile differences comparing not only the raw hops, but also in beers brewed with hops from the two regions. They also performed chemical analysis and the data agreed with the sensory panel's findings. This study built upon a previous one that had looked at hop farms just within the Willamette Valley and had shown similar discrepancies among the hops at the various locations. https://today.oregonstate.edu/news/growing-environment-impacts-aroma-hops-and-beers-brewed-them-oregon-state-study-finds

Upcoming Events

GREAT AMERICAN BEER FESTIVAL

October 6–8, 2022

The Great American Beer Festival returns after a two-year hiatus due to COVID-19 restrictions. This massive celebration of all-things U.S. craft beer is also turning 40. Once again taking place in Denver, Colorado, the 2022 GABF will see 500 breweries pouring over 1,500+ unique beers. Discover new trends, funky projects, and rediscover old favorites. https://www.greatamericanbeerfestival.com/

EARLY BIRD DISCOUNT DEADLINE

October 10, 2022

Save $100 when you register by October 10 for 2022 NanoCon Online, which takes place November 4–5 2022. This is also the deadline for attendees with a U.S. mailing address to receive a NanoCon Goodie Box. Get your questions answered live by speakers, meet and learn from fellow attendees, and talk with vendors specializing in the small-scale Nano brewing niche. http://NanoCon.beer

BYO REPLICATOR

BY DAVE CLARK

DEAR REPLICATOR, My wife and I used to live outside of Chicago, Illinois and made it a habit to venture to Green Bay, Wisconsin at least once a year. Titletown Brewing Co's Green 19 IPA is very much to our liking and it also makes a pretty good black IPA when half-and-half'ed with Titletown's Dark Helmet Schwarzbier. We now live in the Denver, Colorado metro area and can't as easily travel to Green Bay, but as the homebrewer in the house, I would love to replicate Green 19 at home.

Markus P. Hagmann
Aurora, Colorado

Green Bay's Titletown Brewing Co. celebrates the city's rich history of blue-collar folks who loved hard work, community, and, of course, a great beer or two at the end of the work day. The brewery itself can be considered a living, breathing time capsule that easily transports today's craft beer drinkers to a time and place where their grandparents and great-grandparents gathered and celebrated life's biggest moments, likely over beers.

YESTERDAY AND TODAY

The first trip through time took place when Titletown Brewing Co. purchased and renovated a building at an old train depot originally constructed in 1899, the historic Chicago & Northwestern Railway passenger depot. The spot could be considered the social gathering place of the area from the time of its construction until the depot was permanently shut down in 1994.

In December 1996, Titletown opened its doors and this bustling brewpub quickly became a community favorite. As popularity grew, it didn't take long to max out its 15-barrel system, even without any outside distribution. In 2014, the company expanded by purchasing and renovating another historic facility, the former Larsen Canning building adjacent to the original location. The new location enabled the brewery to purchase larger brewing vessels (now a 30-barrel system), which allowed for distribution within the state of Wisconsin for the first time. 2014 also saw the addition of Jed Petrie, Titletown's current Brewmaster, originally brought on as the "lab guy" in charge of quality control.

Along with the full-production brewing system, Titletown added a taproom on the ground floor, as well as an indoor/outdoor "roof-tap" biergarten on the top of the building. The pandemic struck just as the new facility was taking shape, straining the brewery's resources greatly. Titletown persevered, and once the pandemic eased, fans of the brewery came back in droves, once again making this communal area in downtown Green Bay a hot spot.

BOTTLING VS. CANNING

The company bottled its beers for the first six years before adding cans to the mix. Today, 100% of their distribution is in cans, which is better for both the beer and the company's financials.

"Canning is so much better for the beer," said Petrie. "Cans hold up longer than bottles due to less oxygen and light intake. Cans are easier to store and ship, and it helps with date codes. Cans are, hands down, superior to bottling when it comes to distributing quality beer."

TITLETOWN BEERS

A brewery doesn't achieve huge popularity without a lineup of solid beers. Year-round beers include Dark Helmet Schwarzbier (a dark lager), Boat House Pilsner (a Czech-style Pilsner), 400 Honey Ale (a golden ale with local Wisconsin honey), Johnny Blood Red (an Irish-style red ale, and a personal favorite of Petrie), as well as Green 19 IPA (an India pale ale that, according to Petrie, was ahead of its time).

GREEN 19 IPA

"We wanted to emphasize the fruity, citrusy side of the IPA spectrum without being over the top with bittering," said Petrie. "For many years, Green 19 IPA was made with just enough bitterness to balance the malts and not overpower, something you see out of many IPAs today. When it came to competitions, however, the low-level bitterness put Green 19 a little out of style because it wasn't oppressively bitter. The beer is balanced and you can taste the piney and grapefruit character that comes from the Citra® and Cascade hops."

Created around 2005, Green 19 was originally named Hopasaurus Rex. The beer's recipe has morphed somewhat over the years, but was always a modern IPA before its time. Green 19 has traditionally employed either a small 60-minute hop addition, or at times, none at all. Trading bitterness for hop flavor, balance is the goal, especially with generous additions of caramel and Victory® malt that provide additional body, color, and balancing sweetness.

"The specialty malts help provide a bit of a nutty character to the beer; a perfect counterpoint to the citrus and piney hop flavor," said Petrie.

Today, Green 19 checks in at 6.5% ABV with 55 IBU, still on the low end for an IPA. "It's all about adding the right hops at the right time," said Petrie.

While IPAs usually hit the spot paired with fried foods, Petrie's dish of choice is a juicy ribeye.

"I find that enjoying a delicious steak and washing it down with a Green 19 IPA really brings out the best flavors in both the steak and the beer," said Petrie.

Before you fire up the grill or get out your deep fryer, be sure to brew up your own batch of this Green 19 IPA clone and let the hop flavors bring out the best with your favorite food pairing.

TITLETOWN BREWING COMPANY'S GREEN 19 IPA CLONE

(5 gallons/19 L, all-grain)
OG = 1.060 FG = 1.014
IBU = 50+ SRM = 8 ABV = 6.2%

INGREDIENTS

11 lbs. (5 kg) pale ale malt
10 oz. (284 g) Munich malt (10 °L)
7 oz. (198 g) biscuit malt (35 °L)
4 oz. (113 g) CaraMunich® Type 3 malt (60 °L)
7.8 AAU Horizon hops (60 min.) (0.6 oz./17 g at 13% alpha acids)
7.8 AAU Chinook hops (15 min.) (0.6 oz./17 g at 13% alpha acids)
1.1 AAU Citra® hops (15 min.) (0.1 oz./3 g at 11% alpha acids)
1.1 AAU Cascade hops (8 min.) (0.2 oz./6 g at 5.4% alpha acids)
5.9 AAU Chinook hops at (8 min.) (0.45 oz./13 g at 13% alpha acids)
1.7 AAU Citra® hops (8 min.) (0.15 oz./4 g at 11% alpha acids)
0.66 AAU Horizon hops (8 min.) (0.05 oz./1.4 g at 13% alpha acids)
2.4 AAU Cascade hops (1 min.) (0.45 oz./13 g at 5.4% alpha acids)
5.9 AAU Chinook hops (1 min.) (0.45 oz./13 g at 13% alpha acids)
2.2 AAU Citra® hops (1 min.) (0.2 oz./6 g at 11% alpha acids)
0.66 AAU Horizon hops (1 min.) (0.05 oz./1.4 g at 13% alpha acids)
8.6 AAU Cascade hops (0 min.) (1.6 oz./45 g at 5.4% alpha acids)
5.2 AAU Chinook hops (0 min.) (0.4 oz./11 g at 13% alpha acids)
2.8 AAU Citra® hops (0 min.) (0.25 oz./7 g at 11% alpha acids)
3.3 AAU Horizon hops (0 min.) (0.25 oz./7 g at 13% alpha acids)
0.9 oz. (26 g) Cascade hops (dry hops)
0.2 oz. (6 g) Chinook hops (dry hops)
0.65 oz. (18 g) Citra® hops (dry hops)
0.45 oz. (13 g) Horizon hops (dry hops)
SafAle US-05, Wyeast 1056 (American Ale), or White Labs WLP001 (California Ale) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Mash in with 15.4 qts. (14.5 L) of water to achieve a mash temperature of 150 °F (66 °C). Add phosphoric acid to adjust pH to 5.2–5.3. Hold for at least 30 minutes or until fully converted. Raise temperature to 168 °F (76 °C) for mash out. Vorlauf until runnings are clear. Collect wort; sparge until reaching 6 gallons (23 L) in the kettle.

Boil for 60 minutes with the above hop additions. Add hot water (while wort is still at or near-boiling temperatures) to adjust gravity to 1.060, then whirlpool for 20 minutes. Rapidly cool the wort to 65 °F (18 °C). Thoroughly oxygenate wort if using a liquid yeast strain, then pitch yeast. Ferment at 65–66 °F (18–19 °C). Once primary fermentation has slowed significantly, add dry hops. Four days after dry hopping, crash temperature to 35 °F (2 °C), but only when confident fermentation is complete. Carbonate to 2.6 volumes.

TITLETOWN BREWING COMPANY'S GREEN 19 IPA CLONE

(5 gallons/19 L, partial mash)
OG = 1.060 FG = 1.014
IBU = 50+ SRM = 8 ABV = 6.2%

INGREDIENTS

5.88 lbs. (2.67 kg) Briess CBW® Pale Ale dried malt extract
10 oz. (284 g) Munich malt (10 °L)
7 oz. (198 g) biscuit malt (35 °L)
4 oz. (113 g) CaraMunich® Type 3 malt (60 °L)
Follow hop schedule & yeast options from all-grain recipe

STEP BY STEP

Mash in with 2 gallons (7.6 L) of water to achieve a mash temperature of 150 °F (65.6 °C). Place the crushed malts in a muslin bag and mash for at least 45 minutes or until fully starch is fully converted.

Once mashing is complete, remove grain bag and let the liquid drip out without squeezing the grains. Raise the temperature to near boiling. Remove pot from heat source and add half of the total malt extract slowly, stirring constantly. Bring to a boil. Boil for 60 minutes with the indicated hop additions. Taking the pot temporarily off the heat source, stir in the remaining malt extract very slowly with 5–10 minutes left in the boil, then return to heat source. Meanwhile, pre-boil 3.5 gallons (13.3 L) of water, and chill it as close to 65 °F (18 °C), to later top up your wort.

When boil is complete, whirlpool for 20 minutes. Rapidly cool the wort to 65 °F (18 °C). Top up the wort by adding the pre-boiled water. Thoroughly oxygenate wort if using a liquid strain, then pitch yeast. Ferment at 65–66 °F (18–19 °C). Once primary fermentation has nearly ceased, add dry hops (on or shortly after day 7). Four days after dry hopping, crash temperature to 35 °F (2 °C), but only when confident fermentation is complete. Carbonate to 2.6 volumes.

TIPS FOR SUCCESS:

Don't get stressed out if your brewing program comes up with wildly different IBU calculations. When there are this many hop additions, variance is bound to happen. Following Titletown Brewing Company's recipe will produce a very aromatic and flavorful hop character in your beer, with only a moderate level of bitterness. Of course, if the alpha acid numbers on your hops are much different than those listed, adjust your quantities accordingly. The key to a successful brew is ensuring your hops are as fresh as possible and from a trusted source. BYO

BY ASHTON LEWIS

CARBONATING THOUGHTS

Also: Star San water temperature and sprouted grains

Q CAN I "BOTTLE CONDITION" MY HOMEBREW IN A 1-GALLON (3.8-L) KEG OR GROWLER?

CHRIS MORROW
MILLEDGEVILLE, GEORGIA

A This is a great question and one I always like answering. Beer can be conditioned, a.k.a. naturally carbonated, by capturing carbon dioxide produced by yeast in a conditioning tank, bottle, can, or keg. The most common home method of conditioning is in bottles, hence the general term bottle conditioning. In past discussions about this method, I have focused on the how. This answer is going to focus on the safety aspects of "bottle" conditioning, starting with keg conditioning.

Kegs are great for a variety of reasons, including convenience, minimal packaging labor, relatively low cost, and their safety features. Most homebrewers and beer consumers don't think much about pressure safety when it comes to beer kegs because we very rarely hear about exploding kegs. Commercial beer kegs are not only designed to withstand pressure much greater than that used for beer dispense, they are also built with an integral rupture disk to prevent explosions. Beverage gas regulators also include a pressure relief device that vents gas pressure above ~55–65 psig. This gives commercial-style kegs three levels of protection. Cornelius kegs used by most homebrewers have a pressure relief valve on the lid (the thingy with the pull tab) and are also protected by the beverage gas regulator; still a belt-and-suspenders level of safety! Outside of gross negligence, there is not much that's going to cause a keg to blow up. Plastic kegs are a different product and all brewers need to know about their kegs because plastic kegs have exploded and resulted in at least one death. That's a topic for another day.

Bottles are different than kegs because glass bottles do not contain relief valves and do indeed have pressure limits that are sometimes exceeded. But like kegs, we don't hear too much about bottles exploding in the commercial marketplace. The rate of bottle failures is likely higher for homebrewers who don't have labs or packaging quality assurance measures. Most commercial beer is carbonated before packaging or bottle-conditioned to a level that aligns with the pressure rating of the bottle because no one is keen to blow up glass beer bottles. However, there have been some high-profile bottle failures in the market associated with diastatic yeast, high levels of fermentables in fruit beers, and some near-misses related to hop-creep. In all of these examples, beer carbonation levels resulted in pressures exceeding the bottle pressure ratings.

What about growlers? Well, most of the growlers used to fetch beer from your favorite local places that do growler fills are not rated for any internal pressure greater than atmospheric.

Let's pause here and review a few carbonation basics. Most beers in the world contain about 2.5 volumes of

Kegs are great for a variety of reasons, including convenience, minimal packaging labor, relatively low cost, and their safety features.

Photo by Christian Lavender

Homebrew draft systems provide users a level of safety in the form of pressure relief valves.

carbon dioxide, or about 5 g/L. The equilibrium headspace pressure of beer at 38 °F (3.3 °C) containing 2.5 volumes of carbon dioxide is about 11.25 psig; it doesn't matter if the beer is put into a bottle, can, keg, or serving tank, the pressure needs to be 11.25 psig to satisfy the level of carbonation at this temperature. Because packaged beer is in a sealed container, pressure increases with temperature. The carbon dioxide contained in the beer in this example increases the headspace pressure to 29 psig when the beer is warmed to 68 °F (20 °C), and then to 56 psig when the beer temperature rises to 104 °F (40 °C). (Note that this does not appear like a linear relationship because we normal folk use gauge pressure instead of absolute pressure.) Technical details aside, a hot bottle of beer is packing about 95 psig of pressure if the carbonation is pushed to 3 volumes (6 g/L) and the temperature rises to 122 °F (55 °C) in the back seat of your car on a hot and sunny summer's day.

Back to your question. There are no safety concerns at all to condition in a keg, even if you somehow managed to over-carbonate your brew and heat it up 122 °F (50 °C). And if your hot, gassy beer is in a Corny keg you may have some beer foam in your car when the relief valve blows, but nothing more than a beer mess. The same beer in a growler? No bueno! Depending on the type of bottle and its history (new versus used), that hot bottle in your car may up and explode. And if that does happen, just hope you are not in the car.

Here are a few factoids that I hope will help folks with glass safety:

1. Screw-top growlers are intended for short-term transfer of beer from tap, back to a refrigerator, and into a glass. Tales about cold growlers of ale blowing up in the fridge are not something floating around the web, so it's safe to say that this is not a problem.
2. Growlers are known to burst in cars when beer tourists are hauling home precious pints, take a long pit stop for lunch, and return to their car only to discover a pool of beer and shattered glass in the back seat.
3. Heavy-duty growlers are really just large versions of re-usable flip-top bottles. These containers are made from much thicker glass than growlers and are designed to contain carbonated liquids over a wide-range of pressures, including the high temperatures used for pasteurization. No problems bottle-conditioning in these types of containers.
4. For all practical purposes, liquids are non-compressible. However, liquid density does change with temperature because liquids do expand with temperature. This is why bottles should never be filled completely full. Although the effect of temperature on volume is negligible, for example 1.000 gram of water occupies 355.000 mL at 4 °C (39 °F) and 355.331 mL at 70 °C (158 °F), a bottle of beer without headspace can result in bottle failure when no headspace is available for expansion. Easy enough, just don't fill a flip-top full and expel all gas when closing . . . accidentally been there, done that, and can attest to bottle failure within an hour as the beer warmed.
5. Re-used glass bottles fatigue with time, especially if they are heated to sanitize. Commercial bottling lines designed for use with returnable bottles use in-line scanners to detect fissures in glass that are signs of fatigue and reject these bottles before the filler. Homebrewers don't have glass scanners, so it's a good practice to visually inspect bottles. When I began homebrewing, returnable glass bottles were common and we would collect good-looking bottles for use at home. One-way glass bottles are the norm these days and are not designed to be used multiple times. Bottle failures are much more problematic when these single-use bottles are used for homebrewing.

The last thing I will say about glass safety relates to eye protection. Wear safety glasses whenever using a counter-pressure bottle/growler filler! Wear safety glasses or face-shield and gloves if a bottle-conditioned bottle/growler blows up and you decide to open all bottles from that batch. Assuming that all bottles/growlers were filled from a bottling bucket dosed with priming sugar, it's a safe assumption that all bottles contain about the same pressure. If one bottle/growler failed, others may follow and you do not want to be near a bottle when it fails without proper protection. Brew safely and happiness will follow!

Q A FRIEND AND I WERE RECENTLY BOTTLING SOME HOMEBREW TOGETHER AND WE FOUND OURSELVES HAVING A BIT OF A DEBATE. I HAD MIXED THE SANITIZER (FIVE STAR STAR SAN) INTO HOT TAP WATER. HE TOLD ME THAT I SHOULD BE USING COLD WATER. DOES IT MAKE A DIFFERENCE? IF SO, WHY?

JIM WIGGINS
SAVAGE, MINNESOTA

A Star San is in the family of sanitizing detergents known as acid-anionic surfactants. These solutions typically contain an acid, such as phosphoric or lactic acid, and a surfactant. In the case of Star San, phosphoric acid is combined with the surfactant dodecylbenzenesulfonic acid (DBSA). Let's get the debate settled before digging deeper; both of your methods work just fine! Acid anionic sanitizers do their job over a wide range of temperatures and do not rely on heat for their efficacy. No precautions related to temperature are indicated in the Star San safety data sheet (SDS).

I want to address a more general question: What are acid-anionic surfactants and where are they used? In general terms, these compounds are negatively charged (anionic)

molecules that have a hydrophobic end and a hydrophilic end. It's the combination of hydrophobic (water repelling) and hydrophilic (water attracting) properties in a single molecule that give these compounds excellent dispersion properties as well as making them foamy. This just sounds like a garden-variety detergent, so what about the sanitizer function? While DBSA is an excellent detergent, its tendency to disrupt cell membranes with its hydrophobic molecular tail also provides broad-spectrum antibacterial properties. One downside to DBSA is that it is not as effective in killing yeast and molds. Acid-anionics are used in a wide range of applications, including food and health care, because they are safe, effective, and have residual activity. These properties make products like Star San similar to quaternary ammonium compounds, aka quats or QACs, but unlike quats, acid-anionics typically do not damage beer foam.

Two handy properties of DBSA are its stability during storage and its compatibility with stainless steel. This means that clean solutions can be stored in stainless steel fermenters, kegs, or brew kettles and used in the future. pH is the key parameter to check because DBSA loses its antibacterial properties when the pH rises above about 2.5. In general, if the solution looks clear, was properly dosed when originally made, has not been diluted with water, and has a pH less than 2.5, it is good to go. Looks like you guys can trade beers and call this debate a draw!

Q I HAVE BEEN SEEING ROLLED, SPROUTED GRAINS AT THE STORE. WHAT IS THE DEAL ABOUT THE GRAINS BEING SPROUTED AND, MORE IMPORTANTLY, CAN THESE BE USED FOR SOMETHING TASTIER THAN A BOWL OF BREAKFAST OATMEAL?

FRANK MODESTO
HARRISBURG, PENNSYLVANIA

A Sprouted grains have been used for thousands of years for cooking and brewing, with malt being the ultimate sprouted grain product. The history of food and cooking is largely comprised of stories of trial and error, and the consumption of sprouted grains naturally began without people knowing anything about biochemistry or nutrition because those sciences had not been developed and grains don't require any intervention to sprout when given moisture and time. More recently, people have been focused on differences between the bioavailability of nutrients in grains before and after sprouting. No big surprise to us brewers, germination modifies the grain endosperm (energy reserve) and has an effect on all sorts of parameters. Long story short, sprouted grains can definitely be used for much more than a hot bowl of oatmeal.

For starters, what are these sprouted products popping on store shelves and where can they be found? Although there is no standard definition of sprouted grain, these products are definitely not germinated like malt. Based on observation and chewing, my assessment is that the products I have tried are probably soaked, briefly sprouted, dried and flaked. To put this in the context of brewing malt, these sprouted grains are similar to chit malt. If you have never knowingly consumed foods made with sprouted grains or never noticed these products at the store, go to the whole or healthy foods aisle at your local grocery store and look for products like sprouted bread (Food for Life is one company that has been in this market segment for about 50 years), sprouted quick oats, and sprouted rice. Just like brewing malt there is a very wide range of these products on the market. Taken to the extreme you can also find sprouts (often bean or pea sprouts) in the produce section, but these products are well on their way to becoming plants. In fact, you can sow these in soil instead of casting upon a salad! By the way, there are all sorts of sprouted legumes, but sprouted cereals like oats, rye, wheat, teff, barley, and rice are the products that are probably of most interest to brewers.

So, what's the big deal with sprouted grains; sort of sounds like clever marketing to help sell grain, right? It turns out that there is more than a name to go along with these products. When cereal grains germinate, enzyme systems activate and begin converting the energy reserves within the grain endosperm into simpler compounds that can be used by the embryo, rootlets, and acrospire (shoot) during transformation from seed to plant. In practical terms, cell walls are softened, vitamins are made more available, amino acid levels rise, and starch hydrolysis begins. And just like malt modification makes it easier for brewers to produce wort, sprouted grains make nutrient assimilation easier on humans. But we are talking about brewing here, so let's leave the grocery store and enter the brewhouse.

Any rolled grain you can buy in your local market probably has a brewing analogue and can be used directly in brewing. Have a recipe calling for a pound of flaked oats and want to give sprouted oat flakes a try? Go for it and just sub pound-for-pound. Don't expect much of a flavor change, instead pay special attention to things like extract yield, ease of wort separation, mouthfeel, and foam stability. Keep in mind that there is no standard for sprouted grains and some of these products are certainly more modified than others. In general, expect them to be a bit easier to use than raw grains, especially when used at rates above 10–20%. Experimentation in the brewhouse continues to push the limits of beer, so when the patchouli aisle gives you sprouted oats, make beer not war!

And to all those folks who like a bit of patchouli, so do I.

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11:00 AM – 12:00 PM	Taproom Financials: Key Metrics to Follow	Improving Your Brewery SOPs	ABCs of Brewery Law
12:00 – 12:30 PM	Q&A WITH NANO VENDORS		
12:30 – 1:30 PM	Understanding & Managing Hop Creep	Building a Brewery Marketing Plan	Raising Beer Prices Panel
1:30 – 2:15 PM	NANO CRAFT BREWING TRENDS PANEL		
2:15 – 3:15 PM	Designing Your Taproom & Brewery	Using Sales Data For Better Brewery & Taproom Decisions	Increasing Brewery Safety in Small Spaces
3:15 – 3:45 PM	Q&A WITH NANO VENDORS		
3:45 – 4:45 PM	Lessons Learned From 12 Years Running a Nano	Yeast Counting Simplified	Financing Your Start-Up Nano
4:45 – 5:15 PM	Q&A WITH NANO VENDORS		

NanoCon Online Day #2 • Saturday, November 5, 2022

11:00 AM – 12:00 PM	Your Nano Brewery Lab: Equipment & Tests You Need	Lessons Learned From Other Taprooms	Using Brewery KPIs to Boost Your Business
12:00 – 12:30 PM	Q&A WITH NANO VENDORS		
12:30 – 1:30 PM	What I Learned Launching a Brewery This Year	Adding a Distillery to Your Brewery	Using Enzymes in the Nano Brewhouse
1:30 – 2:15 PM	NANO BUSINESS TRENDS PANEL		
2:15 – 3:15 PM	Understanding Taproom Customer Motivations	Keys to a Successful Small-Scale Barrel-Aging Program	What Homebrewers Need to Know When Going Pro
3:15 – 3:45 PM	Q&A WITH NANO VENDORS		
3:45 – 4:45 PM	Contract Brewing: Personal Experiences on the Pros & Perils	Brewery Accounting 101	Legal Checklist for Your Brewery
4:45 – 5:15 PM	Q&A WITH NANO VENDORS		

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BY GORDON STRONG

BELGIAN TRIPEL

A beer deserving respect

The beer known as tripel today has its origins at the Trappist monastery in Westmalle in the Belgian province of Antwerp in northern Belgium.

BELGIAN TRIPEL
BY THE NUMBERS

OG:	1.075–1.085
FG:	1.008–1.014
SRM:	4.5–7
IBU:	20–40
ABV:	7.5–9.5%

Photo by Charles A. Parker/Images Plus

There was once a time when I didn't really appreciate Belgian tripels. They didn't have the same deep range of malt flavors as dubbels or dark strongs, and often seemed poorly made. The amateur ones I tried were often boozy rocket fuel or sweet, heavy, headache-inducing messes, and the imports were often mishandled and had lost their character. Rather than give up on the style, I decided to visit the source and see if there was more to this beer. In 2006, I spent nearly two weeks visiting breweries in Belgium, sampling as many examples as I could find, and documenting my findings. I was happy to learn that I had it wrong and I was just tasting bad examples.

Perhaps I'm not the only one to misunderstand this style. Given its pale color, many assume that it is just a "normal beer" — yet it is about twice as strong as your average American lager. I remember one brewpub in Southern California telling me in the late 1990s that it was a "puke beer." I thought they meant something about the yeast character but the brewer shook his head and said that customers didn't understand its ABV and drank until they got sick. I saw this effect personally in Belgium when a woman in my group asked for a St. Bernardus Witbier and the waiter said they were out but that she could try a St. Bernardus Tripel since they were both blond beers (some Belgians often have a curious notion of beer styles). A half hour later she was sitting there in a dazed stupor and another woman in the group said to her, "you look like you were just slapped by a monk." A couple crude examples, perhaps, but it shows that this is a style that needs to be understood and respected in order to be appreciated.

Belgian tripel is style 26C in the BJCP (Beer Judge Certification Program) Style Guidelines, within Category 26, Monastic Ale, along with Belgian single, Belgian dubbel, and Belgian dark strong ale. This category was formerly known as Trappist Ale, but we changed the name in the 2021 edition of the guidelines at the request of the International Trappist Association. Their concern is that Trappist is a designation of origin, not a style of beer, and that use of its name might lead some commercial breweries to treat the designation as generic.

The name tripel can also be spelled (and is pronounced) as triple. Don't argue with people about this point, it's basically a language choice. I tend to use tripel since in English it should be clear that I'm talking about a beer style and not a baseball play or over-caffeinated espresso, and it is more commonly (but not exclusively) used in Belgium.

HISTORY

Religious institutions in Belgium often claim a long history with brewing as part of their tradition. Yet, like the experience of most American breweries during Prohibition, few survived the societal upheavals of the intervening years intact. After the French Revolution, in 1789 the government disbanded religious institutions, something that involved Belgium after the French invaded during the Napoleonic Wars. World War I also had a significant impact when German invaders requisitioned (stole) copper brewing equipment as a raw material for armaments. World War II interrupted operations in many places. So, few monasteries can claim any kind of uninterrupted brewing tradition.

Many of the monasteries became established (or re-established) after Belgian independence in 1830. For example, the famous Trappist monastery Westmalle was raised to Abbey status in 1836 and also constructed a brewery in the same year. It re-opened after World War I in 1922, which is a common theme among many Belgian

breweries. The Trappist monasteries who use the Authentic Trappist Product seal must produce beer on the grounds of the monastery under the supervision of monks and must use the proceeds for charitable purposes. That seal not only applies to beer, it is also used on cheese, chocolate, and other products.

There are other breweries that make what is known as abbey beer. This is an unregulated term that often implies some kind of religious connotation but none of the beer is made at monasteries. After World War II, starting with Maredsous in 1949, breweries began licensing the names of religious institutions for use in marketing beer. Many of these breweries produce beers of a similar type as those made in Trappist breweries, such as dubbels and tripels. But these breweries are often owned by larger brewing groups (Maredsous is owned by Duvel-Moortgat, Leffe is owned by AB-InBev, Grimbergen and Affligem are owned by Heineken, etc.).

There is a Certified Belgian Abbey Beer seal used by those who make Abbey beers and license the name from religious institutions. It was introduced in 1999 after the Authentic Trappist Product seal was created in 1997. Other breweries make beers called abbey beers with the name of a local saint, some fictitious abbey, or another vaguely religious implication. These designations are meant to identify the origin, not the style, of the beer and should not be given additional meaning.

The beer known as tripel today has its origins at the Trappist monastery in Westmalle in the Belgian province of Antwerp in northern Belgium. Jef Van den Steen wrote in *Belgian Trappist and Abbey Beers* that Westmalle began brewing a stronger double brown beer in 1922 when they reopened their brewery. He said a new brewery was built in 1933 when they first attempted to brew a stronger beer given the name Tripel. He said the beer was derived from a blond beer that had been sporadically brewed since 1931 and that it was launched as a 9.5% ABV blond beer in 1934. In 1935, it was first bottled in the now-familiar 33cl bottles.

Chimay followed much later with an 8% tripel first made in 1966. Originally called blanche (white, after the

BELGIAN TRIPEL

(5 gallons/19 L, all-grain)
OG = 1.072 FG = 1.010
IBU = 34 SRM = 4
ABV = 8.3%

INGREDIENTS

9 lbs. (4.1 kg) Pilsner malt
1 lb. (454 g) Vienna malt
2.5 lbs. (1.1 kg) white sugar
6 AAU Sterling hops (60 min.)
(0.75 oz./21 g at 8% alpha acids)
9.5 AAU Amarillo® hops (10 min.)
(1 oz./28 g at 9.5% alpha acids)
1 oz. (28 g) Styrian Goldings hops
(2 min.)
White Labs WLP510 (Bastogne Belgian Ale), Wyeast 3787 (Belgian High Gravity Ale), or SafAle T-58 yeast
⅞ cup corn sugar (for priming)

STEP BY STEP

This recipe uses reverse osmosis (RO) water. Adjust all brewing water to a pH of 5.5 using phosphoric acid. Add 0.5 tsp. of calcium chloride and 0.5 tsp. calcium sulfate to the mash.

This recipe uses a step mash. Use enough water to have a moderately thick mash (1.5 qts./lb. or 3.1 L/kg). Mash in the Pilsner and Vienna malts at 131 °F (55 °C) and hold for 10 minutes. Raise the temperature to 140 °F (60 °C) and hold for 10 minutes. Raise the temperature to 145 °F (63 °C) and hold for 40 minutes. Raise the temperature to 158 °F (70 °C) and hold for 20 minutes. Raise the temperature to 169 °F (76 °C) and recirculate for 15 minutes.

Sparge slowly and collect 6.5 gallons (24.5 L) of wort.

Boil the wort for 90 minutes, adding hops at the times indicated in the recipe. Add the sugar with 15 minutes left in the boil.

Chill the wort to 63 °F (17 °C), pitch the yeast, and ferment until complete, allowing the temperature to rise as much as it wants, rousing the yeast if necessary to complete. Rack to secondary and cold condition for five weeks at 50 °F (10 °C).

Rack the beer again, prime and bottle condition, or keg and force carbonate. Repitching fresh yeast at bottling may be needed if bottle conditioning. Warm condition for three weeks at 70 °F (21 °C). Age at least six months.

BELGIAN TRIPEL

(5 gallons/19 L, extract only)
OG = 1.072 FG = 1.010
IBU = 34 SRM = 4
ABV = 8.3%

INGREDIENTS

5.4 lbs. (2.5 kg) Pilsen dried malt extract
2.5 lbs. (1.1 kg) white sugar
6 AAU Sterling hops (60 min.)
(0.75 oz./21 g at 8% alpha acids)
9.5 AAU Amarillo® hops (10 min.)
(1 oz./28 g at 9.5% alpha acids)
1 oz. (28 g) Styrian Goldings hops
(2 min.)
White Labs WLP510 (Bastogne Belgian Ale), Wyeast 3787 (Belgian High Gravity Ale), or SafAle T-58 yeast
⅞ cup corn sugar (for priming)

STEP BY STEP

Use 6.5 gallons (24.5 L) of water in the brew kettle; heat to 158 °F (70 °C).

Turn off the heat. Add the malt extract and stir thoroughly to dissolve completely. Turn the heat back on and bring to a boil.

Boil the wort for 60 minutes, adding hops at the times indicated. Add the sugar with 15 minutes left in the boil.

Chill the wort to 63 °F (17 °C), pitch the yeast, and ferment until complete, allowing the temperature to rise as much as it wants, rousing the yeast if necessary to complete. Rack to secondary and cold condition for five weeks at 50 °F (10 °C).

Rack the beer again, prime and bottle condition, or keg and force carbonate. Repitching fresh yeast at bottling may be needed if bottle conditioning. Warm condition for three weeks at 70 °F (21 °C). Age at least six months.

color of its bottle cap), its name was changed to avoid confusion with witbier, which was often called blanche as well. In 1986, it was named Cinq Cents (five centuries) when sold in 750 mL corked bottles. Achel added an 8% tripel in 2000. Many abbey breweries produce a tripel in the style of the original Westmalle, generally in the 8.5–9% alcohol range.

The blond beers of this era are generally seen as being a reaction to the introduction of paler Pilsner-type beers and the beginning of the public to favor the lighter-colored beers. This shift in consumer preference is seen throughout the brewing industry of Europe at the time and is not in any way specific to strong monastic beers.

SENSORY PROFILE

A Belgian tripel is a strong, pale, Belgian ale that shows the common features of other monastic beers — they are top-fermenting, have a high degree of attenuation, are bottle-conditioned, and show a fairly aggressive spicy-estery yeast character. The tripel is distinguished from other stronger Belgian beers in that it is fairly bitter (Westmalle is 38 IBUs). While bitter, it does not have a large quantity of late hops (in contrast with the more modern Belgian IPA, for instance) so as to not clash with the yeast-derived aromatics.

A Belgian tripel is a strong beer, usually 8 to 9%, although can reach up to 9.5% ABV. This distinguishes it from the Belgian blond style, which tops out at 7.5% and is usually less bitter (and often less aggressive in its spicy yeast character). As a pale beer (deep yellow to pale-amber), it has flavors derived mostly from Pilsner-type malts — a light, slightly bready- or grainy-sweet or honey-like flavor, perhaps very slightly toasted. This distinguishes it from Belgian dark strong ales of similar strength that have a richer, deeper malt profile, and usually a much more malty balance. The Belgian single style is similarly pale and bitter, but much lower in alcohol (under 6%) and often hoppier.

Belgian tripels have a fairly light body (medium-low to medium) for their strength, have a dry finish, and very high carbonation. The best examples have a deceptive strength, with only a light warming. The high carbonation and attenuation make them quite drinkable and they should never seem heavy, thick, or sweet. The high carbonation often creates a dense, rocky white head with excellent persistence. The bitterness level is somewhat variable – few approach the bitterness of a Westmalle. Any perception of sweetness is usually due to a lower bitterness level in the balance, rather than an actual sugary flavor in the finish.

The yeast and hop character commonly give a spicy, peppery-type flavor more than clove-like phenols. Esters are often citrusy (oranges and lemons) and sometimes ripe banana. Despite mentioning banana and clove, the yeast character is different than a German weissbier. It is much more complex and varied. Hops complement the yeast, adding floral and spicy notes. The alcohol may add a light spiciness as well and also add to the perception of dryness in the finish.

Tripels are most often confused with Belgian golden strong ales, which are modeled after Duvel. Compared to these beers, tripels are a little darker and fuller bodied, but have a different yeast character – much spicier and less estery, and usually have less late hops. While many kinds of yeast can be used in these beers, this is the general distinction.

BREWING INGREDIENTS AND METHODS

A Belgian tripel recipe can seem deceptively simple. Pilsner malt, white sugar, attenuative Trappist-type yeast, and continental hops. But the Duvel is in the details. With a small number of ingredients, quality matters and brewing choices can have a significant impact.

Pilsner malt (Belgian, French, or German) should form the base of the style. A blend of commercial malts may be used for added complexity. I tend to prefer the Belgian and French maltsters for having a slightly more estery flavor. Dingemans is the brand I saw most frequently used in Belgium. White sugar is used to lighten the body and increase attenuation. In Belgium, this would be white beet sugar. Candi syrups may be used, but for the zero color additions, I don't see the benefit of a syrup since you aren't bringing any caramel or fruity flavors. Using around 20% sugar is common and is what I use in my recipes.

Recipe design must be mentioned here. If we are targeting an 8 to 9% ABV beer, many would incorrectly start by thinking in barleywine terms of a high starting gravity. However, I have discovered that the final gravity of the beer is critical in the mouthfeel and perception of dryness. It doesn't matter how well attenuated your beer is, if it has a high finishing gravity, it will seem sweeter. So, I use the same advice here that I use when making saisons: To finish low, start low. An OG in the 1.070 to 1.080 range will give you an 8.5–9.5% beer if you finish in the 1.008 to 1.010 range.

Sugar alone won't get you this low; you have to choose a mash program to accentuate attenuation. In these cases, I recommend a step mash with the main saccharification temperature taking place around 143 to 147 °F (62–64 °C). I often use multiple steps, but rest for the longest time in this range. Selecting an attenuative yeast helps, with the strain from the Westmalle brewery being the most obvious choice (widely available in North America as Wyeast 3787 Belgian High Gravity or WLP530 Abbey Ale yeast). I have also had good luck with the Orval strain (minus the *Brett*), available as White Labs WLP510 Bastogne Belgian Ale yeast.

Belgian yeast strains are often finicky. I use the Wyeast 3787 most frequently and have found that it does not like to be constrained in its fermenting temperature. So, I tend to start it cool and let it free rise in temperature until it is complete. Have a blowoff tube available since this yeast is also quite sticky and tends to create a lot of kräusen that does not seem to want to fall. Many Belgian breweries use the two strains I mentioned under different fermentation conditions. The yeast can give different flavor outcomes (balance and perception of phenols and esters, primarily) based on fermentation temperature, so my recommendation is to experiment with different temperatures and find ones that give an outcome most pleasant to your palate.

The brewing water is not a major driver of this style. It can be made with fairly soft water, although Westmalle's water is reported to be fairly hard. As long as the mash pH is in the 5.1 to 5.3 range, the outcome should be fine. Adjust

> **If we are targeting an 8 to 9% ABV beer, many would incorrectly start by thinking in barleywine terms of a high starting gravity.**

your water as you see fit to reach this target.

HOMEBREW EXAMPLE

Many people want to create a Westmalle clone when brewing this style, but I actually like the flavor from one modeled on La Rullés Triple, an artisanal brewery located in the town of Tournai in western Belgium. I know for a fact they use Orval yeast — I was at the brewery once when the yeast was delivered from them in a large white bucket. If you can get White Labs WLP510 yeast, give it a try. Otherwise, Wyeast 3787 or SafAle T-58 are reliable alternatives — it won't be the same profile, but each will definitely give you a tripel.

My base malt is Pilsner malt from a Belgian maltster like Dingemans or Castle. Don't use a more heavily flavored Pilsner malt, like the Weyermann Floor-Malted Bohemian Pilsner Malt or the Weyermann Barke® Pilsner malt — the flavor will be too biscuity or toasty. I often slip in a little bit of Vienna malt for a bit more richness and color but keep the percentage low. I always will use 20% white beet sugar in my tripel and will use a step mash for attenuation.

At the time I visited La Rullés, I thought they were somewhat unusual in using not only Orval yeast instead of the Westmalle strain, but in also using Amarillo® hops. But they work well together. I also like using Sterling or Saaz hops, as well as Styrian Goldings. Tettnanger would also be a good choice. The combination of Styrian and Saaz appears in many of my Belgian recipes. The extra Amarillo® hops are a nod to La Rullés.

If you are looking for a recipe more like Westmalle tripel, delete the Vienna malt, target the recipe for 9.5% ABV and 38 IBUs, delete the Amarillo® hops, and use Wyeast 3787 yeast. Step mash for attenuation, keep the sugar, and see if you can get the finishing gravity down to 1.008.

For the right Belgian character, take care to let it ferment to completion, then cool condition it for several weeks (46–50 °F/8–10 °C), prime it and bottle condition it warm for several more weeks (68–70 °F/20–21 °C), then age it until the alcohol character is to your liking. This can take six months or more, sometimes. If this seems like a long time, try channeling your inner monk for patience.

MILD BY NAME, MILD BY NATURE

AN ENGLISH CURIOSITY WITH A LONG HISTORY

by Paul Crowther

Photo courtesy of Shutterstock.com

The mild is the one British beer style that seems not to have penetrated the traditions of North American brewers or homebrewers the way many ales of English origin have. Despite a few examples I found writing this article, mild is truly an elusive style when walking down the aisle of even the best North American bottle shops. There is not a specific American substyle for mild ales, as there are some other styles that originated in Britain such as barleywine, IPA, or stout, which are all styles that have been cherished and adapted in the U.S. and North America. Mild, on the other hand, remains a rare curiosity.

I think one of the reasons mild hasn't been embraced by American homebrewers is that it's hard to quantify. It's not hoppy like an IPA, dark and roasty like a stout, or bitter like a . . . bitter. Steve Dunkley, Owner and Head Brewer of the Beer Nouveau in Manchester, England, put it best: "Mild isn't bitter. It isn't sweet. It simply is."

It's a shame because mild is extremely approachable, easy to brew, and easy to drink due to its gentle malt flavor and sessionable ABV — making it an ideal beer for a homebrewer who'll have forty or more pints to drink with each 5-gallon (19-L) batch. Its low-hopped nature makes brewing a mild a less expensive brew day too. So hopefully this article will get a few more of you out there brewing milds the way we English do!

Trying to explain exactly what makes a mild can be difficult though. It's got hundreds of years of history and contemporary milds can reflect that with a wide range of strengths and colors. This is what got me chatting to Steve about milds in the first place; to try and unpack this history. Steve breaks down the long history of mild into three distinct styles: *Heritage*, *traditional*, and *hybrid*.

HERITAGE MILD

Mild first saw use as a term for beer in the 1700s and was actually more of a description of conditioning than a distinct style. Beer writer Ron Pattinson explained that the same beer conditioned differently would have a different name. "Ones [ales] sold young were described as Mild. Ones that had been aged were called Keeping or Stale."[1]

Steve expanded on this for me, saying, "The beer itself was brewed as normal but there was still a fair amount of sugars left in it." The beer would ferment in the barrel, which most likely would have included *Brettanomyces*, and this extended its shelf life. Steve estimates the beer might have gone into barrel with a gravity as high as 1.026 — so very thick and sweet. A pub could buy a barrel of mild and either serve it as a mild or cellar age it and sell it as a keeping beer that was then higher ABV with less sweetness and a lighter body.

These heritage milds were brewed with a very high starting gravity though, up to the 1.090s and so would still have a high ABV even if served before fermentation was fully complete.

As pale ale became popular in the 19th century, the mild became a distinct style from pale because of a much lower hopping rate; the one consistency mild has maintained is a low bitterness and muted hop character. Heritage milds were not dark beers though, they generally used 100% brown malt and later 100% pale malt. So a heritage mild is a strong, pale, and malty beer with low hop character.

TRADITIONAL MILD

Traditional mild bears little resemblance to heritage mild. It's got an ABV of 3–4% and ranges from copper to chestnut brown in color. It does maintain the low bitterness, malt focus, and thicker body of its older cousin, however. So how did mild go from a pale, strong beer to the darker, sessionable beer we more commonly know today?

Around 1900, mild had over time gotten weaker with changing consumer tastes but was much stronger than today's average mild. Burton mild ale around this time was averaging between 1.056–60 original gravity.[2]

Two World Wars led to periodic sharp increases in the price of food and thus the price of malt. Also, to try and fill a budget deficit brought on by the Great Depression, the taxes on beer increased sharply in the 1930s, which led to brewers making weaker beers to keep them affordable. So this confluence of political and economic factors lead to traditional mild eventually becoming around 3–4%.

The question of why mild became darker is a bit less clear. We do know that steadily throughout the early 20th century milds initially used caramel to darken the beer before eventually the use of roasted and crystal malts became the norm, causing mild to change from pale to a dark brown. We don't know what drove brewers to do this though; it's honestly a bit of a mystery.

There are still some traditional milds, such as Timothy Taylors Golden Best, that are built like low-ABV heritage milds — these are called pale or golden milds, but are much less common than dark mild.

Another change around this time was the introduction of invert sugar. Invert sugar is a sugar syrup that is a 50/50 mix of glucose and fructose, made from cane sugar. Its proponents swear by its use in traditional mild brewing, believing it adds sweetness and a creamier mouthfeel to the beer whereas detractors say it is almost entirely fermented out. There are examples of milds with and without invert sugar used in contemporary beers representing this split of opinion.

HYBRID MILDS

In the past few years there has been a growing interest in milds from British craft breweries. As you'll see from the contemporary clone brews at the end of the article, many of these newer English craft breweries have wanted to resurrect the high ABV of heritage milds but often include idiosyncrasies such as the darker malts of traditional milds. This has led to beers sold as "strong" or "imperial" milds that aren't really either heritage or traditional, so instead they are sometimes referred to as hybrid milds.

BREWING YOUR OWN MILD

My advice that follows is focused on brewing a traditional mild and one that might fit into the Beer Judge Certification Program (BJCP) guidelines, but I will make reference to heritage milds as well.

The specifications of a traditional mild are pretty much what the vital statistics of the current BJCP dark mild style describe:

IBU: 10–25
SRM: 14–25
OG: 1.030–1.038
FG: 1.008–1.013
ABV: 3–3.8%

GRAIN BILL AND MASHING

The majority of the grist (80%+ or 70%+ if using invert sugar) should be a base of a mild malt. Mild malt is kilned slightly darker than pale malt and adds a golden hue and sweet/nutty notes. It's similar to Vienna and Munich malt but lighter than either. Pale malt can also be used, ideally using Maris Otter or Chevallier barley varieties for the heritage flavor.

Invert sugar can be included up to 10%. It can be hard for homebrewers to get ahold of but Lyle's Golden Syrup is a good alternative; this is readily available in the U.K. and can be found online or often in the British section of North American supermarkets. Molasses or honey can be used as a substitute. Searches on the internet also turn up DIY invert sugar if you're up for making your own.

Crystal malts are essential for building body and coloring the beer. You can color the beer with any crystal malt combinations you like as long as you get the beer to the 14-25 SRM that is appropriate for the style, but an addition of up to 3–4% of either chocolate or black malt wouldn't be inappropriate. You are looking to build notes of nut, toffee, caramel, and bread. Roasted character shouldn't be dominant if you are using roasted malts and any coffee or chocolate notes should be muted.

Mash at a slightly higher temperature than usual — 152–155 °F (67–68 °C) is ideal — to get a higher final gravity. A one-hour mash is sufficient.

HOPS AND BOILING

British landrace hops are the most appropriate. The earthy bitterness of the majestic Fuggle hops or floral notes of East Kent Golding complement the malty character well.

You want sufficient bitterness to avoid the beer being cloyingly sweet and a hint of hoppy aroma, but not enough to overpower the malt character. Enough bittering hops for 10–20 IBUs and around 0.5–1 ounce (14–28 g) of hops as a late boil addition. Dry hopping isn't appropriate for the style.

If you are doing a heritage or hybrid style mild, increase the IBUs to around 25–30 to offset the increased residual sugars.

YEAST AND PACKAGING

A characterful British yeast with lower attenuation is ideal. White Labs WLP002 (English Ale) is my go-to. Wyeast 1968 (London ESB) is another good option. The lower attenuation of these strains compared to other English ale strains from these manufacturers will keep the beer at higher final gravity resulting in a thicker body and luscious mouthfeel, which is vital with such a low-ABV beer.

Bottle conditioning mild is much more traditional than force carbonating in a keg, but either way mild is — like other British ale styles — best served at lower carbonation levels. Aim for 1.5–2.0 volumes of carbonation. This low carbonation level is why mild is traditionally cask conditioned in the U.K. — obviously for us homebrewers that's not too easy to do unless you've got your own beer engine, but I would encourage bottle conditioning over forced carbonation.

CONTEMPORARY MILD CLONES

I reached out to a few breweries to learn more and develop clone recipes of contemporary mild ales. Many of the more traditional breweries would not reveal their secrets and a lot of metaphorical doors were slammed in my face; mild is taken very seriously by British brewers! However, a few craft brewers were kind enough to share their recipes with me in hopes of inspiring more homebrewers to brew the humble mild. Enjoy the clone recipes on pages 31–33 that illustrate just how diverse a style mild is.

REFERENCES

[1] Pattinson, Ron. "*A Short History of Mild.*" Shut up about Barclay Perkins, http://barclayperkins.blogspot.com/2008/05/short-history-of-mild.html.

[2] Daniels, R. (2000). *Designing Great Beers*. Brewers Publications.

English Mild Clone Recipes

Elusive Brewing's Microball clone
(5 gallons/19 L, all-grain)
OG = 1.041 FG = 1.013
IBU = 16 SRM = 18 ABV = 3.7%

This is a great example of how to build the grain bill without relying on chocolate or black malt. A blend of dark crystal malts gives this recipe that classic malty mild flavor. Andy Parker, Owner and Head Brewer of Elusive, is a homebrewer at heart; however, and couldn't resist using Bramling Cross to make this recipe a bit different from other traditional English mild ales. Bramling is a relatively modern hop, released in the 1960s, and has a distinct blackcurrant aroma. Bramling adds atypical flavors for a mild, yet they complement the sweet malt flavors well.

INGREDIENTS

6 lbs. (2.7 kg) Maris Otter pale ale malt
1.5 lbs. (0.68 kg) Munich malt (20 °L)
8.8 oz. (250 g) Crisp crystal 400 (150 °L)
3.5 oz. (100 g) Special B malt
3.5 oz. (100 g) Simpsons DRC malt
1.2 AAU Bramling Cross hops (60 min.) (0.2 oz./6 g at 6% alpha acids)
2.4 AAU Bramling Cross hops (30 min.) (0.4 oz./11 g at 6% alpha acids)
2.4 AAU Bramling Cross hops (15 min.) (0.4 oz./11 g at 6% alpha acids)
1 oz. (28 g) Bramling Cross hops (0 min)
White Labs WLP002 (English Ale), Wyeast 1968 (London ESB Ale), or LalBrew London yeast
⅓ cup corn sugar (if priming)

STEP BY STEP

Mash crushed grains at 151 °F (66 °C) for 60 minutes. Batch sparge slowly for 15 minutes at 162 °F (72 °C). Collect 6.5 gallons (24.5 L) of wort in the brew kettle. Bring wort to boil for a standard 60-minute boil, adding hops as indicated in the ingredients list.

When the boil is complete, cool wort down to 65 °F (18 °C) and transfer to fermentation vessel.

Add yeast as packet directs. Bottle conditioning mild is much more traditional than force carbonating in a keg, but either way mild is best served at lower carbonation levels. Aim for 1.5–2.0 volumes of carbonation.

Elusive Brewing's Microball clone
(5 gallons/19 L, extract with grains)
OG = 1.041 FG = 1.013
IBU = 16 SRM = 18 ABV = 3.7%

INGREDIENTS

5 lbs. (2.3 kg) Maris Otter liquid malt extract
8.8 oz. (250 g) Crisp crystal 400 (150 °L)
3.5 oz. (100 g) Special B malt
3.5 oz. (100 g) Simpsons DRC malt
1.2 AAU Bramling Cross hops (60 min.) (0.2 oz./6 g at 6% alpha acids)
2.4 AAU Bramling Cross hops (30 min.) (0.4 oz./11 g at 6% alpha acids)
2.4 AAU Bramling Cross hops (15 min.) (0.4 oz./11 g at 6% alpha acids)
1 oz. (28 g) Bramling Cross hops (0 min)
White Labs WLP002 (English Ale), Wyeast 1968 (London ESB Ale), or LalBrew London yeast
⅓ cup corn sugar (if priming)

STEP BY STEP

Steep crushed grains in a muslin bag as brewing water heats up to 170 °F (77 °C). Turn off the heat, remove the grains allowing liquid to drip back in the kettle, and stir in all the liquid malt extract. Once extract is fully dissolved, bring wort up to a boil for a standard 60-minute boil, adding hops as indicated in the ingredients list.

When the boil is complete, cool wort to 65 °F (18 °C) and transfer to fermenter. Add yeast as packet directs. Bottle conditioning mild is much more traditional than force carbonating in a keg, but either way mild is best served at lower carbonation levels. Aim for 1.5–2.0 volumes of carbonation.

TIPS FOR SUCCESS:

Bramling Cross hops can be difficult to source outside of the U.K. If you can't get ahold of Bramling Cross then Bullion or Galena would be appropriate substitutes for a similar blackcurrant character. You could also go with a traditional mild ale variety such as Fuggle or East Kent Golding, but this will result in a beer further from Elusive's Microball.

Thornbridge Brewery & Bundobust Brewery's Dark Mild clone
(5 gallons/19 L, all-grain)
OG = 1.039 FG = 1.010
IBU = 25 SRM = 23 ABV = 3.8%

A bit more chocolate malt than you'd usually see in a traditional mild makes this collaboration beer unique (though

English Mild Clone Recipes

you'd lose points from a BJCP judge). Dominic Driscoll, Production Manager at Thornbridge, noted he was aware of this but that their patrons prefer the more roasted character this imparts. The Slovenian hops are also the brewer's preference. Swap them for English Golding hops if you wish.

INGREDIENTS

5.5 lbs. (2.5 kg) Maris Otter pale ale malt
0.5 lb. (230 g) chocolate malt
5.6 oz. (159 g) wheat malt
5.6 oz. (159 g) medium crystal malt (90 °L)
3.5 oz. (100 g) dark crystal malt (135 °L)
11.5 oz. (325 g) Lyle's Golden Syrup
6.3 AAU Fuggle hops (60 min.) (1.4 oz./40 g at 4.5% alpha acids)
1.6 oz. (45 g) Styrian Golding hops (0 min.)
White Labs WLP002 (English Ale), Wyeast 1968 (London ESB Ale), or LalBrew London yeast
⅓ cup corn sugar (if priming)

STEP BY STEP

Mash crushed grains at 153 °F (68 °C) for 60 minutes. Batch sparge for 15 minutes at 162 °F (72 °C). Collect 6.5 gallons (24.5 L) of wort in the brew kettle. Turn off heat and slowly pour in Golden Syrup while constantly stirring, making sure to stir in thoroughly until dissolved in order to avoid scorching.

Bring wort to boil for a standard 60-minute boil, adding hops as indicated in the ingredients list. When the boil is complete, cool wort down to 65 °F (18 °C) and transfer to fermentation vessel. Add yeast as packet directs.

Bottle conditioning English mild is much more traditional than force carbonating in a keg, but either way mild is best served at lower carbonation levels. Aim for 1.5–2.0 volumes of carbonation.

Thornbridge Brewery & Bundobust Brewery's Dark Mild clone

(5 gallons/19 L, extract with grains)
OG = 1.039 FG = 1.010
IBU = 25 SRM = 23 ABV = 3.8%

INGREDIENTS

4.2 lbs. (1.9 kg) Maris Otter liquid malt extract
0.5 lb. (230 g) chocolate malt
5.6 oz. (159 g) medium crystal malt (90 °L)
3.5 oz. (100 g) dark crystal malt (135 °L)
11.5 oz. (325 g) Lyle's Golden Syrup
6.3 AAU Fuggle hops (60 min.) (1.4 oz./40 g at 4.5% alpha acids)
1.6 oz. (45 g) Styrian Golding hops (0 min.)
White Labs WLP002 (English Ale), Wyeast 1968 (London ESB Ale), or LalBrew London yeast
⅓ cup corn sugar (if priming)

STEP BY STEP

Steep crushed grains in a muslin bag as brewing water heats up to 170 °F (77 °C). Turn off the heat, remove the grains allowing liquid to drip back in the kettle, and stir in all the liquid malt extract being sure not to scorch any on the bottom of the pot. Once extract is fully dissolved, bring wort up to a boil for a standard 60-minute boil, adding hops as indicated in the ingredients list.

When the boil is complete, cool wort down to 65 °F (18 °C) and transfer to fermentation vessel. Add yeast as packet directs.

Bottle conditioning English mild is much more traditional than force carbonating in a keg, but either way mild is best served at lower carbonation levels. Aim for 1.5–2.0 volumes of carbonation.

TIPS FOR SUCCESS:

If you can't find Lyle's Golden Syrup online or in the British section of your local supermarket you can substitute honey or make your own invert sugar (recipes can be found online — requiring only sugar, water, and citric acid or cream of tartar).

Steam Machine Brewing Co.'s Imperial Honeyed Mild clone

(5 gallons/19 L, all-grain)
OG = 1.079 FG = 1.013
IBU = 32.5 SRM = 5.7 ABV = 8.7%

This is a good example of a modern homage to the heritage mild. Nick Smith at Steam Machine told me he was inspired by reading Ron Pattinson's blogs and seeing heritage mild recipes that were completely unlike anything he'd seen before. The brewery had been gifted some honey from a local producer and wanted to use it in the mild in place of invert sugar, and the honey flavors blend perfectly with the sweet and floral aroma of East Kent Golding hops.

INGREDIENTS

6.7 lbs. (3 kg) Crisp Chevallier® Heritage malt
6.7 lbs. (3 kg) mild malt
2 lbs. (0.9 kg) honey (0 min.)
6.25 AAU East Kent Golding hops (60 min.) (1.25 oz. at 5% alpha acids)
4.5 AAU East Kent Golding hops (10 min.) (0.9 oz. at 5% alpha acids)
White Labs WLP013 (London Ale), or Wyeast 1028 (London Ale), or SafAle S-04 yeast
⅓ cup corn sugar (if priming)

STEP BY STEP

Mash crushed grains at 149 °F (65 °C) for 60 minutes. Batch sparge for 15 minutes at 162 °F (72 °C). Collect 6.5 gallons (24.5 L) of wort in the brew kettle. Place jars of honey in a bowl of

English Mild Clone Recipes

warm water (85–90 °F/29–32 °C) at this time to help loosen up the honey and make it easier to add later. Bring wort to boil for a standard 60-minute boil, adding hops as indicated in the ingredients list.

When the boil is complete, stir in the honey until dissolved. Cool wort down to 65 °F (18 °C) and transfer to fermentation vessel. Add yeast as packet directs.

Bottle conditioning mild is much more traditional than force carbonating in a keg, but either way mild is best served at lower carbonation levels. Aim for 1.5–2.0 volumes of carbonation.

Steam Machine Brewing Co.'s Imperial Honeyed Mild clone

(5 gallons/19 L, extract only)
OG = 1.079 FG = 1.013
IBU = 32 SRM = 6 ABV = 8.7%

INGREDIENTS

9 lbs. (4.1 kg) Maris Otter liquid malt extract
2 lbs. (0.9 kg) honey (0 min.)
6.25 AAU East Kent Golding hops (60 min.) (1.25 oz. at 5% alpha acids)
4.5 AAU East Kent Golding hops (10 min.) (0.9 oz. at 5% alpha acids)
White Labs WLP013 (London Ale), or Wyeast 1028 (London Ale), or SafAle S-04 yeast
⅓ cup corn sugar (if priming)

STEP BY STEP

Heat brewing water up to 170 °F (77 °C). Turn off the heat and stir in all the liquid malt extract. Once extract is fully dissolved, bring wort up to a boil for a standard 60-minute boil, adding hops as indicated in the ingredients list. Place jars of honey in a bowl of warm water (85–90 °F/29–32 °C) at this time to help loosen up the honey and make it easier to add later.

When the boil is complete, stir in the honey until dissolved. Cool wort down to 65 °F (18 °C) and transfer to fermentation vessel. Add yeast as packet directs.

Bottle conditioning English mild is much more traditional than force carbonating in a keg, but either way mild is best served at lower carbonation levels. Aim for 1.5–2.0 volumes of carbonation.

Cross Borders Brewing Co. & Dark Star Brewing Co.'s Intergalactic Mild clone

(5 gallons/19 L, all-grain)
OG = 1.061 FG = 1.015
IBU = 25 SRM = 22 ABV = 6.1%

This recipe represents the hybrid mild. Brewed using Nottingham yeast for its strong attenuation for the higher gravity. This beer has a strength more akin to heritage mild but incorporates the dark grains of a traditional mild.

INGREDIENTS

9.5 lbs. (4.3 kg) mild malt
2 lbs. (0.91 kg) Maris Otter pale ale malt
12.5 oz. (354 g) crystal malt (150 °L)
4.6 oz. (130 g) chocolate malt
7.4 AAU Admiral hops (60 min.) (0.5 oz. at 14.75% alpha acids)
1 oz. (28 g) Fuggle hops (0 min.)
1 oz. (28 g) East Kent Golding hops (0 min.)
LalBrew Nottingham, White Labs WLP007 (Dry English Ale), or Wyeast 1098 (British Ale) yeast
⅓ cup corn sugar (if priming)

STEP BY STEP

Mash crushed grains at 151 °F (66 °C) for 60 minutes. Batch sparge for 15 minutes at 162 °F (72 °C). Collect 6.5 gallons (24.5 L) of wort in the brew kettle. Bring wort to boil for a standard 60-minute boil, adding hops as indicated in the ingredients list.

When the boil is complete, cool wort down to 65 °F (18 °C) and transfer to fermentation vessel. Add yeast as packet directs. Bottle conditioning mild is much more traditional than force carbonating in a keg, but either way mild is best served at lower carbonation levels. Aim for 1.5–2.0 volumes of carbonation.

Cross Borders Brewing Co. & Dark Star Brewing Co.'s Intergalactic Mild clone

(5 gallons/19 L, extract with grains)
OG = 1.061 FG = 1.015
IBU = 25 SRM = 22 ABV = 6.1%

INGREDIENTS

8 lbs. (3.6 kg) Maris Otter liquid malt extract
12.5 oz. (354 g) crystal malt (150 °L)
4.6 oz. (130 g) chocolate malt
7.4 AAU Admiral hops (60 min.) (0.5 oz. at 14.75% alpha acids)
1 oz. (28 g) Fuggle hops (0 min.)
1 oz. (28 g) East Kent Golding hops (0 min.)
LalBrew Nottingham, White Labs WLP007 (Dry English Ale), or Wyeast 1098 (British Ale) yeast
⅓ cup corn sugar (if priming)

STEP BY STEP

Steep crushed grains in a muslin bag as brewing water heats up to 170 °F (77 °C). Turn off the heat, remove the grains allowing liquid to drip back in the kettle, and stir in all the liquid malt extract. Once extract is fully dissolved, bring wort up to a boil for a standard 60-minute boil, adding hops as indicated in the ingredients list.

Follow the remainder of the all-grain recipe instructions. BYO

YES, HOMEBREWERS CAN

Canning homebrews has gotten easier in recent years

by Vito Delucchi

Depending on when you started your craft beer journey, you might have had a negative connotation with canned beer. For a good portion of time, the best craft beer was found in glass bottles, while the beer in cans was mostly macro-scale-multinational-corporate-product (MSMCP™). Over the last decade, however, we've seen a massive shift in the craft beer industry from glass bottles to aluminum cans. Having worked at a commercial brewery during this time, it was interesting to watch the packaging side fluctuate in terms of cans versus kegs being packaged for wholesale and retail. Obviously, the pandemic had a major impact on that, but the shift to aluminum started much earlier — and for good reason.

And it hasn't just been on the commercial side of things where we've seen cans become popular. In the last couple of years quite a few single-canning systems have been made available that are priced right for homebrewers to get in on the craze.

Let's start with a review of the pros of canning your homebrew. First and foremost is their portability. Cans are lighter and more durable. That means they're cheaper to ship and less prone to breakage en route. This also translates down to the person drinking the beer. Throwing a few cans of beer in your backpack for hiking or golf bag for a day on the course is a lot lighter than a few bottles. Plus, you can easily crunch them down once finished, further reducing storage space needed. Let's not forget their durability; drop a beer bottle poolside and watch out now! Drop a can and you'll only be scowled at for alcohol abuse on the beer you wasted if any spills.

Secondly, I believe an aluminum can is superior to a glass bottle in terms of beer freshness. Let's not even talk about the old green or clear glass bottles that will become lightstruck in no time. Although I honestly don't recall having a skunked beer from dark brown bottles, it's been said they can't fully protect your beer from becoming light struck, whereas aluminum is 100% effective in stopping UV rays from skunking your delicious creation. We also have the amount of oxygen ingress you get from the closure to take into consideration. The plastic seal on crown caps, even with the oxygen-absorbing kind, still underperform compared to the seal you can get on a well-seamed can. Be it commercial brewer or homebrewer, you want your packaged beer to taste amazing when consumed, and aluminum cans are a great choice.

Photo by Charles A. Parker/Images Plus

Photo by Chris Graham

Filling cans with carbonated beer is done in the same way you would fill bottles, including through a line attached to a kegerator faucet. Fill the can high enough that foam rises above the top of the can to minimize oxygen in the can once the lid is sealed in place.

CANNING AT HOME

OK, enough about commercial canning and why cans are great, let's talk about canning at home. Until recently, canning beer was out of reach for most homebrewers. Now there are several home can seamers on the market and the price tag is very reasonable. I will go over several of the different units available and a basic how-to in a moment.

But first, I think it's worth telling a quick story for those who might be intimidated by canning beer at home. It was a few years ago at the National Homebrewers Conference while working at the MoreBeer! booth on club night. The Cannular had just come out and we had one for display along with a box of empty cans. We didn't plan on using it that night and no one on the team had any prior experience with it. With all that cold beer on tap all around us, we thought it would be pretty cool to fill and seam a few cans on the spot. Long story short, we canned up 200+ homebrew souvenirs for homebrewers in attendance that evening. That's how simple it was; having never used the device before, our team was able to figure it out on the fly during club night! Not saying you should have a beer in hand while operating one — in fact, my official stance on that is you should definitely not. The moral of the story is don't be intimidated by canning — it's a simple and easy process; just like bottling beer. Let's go over the basic process and how to use a can seamer.

STEP 1: FILLING

First thing we need to do is fill the can with beer. On a commercial canning line this is done very quickly in sequence. Typically, first purging with CO_2 and then capping/seaming carbonated beer on foam or can conditioning. Essentially all the same principles of bottling homebrew apply. This step is when you run the risk of picking up oxygen, so keep that in mind and do your best to mitigate it on a homebrew scale.

As for filling methods, if you can use it to fill a bottle, chances are it will fill a can. You have two major choices: Can conditioning or canning carbonated beer. If can conditioning, proceed the same way you would with bottles by calculating the amount of priming sugar per batch to reach your desired carbonation level or adding a carbonation tablet and then filling with a bottling wand.

Or you can fill your can with carbonated beer (which is more common, particularly on a commercial scale). Force-carbonate your beer and transfer with a counter-pressure filler or attach a silicone tube from your kegerator faucet and slowly fill the can. Allow the foam to pour slightly above the top of the can and put the lid on to minimize oxygen in the can. Just work quickly and don't be afraid to waste some beer via foam and you will keep your dissolved oxygen (DO) levels in check.

STEP 2: SEAMING

Once your beer is in the can, it's time to close it up with the can seamer of your choice — right? Well, technically yes, but now we're in the weeds of this article — can seamers! So, let's slow down and go over a few basic things about homebrew can seamers. Below is a basic step-by-step seaming process followed by some color commentary about the individual parts involved in these processes.

Overview of Can Seaming Process:

Step 1. The filled can is placed onto the base plate (or table).

Step 2. The filled can is then lifted and clamped into place between the upper chuck and the base plate.

Step 3. The upper chuck is then engaged into the can end, allowing the chuck to spin the can.

Step 4. While the filled can is spinning, the first operation seaming roller is fed into the end flange to form the initial seam. The second operation roller then flattens and completes the seam.

OK now that we have an idea of the process let's take a closer look at what some of these seamer parts you may not be familiar with actually are.

We'll start with the ***chuck*** as it's doing most of the heavy lifting and sealing of the can. The chuck holds the can end as the can is raised into it and then rolls and provides a hard surface for the rollers to close the can seam as it rotates. All of the homebrew can seamers included in the chart on page 38 come with a standard 202 diameter chuck and typically don't need much adjusting. There are many different can lid sizes on the market and within sizes there are three basic types or profiles; B64, CDL, and SuperEnds. But 202/B64 is the most common with 202 end cans being the typical tops to 12-oz., 16-oz., and 12-oz. sleek cans. The number represents the outer diameter, which is 2.02 inches. Then depending on the height of the can you have volumes of 12 oz. (355 mL), 16 oz. (473 mL), etc. Most can seamers allow you to swap out different chucks to seam larger diameter cans such as crowlers as well. The chuck is what the lid will fit up into while the manual or automatic seam rollers apply pressure and create the seam between the can and lid. As for the lids themselves, again there are numerous options available, but by far the most common is what they call a B64 style lid. Different lids can offer different size openings, such as standard, wide mouth, or full aperture. A can seamer is essentially just applying pressure to the can and lid to create a seam and seal your beer inside.

Photo by Chris Graham

Before being seamed, can lids fit easily into place on top of the can.

The ***seam*** is where the lid and the can itself come together to form an overlap. The amount of this overlap will determine how well the can lid will hold. Typically, we're looking for over 0.025 and up to 0.035 of an inch (0.64–0.89 mm) overlap. You can measure this by cutting a small tab in the seamed can with a Dremel tool and measuring with a pair of calipers. Depending on the can size and lids you're using, you may have to adjust your seamer up or down. The amount of this overlap can be adjusted by the next important part of a can seamer — the ***base plate*** or ***table***. The table is what raises the can into the chuck for sealing. Now I know we just talked about thousandth-of-an-inch gaps, but remember my story from Homebrew Con? These devices are really simple and easy to use with a little bit of understanding. Most tables are easily adjustable and lock into place with a set screw once configured to your desired height. Oktober's seamers come with a wave spring under the table that makes adjustment to the table height even less frequent.

The easiest way to dial in a can seamer is to fill a few cans with water and practice on those first. Essentially you want the table to put just a slight amount of pressure on the lid

CAN I EVEN FIND THEM?

As many of us probably heard, during the pandemic there was a shortage of aluminum cans and some breweries couldn't even get their hands on them. Having worked at a commercial brewery, I can personally attest to the prodigious dearth of cans at that time. Finding cans to package your beer has gotten a lot easier in 2022. I think it was a supply catching up with demand issue more than a resource thing at first. Think about it, a majority of breweries across the nation pivoted to packaged beer all at once in order to keep selling their product when customers weren't allowed in their taprooms.

To dig a little deeper into the subject I reached out to a couple contacts in the industry. One owns a mobile canning line and the other is the purchaser for a major wholesale company. The sentiment was very similar in that the supply was the main issue back then. Both of them said they are contracted to handle the continued elevated usage levels, and a good amount of expected growth as well. That's the good news — it doesn't sound like commercial or homebrewers are going to have any problems finding cans and lids.

The bad news, however, is that both of them said their costs have increased. I believe to some extent this is coming from inbound shipping costs and tariffs, so there could be some relief on that end at some point (one would hope . . .). The pandemic and war in Ukraine certainly play a part as well. Those are conversations for economists not homebrewers. But I digress. You should have no problems finding cans and lids in the months and years to come, if you are OK paying more for them.

when it's locked in place. Having liquid in the can replicates how firm the can will be when you go to seam with beer inside. After you run the seamer, an easy, low-bar test you can perform is simply turning the can upside down and squeezing it to see if you have a good seal or not (does it leak)? Rinse and repeat as needed until you get a good overlap. If it's within the parameters stated earlier, it should hold up to 90 psi. Once you've adjusted the table height (base force) and are getting a good seal, simply lock it into place and you're ready to start canning!

The next thing worth mentioning is power; that line from *Back to the Future II* comes to mind. "Hey, McFly, you bozo! Hoverboards don't work on water . . . Unless you've got power." Fortunately, you don't need power (but it makes it easier), because some can seamers can be completely manual. Essentially two steps can be motorized — the spinning of the chuck and the application of the seam rollers. A ***roller*** is what presses against the lid and chuck to complete the seam and ensure the can is sealed and pressure can be maintained. Powering (automated) / mechanically automating (turning a geared lever) either of these steps will not only make canning easier, it can also ensure a consistent seam in the case of the seam rollers. Skill using manual seam rollers can be just as good to help with over seaming. But it is worth noting that when using manual seam rollers, if you apply too much pressure you can over seam the can and it will leak. As with anything, it all comes down to what you're looking for and how much you want to spend.

The last thing we'll cover quickly is the cleanup. One piece that is available with many seamers is a ***splashguard***, which is handy to contain the potential mess caused by quickly spinning cans with drops of foam overflowing (remember, you are putting the cap on top of foam when canning carbonated beer). After canning a batch of homebrew a quick wipe down with water or sanitizer is recommended and occasional greasing of parts makes maintenance simple.

Photo by Chris Graham

The table raises the filled and loosely capped can against the chuck, which then spins the can as pressure from the rollers seal the lid into place.

Now let's take a look at the widely available homebrew can seamers on the market. These are all (at the time of this writing) under $1,000 and work with standard aluminum cans that are readily available. BYO

Chart 1: Single-can seamer comparison

Can Seamer	Can Compatability	Chuck	Seam Rollers	Splashguard	Price
Oktober - BENCHMK	Standard 16 oz. and 12 oz. cans, B64, 202 ends	Handheld power drill/driver (not included)	Manual with hard stop to prevent over-seaming	Included	**$499.00**
Oktober - The SL1 Can	Standard 16 oz. and 12 oz. cans, B64, 202 ends	Motor / Power Included	Manual with hard stop to prevent over-seaming	Optional ($159)	**$879.00**
All American - SF202A	Standard 16 oz. and 12 oz. cans, B64, 202 ends	Manual / Flywheel	Mechanically Automated	None	**$949.00**
All American - S202A	Standard 16 oz. and 12 oz. cans, B64, 202 ends	Manual / Hand crank	Mechanically Automated	None	**$849.00**
Kegland - Cannular	Standard 16 oz. and B64 202 ends *12 oz. cans (*Required spacer sold separately $24.99)	Motor Included (Power supply sold separately, $87.98)	Manual	Optional ($49.99)	**$549.99**
Kegland - Cannular Pro	Standard 16 oz. and 12 oz. cans, B64, 202 ends	Motor Included (Power supply sold separately, $109.99)	Automated	Optional ($59.99)	**$699.99**

Photos by Charles A. Parker/Images Plus

LAUTERING FOR ALL-GRAIN BREWERS

Maximize efficiency through the lauter

by Brad Smith

Lautering appears to be a simple step in all-grain brewing. We run hot water through our grain bed after the mash step to extract the wort we need, and then proceed to boil, chill, and ferment that wort into beer. However, there are a lot of important processes happening during the lauter that determine the gravity, volume, and quality of our wort and finished beer.

In this article I'm going to break down lautering including important equipment design and process factors. Knowledge of these factors can help you get more efficiency out of your system, as well as hit your target gravities and volumes every time.

MASH EFFICIENCY AND BREWHOUSE EFFICIENCY

When we talk about the mashing process as a whole, many brewers focus on the efficiency of the mash process. Mash efficiency measures the percent of potential grains by weight converted into gravity points in the extracted wort. It is distinct from brewhouse efficiency, which measures the overall percentage of gravity points that make it into the fermenter. Brewhouse efficiency is lower than mash efficiency because it includes losses that occur later in the brewing process.

Mash efficiency is calculated totaling the weight times the potential/yield points for each grain, which is typically listed as the dry grain fine yield. The yield represents the highest possible percentage of sugars by weight you could extract under laboratory conditions. Potential is another measure for the yield, and usually expressed as a specific gravity representing the gravity from a pound of grain into a gallon of water. These are the same measure, but expressed in different units. Using either measure you can calculate the potential gravity points for a given grain bill, which you then divide into the volume to get the estimated ideal gravity of the wort.

In the real world, no one achieves the ideal extraction during the mash, which would be 100% efficiency. The percentage of the ideal you achieve is called the mash efficiency, and is often in the 80–85% range for homebrew systems. If we include other losses in the system as we go from lauter tun to fermenter, the efficiency drops further and the percent we achieve going into the fermenter is called the brewhouse efficiency. This number is typically in the 65–75% range for many homebrewers.

I will also note that having an optimal mash or brewhouse efficiency is not as important for homebrewers as it is for commercial brewers. At a homebrewer level, a 5% lower efficiency might mean only an extra pound (0.45 kg) of grain is needed to get to our target gravity, which is a nominal expense of a dollar or two for most homebrewers. However, at a commercial level a 5% increase in efficiency would mean 5% less grain costs over an entire year, which could be a substantial savings. So we don't need to be obsessive about our homebrew system efficiency even though as brewers we want a system that is effective.

LAUTER TUN DESIGN CONSIDERATIONS

A lauter tun is simply a vessel designed to hold the grains while lautering and filter out the grain matter from the wort. Ideally it will also extract as much of the color and sugars as possible from the grains, which will improve our mash efficiency. In most modern brewing systems the mash tun doubles as the lauter tun, so we often mash and lauter in the same vessel.

The lauter tun should be designed to maximize efficiency. It is important to understand, first, that the sparge operation is a *diffusion process* rather than a *rinsing process*. We're not simply rinsing the sugars out of the grains, but instead giving the water a chance to dissolve those sugars into solution creating wort. This does take some time so it is important not to rush your sparge.

The grain bed is composed of grain particles, sugars, and grain husks. The grain husks help to form a natural filter bed that aids in extraction. The mashed sugars are mostly soluble, which aids in extraction. Unfortunately the grain bits are not uniform in size, and their variation leads to instabilities in flow and a loss of some efficiency.

One of the first design considerations is the width and height of the lauter tun. It might appear at first that a high, narrow lauter tun would be more efficient because the water would have to flow more slowly through a thicker grain bed. In reality it turns out that if the grain bed is too tall it will actually compact down due to weight, and inhibit the flow. Similarly if the grain bed is too shallow, the grain filter bed will never form and the wort will not properly clear.

At the homebrew level, the rule of thumb is that the grain bed height-to-width ratio should be between 1:2 and 2:1.[1] Assuming a cylindrical lauter tun, this means in practice the height of the lauter tun should be at least as high as the diameter of the lauter tun. Keep in mind that the rule of thumb above is for the grain bed itself and we'll always need additional height to account for water added when sparging to maintain a floating grain bed as well as the fact that our lauter tun needs to account for variation in the grain bill to support high-gravity batches. Both of these factors drive most lauter tuns to be closer to a 2:1 height-to-width in practice.

A second major consideration in lauter tun design is the flow of the wort through the grain bed. Water will always choose the path of least resistance, and as noted earlier variations in the crush will form natural channels through the grain bed, extracting more sugars from some parts of the grain bed than others.

The filtering system we use at the bottom of the lauter tun can potentially make these channels much worse. Consider for a moment a lauter tun with a single small hole in the middle of the bottom of the vessel. All of the wort would need to pass through that one hole, creating a single channel that excludes a large portion of the grain bed, resulting in very poor efficiency. It would also be excruciatingly slow, as all of the wort would have to travel through a single small hole.

A sparge arm is one way to ensure sparge water is distributed evenly across the top of the entire grain bed without disturbing the grain itself.

As we add more holes and expand the area covered, more channels will form, and the efficiency will rise. For example a manifold pipe in the bottom of the grain bed with dozens of holes will certainly work better than a single hole. A full screen filter bed with hundreds of holes that covers the entire bottom of the lauter tun is ideal, as potentially hundreds of channels are created covering most of the grain bed area.

Another design consideration is the dead space under the filter bed. As long as the system is designed to recover this dead volume, it won't have a significant impact on efficiency. However, if you are mashing in the same vessel as you lauter, then the dead volume needs to be considered as it will alter the water-to-grain ratio in the mash and could leave you with less water in the grain bed above the filter. So if you have a mash tun with a large dead space, you may need to use more water in the mash to achieve your desired water-to-grain ratio.

A final consideration for lautering is how to feed your sparge water into the grain bed from the top. This is, in many ways, analogous to the filtering design issues mentioned earlier. If we imagine adding hot water to the lauter tun from a single point, it is not hard to see that this can form a single channel through the grain bed resulting in low efficiency. Ideally we want to distribute the water evenly across the top of the entire grain bed without disturbing the grain bed itself.

It is for this reason that many commercial and advanced homebrewing systems use a sparge arm that rotates to evenly distribute sparge water over the top of the grain bed. Others use a spray nozzle to get a similar effect. I also try to keep my grain bed floating during the entire sparge by regulating the flow of water in and out of the lauter tun.

PROCESS CONSIDERATIONS

With an understanding of the design considerations of the lauter tun, we now turn to some of the process factors that drive lautering.

Grain crush size

Perhaps the most important of these is getting a proper grain crush up front. As I mentioned earlier, the grain husks form a filter bed that helps to form tiny channels that prevent the water from running straight through the bed. These husks also prevent the small bits of grain from clogging up your filter screen, which would result in a stuck sparge.

An ideal grain crush has large, partially intact grain husks but very small bits of the malt's endosperm from the interior of the seed. In most cases a dual roller mill is needed to achieve this proper crush as the rollers will crush the interior of the grain but leave large intact pieces of husk. You would like to have the interior bits be as small as possible without destroying the husk pieces or resulting in a stuck sparge.

To do this you need to adjust your malt mill gap carefully, and experiment with your specific system as different systems have slightly different size filter bed holes and layouts. This means that some systems may handle a finer grain crush than others. Ideally you want to crush your grains as fine as possible without creating a stuck sparge situation.

Mash and sparge volumes

A second process consideration is getting your mash and sparge volumes correct. The volume of water needed for the sparge is driven by the total mash water needed. First, your pre-boil volume is critical as that determines the total amount of wort you need to extract in the lautering process. This volume can be calculated by taking your desired batch volume into the fermenter and adding to it your boil-off volume and losses (trub loss being the major one).

To your pre-boil volume you need to add the grain absorption, which is the amount of water that will be absorbed by the grain itself. This is typically around 1 pint of water per pound of grain (approximately 1 L/kg). BeerSmith uses 0.96 pints per pound of grain (1 L/kg) as the default. Brew-in-a-bag (BIAB) brewers achieve more grain bed compression, and typically a number of about 6 fl. oz./lb. (0.4 L/kg) is used, though obviously there is no lauter step with a BIAB system.

Adding together your target pre-boil volume to the grain absorption and also any dead space (losses) in the lauter tun will give you the volume needed for total mash water used. From there it is a matter of dividing the total mash water between the mash and sparge.

Usually the mash portion is determined by the water-to-grain ratio you want to use for the mash itself. Most modern mashing is done in the 1.2–1.7 quarts per pound range (2.5–3.5 L/kg). So determining the

mash water needed can be calculated directly from the weight of all of the grains used in the mash. Finally, take your total mash water needed and subtract the mash portion to get the water needed in the sparge. This is the volume you will heat up separately for the sparge step.

Temperature and the mash out

Another consideration for lautering is what temperature to use as well as whether to include a mash-out step. A higher temperature will decrease the mash viscosity, which can aid in extraction. Hotter sparge water will make the sugars in the grain more soluble and easier to dissolve. In addition the hotter water is less viscous, which also helps to reduce the chance of a stuck sparge, particularly when working with non-barley adjuncts.

Some older references include a warning about getting the mash water too hot (about 180 °F/82 °C is often cited) as it could result in excess tannin extraction during the sparge. In reality, assuming a proper pH, a higher sparge temperature does not increase the risk of tannin extraction, so you can add near-boiling water in the sparge, which will raise the overall temperature of the mash bed and increase viscosity.

The Brülosophy blog did an experiment on "cold sparging" with room-temperature water. They compared a beer lautered at conventional temperatures versus one that was lautered with cool water. While they did get a slightly higher original gravity (better extraction) in the batch that was hot sparged, blind taste tests between the hot sparge and cold sparge beer found no difference in the overall flavor of the beer.[2]

Which brings us to the decision on whether to use a "mash-out" step. The purpose of a mash-out step is to raise the temperature of the grain bed up to about 168 °F (76 °C) to halt enzymatic activity and decrease viscosity. In reality, enzymatic activity does not have a hard cutoff temperature, and you really don't need to "halt" it after conversion, as it will certainly be curtailed in the boil. So the main reason to do a mash out would be to decrease viscosity and increase solubility of extract in the wort. This is primarily needed when working with sticky non-barley adjuncts like wheat to avoid a stuck sparge. So the rule of thumb I use is to do a mash out when my grain bill has a large portion of non-barley adjuncts.

The decreased viscosity and increased solubility of extract in the wort caused by the mash out may also improve efficiency, especially for high-gravity beers. Also it reduces the time needed to bring the wort up to a boil. Doing a cold sparge will lower the overall wort temperature, so it will take much longer to achieve a rolling boil as you transition to the boil phase.

Lautering time

How long should you lauter? As I mentioned in the section on lauter tun design, lautering is a diffusion process and not a rinsing process, so ideally you want to lauter slowly. I typically will take at least 20–30 minutes to lauter my mash, and sometimes run slower if working with sticky non-barley grains.

I also regulate the flow in and out of the lauter tun to maintain a floating grain bed. By keeping the grains floating until the very end of the lauter, you avoid compacting the grain bed too much, which can result in a stuck mash or poor efficiency.

The pH of the runnings

While most homebrewers do not need to worry too much about the pH of the runnings, commercial brewers often do monitor the pH of the wort as it comes out of the lauter tun. The pH will start close to the pH of the mash (5.2–5.6 is recommended) but will rise as more alkaline water is run through the acidic grain bed. For light-colored, lower-gravity beers in particular the pH can rise fairly rapidly near the end of the lautering process.

If the pH of the runnings rises above 6.0 you run the risk of extracting tannins from the grain husks in the grain bed. Tannins can create a bitter, sour off-flavor akin to sucking on a tea bag. For this reason most commercial brewers will stop lautering when the pH of the runnings exceeds 6. For homebrewers, this is rarely an issue as long as your starting mash pH is adjusted down to the 5.2–5.6 range, but can be an issue for some low-gravity, light-color beers.

The vorlauf and recirculation

The traditional lautering process begins with a step called the vorlauf. This is a German name for drawing off the first bit of runnings (generally a couple quarts/liters for a 5-gallon/19-L batch) from your sparge and adding it back to the top of the mash tun. This is done to give the grain bed a chance to set and also remove the large number

Mashing out around 168 °F (76 °C) will decrease viscosity and increase solubility of extract in the wort—benefits that will help prevent a stuck sparge and improve efficiency.

of grain bits and debris that come out initially during the sparge, improving clarity. It also moves water to the top of the grain bed and avoids diluting wort in the kettle. I do recommend using a vorlauf step if you are doing a traditional lauter.

Many modern brewing systems and even many small all-in-one systems now incorporate a pump for recirculating the wort during the mash. This is similar to the vorlauf step, but often the pump runs continuously until the lauter begins.

Recirculation has some benefits. It sets the grain filter bed early so you have an established bed when you begin the lautering process. It also aids in clarity, as you won't get the initial wave of grain bits and debris when you start sparging.

The only downside of continuous recirculation is that it can set up channels in the grain bed, which may ignore or bypass some portions of the grain bed. This is particularly true if the system recirculates the wort out to a single fixed point in the top of the grain bed rather than distributing it across the grain bed with a sparge arm or similar device or if the recirculation rate is too fast. This can result in a drop in efficiency, as the wort will flow through the established channels instead of flowing evenly through the entire grain bed.

High-gravity beer considerations

While I've covered all of the major factors in lauter tun design and the process by this point, I want to also address the special case of high-gravity lautering. When you brew a high-gravity beer, your efficiency will drop off substantially. The reason for this is simply that you have roughly the same quantity of overall water for the batch running through a much larger quantity of grain.

As I mentioned earlier, lautering is a diffusion process where the sugars we converted during the mash dissolve into the water forming wort. Unfortunately, as the gravity of the wort goes up it becomes increasingly difficult to put more sugar into it. In effect it becomes more difficult for the wort to absorb additional sugars as the gravity rises. So having a larger amount of grains in roughly the same amount of water (driven by our desired pre-boil volume) results in lower overall efficiency.

You need to account for the lower efficiency by using even more grain, which to some degree makes the problem worse. In some cases you will need more grain than may fit in your mash tun, and may need to move to other techniques like adding malt extract during the boil to hit your original gravity or brewing smaller batch sizes. However, you can improve your high-gravity efficiency by raising the temperature during the sparge, because hot water will make the sugars more soluble.

Therefore doing a mash out and high-temperature sparge is a good idea when brewing a high-gravity beer. In addition, you will need to lower your mash and brewhouse efficiency when brewing big beers to account for the lower efficiency achieved. Many brewers maintain two separate equipment profiles for regular brewing and high-gravity brewing to account for these factors.

Performing a vorlauf step, where about 10% of the wort is drawn off and then poured back over the grains, allows the grain bed to set and also helps filter out small bits of grain before running the remainder of the wort to the boil kettle.

SUMMARY

Though lautering may sometimes be looked at as simply "rinsing" the grains, the actual process is a bit more complex than that. Achieving an efficient lauter involves selecting a well-designed mash and lauter system, properly crushing the grains, selecting the right temperature, sparging slowly, managing the flow in and out of the lauter tun, and monitoring the pH of the runnings. Additional care must be taken with high-gravity beers to make sure you don't overflow the capacity of your mash tun and achieve good extraction. Follow these tips and reap the rewards. BYO

RESOURCES:

[1] Palmer, John. *How to Brew.* Brewers Publications

[2] Found, Ray. *Impact Sparging with Cool Water Has on an American Amber Ale* https://brulosophy.com/2016/04/11/

Photo by Charles A. Parker/Images Plus

Chicha Beer

A reimagined style emerges from the high Andes

by Gordon Strong

During a visit to Quito, Ecuador last year, I had the pleasure to learn about an emerging style of beer, chicha beer, that is starting to be made throughout the Andean mountain region. Wait! Don't run away – this article has nothing to do with spitting in your beer. Most Americans know of chicha only through the old *Brew Masters* TV show where "Sam heads to Peru to explore an ancient corn-based brew called chicha; then, it's all hands on deck in Delaware when the Dogfish staff uses human saliva to brew their own chicha." Seriously, that is the actual synopsis the network used for the episode.

Historical chicha at one time did involve chewing the grain to provide enzymes as an alternative to mashing, but this modern style of chicha beer is an homage to that indigenous brew but involving more current (and I dare say, more sanitary) brewing practices. However, some elements of that story remain — it is from the Andes, it involves corn, and it is traditional. I have seen this transformation of traditional styles elsewhere — such as modern Finnish sahti, modern takes on medieval gruit, and updated colonial ales in the U.S. So, I do think that updating historical beers to modern times does make for interesting styles, just don't think of these current interpretations as recreations of the originals — they are re-imagined.

DISCOVERING THE STYLE

My journey to discover the style involved judging at the Copa Cervecera Mitad del Mundo (Middle of the World Brewer's Cup) in Quito. Mitad del Mundo is a monument in Ecuador marking the location of the Equator, and is often used informally to refer to the country. My friend, Nathan Keffer, was the competition organizer and he told me that I was going to judge a new category called chicha beer. He had written a draft style description and had a full flight of 11 beers for me. He told me that chicha was produced in countries like Ecuador, Peru, Chile, Bolivia, Colombia, and Costa Rica.

I was concerned about my lack of understanding of the style, although I had previously tried chicha in Chile and Peru. However, he had two experts to assist: Beer Judge Certification Program (BJCP) judges and brewers Andrea Huerta from Peru and Jose Pinos from Ecuador. These two kindly and patiently spent over an hour teaching me about the historical beer, including showing me some videos of its production. We then discussed how this new style re-interpreted the original. Only then did we get down to judging. It was quite a varied flight, but there was one beer that really caught my attention. It was described as "60% corn, 30% Pils, 10% raw wheat, 15-min. boil, no hops, Ecuadorean herbs, flowers, spices; split ferment *Lacto* and *Sacch,* bottle conditioned with *Brett*" — good detail.

Later in the competition, I had the honor of judging Best-of-Show (BOS). That chicha beer was on the table, and I could tell it impressed the other judges. Somewhat like an American wild ale, but you could swear it had hops in it. Very enjoyable. When I judge a beer in an earlier round that advances to BOS, I typically let all other judges express their opinion before mentioning that I had passed that beer. It was

not a unanimous decision, but four out of five judges thought that beer was the best on the table, and it won the competition. But at this point I didn't know its identity; the awards festival was planned for the evening of the following day.

The next day I was planning to do some sightseeing, but missed the bus. Undeterred, I saw a group of judges in the hotel lobby and started talking to them. My frequent interpreter, Carlos Estrada from Colombia, was among them, and he mentioned that they were going to a local brewery that had come highly recommended from other beer geeks. I asked if they had room for me to join them, and fortunately they did.

I learned we were visiting Cervecería Quiteña, a small farmhouse-style brewery outside of Quito. The brewer, Andrés Erazo, and his wife, Cristina Harja, graciously showed us their entire brewery and led us through a tasting of several of their beers. They had a chicha beer that seemed interesting — but it wasn't the one I judged at Best-of-Show. Since the results had not been announced, I said nothing about this style other than noting that I had judged it during the competition.

Later, at the festival, I was surprised when Quiteña was announced as the BOS brewery. Apparently, they had made multiple versions of the beer and I had tried a different one earlier that day. Also, it turns out the arguing amongst BOS beers was pointless, since the top two beers were from this brewery. After returning home, I was able to get additional information from Andrés about his beers, and that information was invaluable in preparing this article. He also invited me to an online workshop earlier this year where brewers from five different countries discussed how they interpreted the style.

LINKS TO THE PAST

Chicha beer retains some of the character of the traditional indigenous *chicha de jora* (made from malted yellow corn, soaked and dried in the sun), in that it has an earthy corn character and is usually at least somewhat sour. Traditional chicha is produced through a laborious process using a long boil but no mashing. In some versions, unmalted corn is cooked first, then milled, then wrapped in plantain leaves for a week before being used. It ferments often using a fruit-based starter (spontaneous fermentation of pineapple rinds) and develops character through micro-oxygenation — fermenting in clay pots covered with cloth, kind of like making traditional Kosher dill pickles. It is often filtered with straw before a mixed fermentation of yeast and bacteria takes place, where repitching of fermentation sediment is common. No hops are involved, but regional herbs, spices, and flowers provide bitterness, aroma, and flavor. It is often sold very fresh, while fermentation is still active.

Variations exist by region, and corn is not universally used. Ingredients are defined by regional and seasonal availability — *terroir,* anyone? Some Amazonian regions use manioc, and other grains like quinoa can be added. Fruit certainly can be used (particularly the small mountain strawberries of the region), but it isn't a requirement. Since there is some intentional oxidation in the process, a light acetic character is acceptable as long as it does not get out of hand. Chicha can have a variable sweetness, and is often thick and cloudy, like many historical beers. Alcohol levels are usually not high. As you can imagine, these aspects make the beer somewhat unstable and it must be consumed quickly before it spoils.

I also tried some other regional drinks such as chicha morada (purple chicha) and colada morada, a sweetened, spiced drink often associated with the Day of the Dead celebration. I think it is important to understand that different countries have varying traditions and interpretations, and that any of these can be drawn upon to create a modernized version. Do not make the mistake of assuming there is a single inspiration for modern chicha beer.

MODERNIZING A TRADITION

Modern chicha beer adapts some elements of *chicha de jora* while using some modern brewing methods that add to stability and drinkability. It's more than a mere nod to tradition, there is a strong sense of respect of the regional heritage involved. It's innovation without a cavalier attitude, never forgetting the cultural foundations. Some modern producers see producing chicha beer as an act of rebellion, honoring their pre-Hispanic heritage. They are proud of creating products with creativity, excellent ingredients, and modern

Photo by Gordon Strong

Chicha beer is often filtered using straw in the lauter tun prior to undergoing a mixed fermentation.

health standards.

Chicha beer should use a significant percentage of malted corn (often produced at the brewery, or from artisanal suppliers using purple, white, yellow, red, or blue corn). Other grains can be used as well, but are generally base-type grains. The saison farmhouse tradition is the closest analog; Pilsner malt, wheat, oats, quinoa, or other regional grains are often used. Some of these additional grains can be malted (barley and wheat, in particular) or raw. But an all-corn version is certainly possible.

Hops are often not used, or if used, are used at a simple level as in kettle sours (something under sensory threshold level for antibacterial purposes). Instead of hops, chicha beer can be flavored with a wide range of traditional Andean medicinal herbs, spices, and flowers. Some herbs I saw mentioned were *cedrón* (lemon verbena), *toronjil* (lemon balm or sweet Melissa), *escancel* (bloodleaf), *hierba luisa* (lemon grass), *hierba buena* (spearmint), and *congona* (*Peperomia inaequalifolia*). Flowers included sweet violet, rose geranium, malva, *manzanilla* (chamomile), and *ataco* (purple amaranth). Spices are used a little less frequently, but can include *clavo* (clove), *ishpingo* (Amazon cinnamon), *canela* (cinnamon), and *pimenta dulce* (allspice). I often saw a raw brown sugar called *panela* or sometimes honey used to adjust sweetness. Fruited versions most often used wild strawberries, but also could include pineapple, orange rind, peaches, blueberries, or other local fruits such as golden berries.

While I have mentioned a long list of potential ingredients, I think some care needs to be taken not to use too many of them or to use them in clashing combinations. It's easy to make a train wreck of a beer by overdoing the additional ingredients. Selecting a combination of herbs that mimic hops is quite a task, involving experimentation. I personally would lean heavily into those with lemony or minty characteristics, and go very light on any spice additions. I always worry about using too much clove since that will trigger the phenol off-flavor sensors of many judges, but cinnamon-like flavors are fair game.

Photos by Gordon Strong

Chicha is generally made with a high percentage of malted corn (colors vary) and regional herbs, spices, and flowers to provide bitterness, aroma, and flavor in place of hops.

Modern mashing and boiling techniques can be used in the brewhouse to produce the wort for chicha beer. In the workshop, I heard brewers discuss several different types of mash programs — infusion, step, and decoction. Likewise, I heard of several different fermentation programs including kettle sour processes, mixed fermentation techniques, and blending of split fermented products. Some were exploring barrel aging as an alternative to clay pots to introduce micro-oxygenation. One brewer mentioned how strains of *Brett* were isolated from historical clay fermentation pots. I didn't see anything standardized, so I think brewers are free to use whatever production and fermentation methods they see fit to produce the beer with the desired finished profile.

The use of alternative grains like these may cause lautering difficulties. Several brewers recommended using rice hulls, straw, or brew-in-a-bag to improve lautering. Experimentation with different grist compositions to gain enzymes and consistent results is possible, particularly if producing your own malted corn.

SOURCING INGREDIENTS

Some of the brewing ingredients might be difficult for those outside the Andean region to find. Googling "how to malt corn" can tell you how to try this at home. I would start with dried corn sourced from a local Latin-American *supermercado* — mine has dried purple corn with large kernels. If you know artisan maltsters, particularly those who are exploring heirloom varieties, you may find they produce malted corn. One such maltster I found is Sugar Creek Malt in Lebanon, Indiana.

If you want to make the beer using a mini-mash, a good substitute for the malted corn is pre-cooked masarepa, or white corn meal flour. I found the P.A.N. brand widely available at Latin markets. Look for something designed to make arepas rather than masa harina since Andeans prefer the more pure corn flavor from it as it is less processed.

Ecuadorian horchata is an herb tea blend, not to be confused with Mexican horchata, a sweet rice drink with cinnamon. Horchata lojana is another Ecuadorian herb tea – I found iLe Té brand online, among others. These products are good substitutes or bases for the herbs — just don't choose actual tea since you don't want those extra tannins or flavors. Farmer's markets or health food stores might also be a source for some unusual herbs, or stores that cater to traditional medicinal herbs or natural healing. If you can't find individual herbs to create a blend, purchasing

one of these commercial mixes might be a better choice. Breweries in Ecuador often purchase a mixture from local foragers.

If you want to experiment with creating your own chicha starter, you can try cutting up some pineapple rinds, mixing them with ground corn or sugar, putting them in a jar on the counter covered by cheesecloth, and leaving it alone for 2–3 days. The goal is to let a little air in but keep flies out. This is like making *tepache*, a sweetened Mexican drink with cinnamon. Personally, I would go with brewer's yeast, *Lactobacillus*, and *Brettanomyces*, like a mixed fermentation beer, but this might be a more traditional alternative.

Yeast selections should favor attenuation. Diastatic yeast like saison strains work well. Andrés Erazo said he uses yeast from Yeast Bay but that dry yeast like LalBrew Belle Saison works great. He also suggested a clean yeast like SafAle US-05 as a good, widely available choice. Since there are no hops in these beers, any type of *Lacto* will work. *Lactobacillus plantarum* is a popular choice for sour beers. If using *Brett*, a *Brett Bruxellensis* strain gives good results.

Chicha Commercial Examples

Akademia Brewing (Athens, GA)
Chicha – N – Tito's
Bent Hill Brewery (Braintree, VT)
Chicha
Cervecería Barbarian (Lima, Peru)
Chicha Tu Mare Sour Ale
Cervecería Quiteña (Quito, Ecuador)
Fandango
Dos Luces Brewery (Denver, CO)
Chicha Inti
Dos Luces Brewery (Denver, CO)
Túpac Amaru Imperial Chicha
Hammerton Brewery (London, England)
Chicha Sour
Intracoastal Brewing Co. (Melbourne, FL)
Peruvian Chicha Cerveza
Neches Brewing Co. (Port Neches, TX)
Cherokee Chicha
Off Color Brewing (Chicago, IL)
Wari
Tetrad Brewing Co. (Greenville, SC)
Chicha Morada

SENSORY PROFILE

It's hard to write a traditional sensory profile for this style since it is so variable based on the choice of ingredients. I think it should show evidence of the ingredients used, but also have some basis in one of the traditional beverages. In general, most chicha beer will have corn in it, but might not seem overly sweet "corny" in flavor — rustic or earthy is more accurate. Maybe more like field corn than sweet corn. Most people associate some acidity with chicha, so it makes sense for some to be present in chicha beer (although a few producers are experimenting with chicha without sourness). However, excessive acidity is a fault, as is an overly acetic, vinegary product. Drinkability is important, and an overly acidic, acetic, or funky chicha beer would be more reminiscent of a spoiled or rancid chicha, not a fresh one. Acetic acid is a sensitive issue; maybe it's like a Flanders Red — a little is OK as long as it doesn't dominate the character.

The use of Andean herbs is a common theme, but many of these have lemony, minty, or sweet characters. Many herbs are also bitter and can balance the natural sweetness of beer. I found many examples to be virtually indistinguishable from hopped beer, with pleasant levels of bitterness and an aromatic quality that could be ascribed to some varieties of traditional hops. Maybe not some of the most modern or extreme hop varieties, but they didn't seem vegetal, grassy, or overly "green."

Traditional chicha is lightly carbonated but modern chicha beer can be almost Champagne-like in character. The sweet, thick, heavy traditional drink is modernized to a fully attenuated, dry character. Since interpretations can vary, the body and carbonation ranges are broad, as is the balance. Most modern versions tended to the drier and more lively style, as this tends to be more stable and drinkable.

TOWARDS A NEW STYLE

Chicha sometimes gets a bum rap in Latin America, as it is often associated with old times, lower class people, and rural areas. Which is ironic, because it was once the drink of Incan nobility. The modern public thinks of it as something sold on the street in plastic bottles, leading poor people to get crazy. I think that viewpoint is symptomatic of how many traditions are viewed by those who wish to leave the past behind, particularly after Spanish colonial times when new traditions were introduced (including the belief that wine was superior to any local drinks).

I see how deeply cultural roots run in the Andean region and how passionate people are about preserving their heritage. I think chicha beer represents a good balance between modernization and tradition, and I hope it is a model for how other indigenous world beer styles can be rediscovered and reinterpreted in our times. It could be something of a renaissance, where a once-noble drink is elevated from its somewhat denigrated current position back to its rightful place as something to be admired.

I have been assisting the chicha beer enthusiasts in defining their style in modern terms. It's been a challenge since the beer is so ingredient-driven. I think it makes more sense to think of the beer as a specialty-type beer as far as defining the beer in BJCP terms rather than a classic style base beer with some added ingredients. As a specialty beer, the brewer can define the ingredients and process, and give information to judges as to how to evaluate the concept. I think this offers more flexibility in preserving the creativity of the brewers without constraining the varying local traditions. I look forward to seeing how this style develops and is used in future competitions. I expect it to be a regional style in Latin America since some knowledge of the traditional beverages are needed to give a fair evaluation.

CERVECERÍA QUITEÑA'S FANDANGO CLONE

(5 gallons/19 L, all-grain)
OG = 1.040 FG = 1.002
IBU = 0 SRM = 2 ABV = 5%

My deepest thanks go to Andrés Erazo of Cervecería Quiteña for these recipes. These represent one approach to producing modern chicha beer, not the only way. The goal of this beer is a Champagne-like chicha beer, very dry and highly carbonated. See the "Sourcing Ingredients" section of the article for more information about obtaining some of these ingredients that are less common outside of South America.

INGREDIENTS

5 lbs. (2.3 kg) malted corn
3 lbs. (1.4 g) Pilsner malt
1 lb. (450 g) unmalted wheat
3–4 oz. (85–113 g) Horchata lojana herbal tea blend
LalBrew Belle Saison, Wyeast 3711 (French Saison), or Yeast Bay Wallonian Farmhouse yeast
2 g Lallemand WildBrew Sour Pitch or other *Lactobacillus* of choice
Brettanomyces Bruxellensis of choice, such as Yeast Bay Beersel Brett Blend
¾ cup corn sugar (if priming)

STEP BY STEP

Mash the grains in 152 °F (67 °C) water for 60 minutes. Slowly ramp up to 170 °F (76 °C). Transfer mash to lauter tun lined with straw. Sparge slowly and collect 6.5 gallons (24.5 L) of wort.

Boil the wort for 90 minutes. Add herbal tea at knockout, stir, let steep for 20 minutes, then chill wort to 95 °F (35 °C). Run off half the wort into your first fermenter. Pitch the *Lactobacillus* in this fermenter and give it two or three days to sour at temperatures up to 104 °F (40 °C).

Chill the remainder of the wort to 68 °F (20 °C) and rack it into the second fermenter and then pitch the saison yeast. Allow yeast to free rise in temperature up to 79 °F (26 °C).

When the first (*Lacto*) fermentation is complete, mix it into the second fermenter, and allow the blended batch to ferment dry. When fermentation is complete, rack the beer, bottle condition with the *Brett*, or keg and force carbonate to 2.4 v/v.

Corn meal option:
Replace the malted corn with 4.5 lbs. (2 kg) pre-cooked white corn meal (such as P.A.N. brand), increase the Pilsner malt to 3.5 lbs. (1.6 kg), and eliminate the unmalted wheat from the all-grain recipe. Follow the same step-by-step instructions, adding the corn meal to the mash with the Pilsner malt.

HOMEBREW CHICHA BEER

(5 gallons/19 L, all-grain)
OG = 1.048 FG = 1.010
IBU = 0 SRM = 2 ABV = 5.1%

This is a more traditional, rustic version using homemade and locally sourced ingredients.

INGREDIENTS

5.5 lbs. (2.5 kg) Pilsner malt
5.5 lbs. (2.5 kg) malted corn
3–4 oz. (85–113 g) blend of dried lemon verbena, chamomile, mint, cinnamon (blended to taste)
Tepache starter (see step by step)
SafAle US-05 or a saison yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Two or three days before brewing, prepare the tepache starter. Wash a very ripe pineapple well. Cut off and chop up the peels. You can also add the pineapple core, chopped. Reserve the flesh of the pineapple for eating. Place the peels and the core, if using, in a pitcher or large jar. Add enough of a 1.030 solution of water and corn sugar to completely cover the pineapple. Cover container with cheesecloth and leave in a warm (77–86 °F/25–30 °C) place for 2–3 days, skimming white foam from the top every 12 hours. Strain and use as your starter after the wort has been prepared. Do not allow to ferment longer, or it will get too vinegary.

Using a brew-in-a-bag technique, mash the grains in 156 °F (69 °C) water for 90 minutes. Remove bag with grain, leaving behind 6.5 gallons (24.5 L) of wort.

Boil the wort for 60 minutes. Add the herbs at the end of the boil and allow to rest for 20 minutes before running off.

Transfer to fermenter, chilling to 68 °F (20 °C). Add the tepache starter allowing a free rise in temperature up to as high as 77 °F (25 °C). Ferment for three days. After this time, pitch *Saccharomyces* yeast of choice and allow fermentation to run to completion.

Rack the beer as gently as possible without disturbing carbonation, package in plastic soda bottles and serve within the next week, or keg and force carbonate.

Partial mash option:
Replace the malted corn with 5 lbs. (2.3 kg) pre-cooked white corn meal (such as P.A.N. brand) and reduce the Pilsner malt to 5 lbs. (2.3 kg).

Two or three days before brewing, prepare the tepache starter using instructions from the all-grain recipe.

Using a brew-in-a-bag technique, mash the grain and cornmeal in 156 °F (69 °C) water for 90 minutes. Remove bag with grain, leaving behind 6.5 gallons (24.5 L) of wort.

Boil the wort for 60 minutes. Add the herbs at the end of the boil and allow to rest for 20 minutes before running off.

Follow the remainder of the instructions from the all-grain recipe.

BY DREW BEECHUM & DENNY CONN

INTO THE CIDER HOUSE

When fall calls, we pick up

Do you feel that? Cold temperatures are whispering their sweet sigh of relief after summer's long tyranny of heat. And when the temperatures start to fall, it's natural to think of apple cider — America's foundational beverage. There's so much fun to be had with apple cider fermentations . . . why wouldn't you play?

Before we dig deeper, yes, hard cider was America's original tipple of choice. Quality brewing ingredients were scarce in early days, but apples flourished in the colonies and required far less equipment and know-how to convert to a fine fermented beverage.

At the heart of it — hard cider, like other fruit wines, is simple stuff. Grow apples, crush them, ferment the juice and enjoy. Like almost all simple things, there's deeply weird complex knowledge hidden just below the surface.

In the wide world of apples, there are thousands of varieties because apples don't grow true from the seed.

Photo by Brenda Bailey Collins

PICKING YOUR APPLES

The first is the apples themselves. The varieties you can find in the grocery store are "culinary" apples – apples for eating, either out of hand or baked, etc. The flavor profiles tend to the sugary sweet and highly tangy sharp — although these days it is harder to find apples that are acid focused without an overwhelming sweetness.

In the wide world of apples, there are thousands of varieties because apples don't grow true from the seed. Most of those weird and wooly apples are tannic and horrifying to our palate (try eating a crabapple). But those tannic and bitter apples actually hold the key to making a great glass of cider.

If you're Denny and live with land in a climate conducive to growing apples, then go forth, plant trees and have fun. (Trees, intentionally pluralized so you can reliably have pollinated trees that put out a good harvest). Starting with whole fruit, you do need tools to process the apples and get at the juice. Namely, you need to scrat the apples (great word for crushing the fruit into squeezable bits) and then squeeze the bits to yield fermentable juice. In the world of wine, this would be known as a crusher and press.

Denny has a lovely Correll cider press to transform his apples to juice in pure Cadillac style. If you're not into spending the dosh on a purpose-built rig, you can crush and press the apples in any way that works. We've seen and used scratters based on clean garbage disposal units and even very carefully pulsed food processors. Presses can be made using mesh bags, boards, and a hydraulic jack. Remember, cider has been around a lot longer than modern tooling. If push comes to shove, you can even use a home juicer.

Can't get your hands on a slew of whole apples? For most folks in temperate climates, there is a good chance that you have an orchard somewhere nearby that is generating fresh apple juice. They'll primarily be using culinary apples because that's what most of us have come to expect, but most orchards have a few "weird" trees. Drew has had good luck calling up his "local" (70–80 miles in Los Angeles, California is still "local") orchard and asking them to throw some of those weird apples into the mix. If you can't do that, you may be able to find crab apples in your fancy grocery's produce store.

And lastly, because we know sometimes you just want something cold, fruity, and fizzy: Pre-packaged store juice can work in a pinch. As always, go for the best quality juice you can get your hands on. Even frozen concentrates can be used to reasonable effect — but they're much better as a post-fermentation sweetener/fruit booster.

> **Drew's played around with staggered nutrient additions, like those recommended for mead, and found improvement in fermentation performance.**

FERMENTATION DECISIONS

To ferment, you have several choices. For drier, more alcoholic and assertively acidic ciders, dried wine yeast works like a charm (Drew prefers white wine strains for their fruitiness). But for a more balanced cider we both tend to use beer yeasts. No surprise that Denny loves his namesake Wyeast 1450 "Denny's Favorite." Drew tends to use the English strains or something neutral and on-hand.

But who says you need extra yeast at all? Years ago, Drew got a chance to explore some small traditional English ciders. They were fermented with the yeasts and other critters found on/in the apples themselves. The resulting ciders had the weird funk and acidic complexity of a finest lambic. (Drew: There were several that packed such a pucker punch to make Cantillon seem soft and friendly.)

While you could go 100% natural, the variable and challenging nature of the resultant product makes you understand why brewers reach for a pure cultured yeast. Drew splits the middle by allowing fresh juice to sit in the fermenter for 2–3 days before pitching yeast. This process allows the cider to build complexity without becoming overwhelmingly funkified and is a technique commonly used in the wine world.

Drew's not a fan of adding potassium metabisulfite (KMBS) because he has an allergic reaction to it in quantity. But if you don't react, (no, sulfites don't cause headaches, they cause legit allergic reactions in some asthmatics) then it's a good idea to add sulfite to the juice either before or after the rest. Metabisulfites, when added to juice with a sufficiently low pH, will disassociate into free SO_2 that prevents the growth of spoilage organisms long enough for a fresh supply of yeast (not sensitive to free SO_2) to overwhelm the native flora and consume all the food. Wait 24 hours and pitch your yeast. Alternatively you can simply skip this sulfite step and just hit the juice with a healthy colony of yeast just after pressing.

One other consideration, and the only pre-ferment addition we'd consider, is the addition of a yeast nutrient. Like other fruit or sugar musts, apple juice is pretty poorly stocked for healthy yeast growth and ferments. Follow the instructions on your favorite wine or mead yeast nutrient (such as Fermaid K or Superfood). Drew's played around with staggered nutrient additions, like those recommended for mead, and found improvement in fermentation performance.

IT'S PACKAGING TIME

When the cider is finished, in about 1–2 months, you can finally package and drink. Almost certainly, your cider will be tart and dry. Depending on your source apples, your cider may need some extra "bitterness" — the easy go-to answer is a small dose of grape tannin. Sold as a powder or liquid preparation, 0.25–1.25 tsp. is all you'll need for a 5-gallon (19-L) batch. You may also want to add some extra acidity. (Acid and tannins are the salt and pepper of the wine world.) We highly recommend that you blend test samples with varying amounts of acid and tannin before dosing your full batch!

But what if you don't want a dry cider? Apples are sweet after all. I want sweet, sparkling cider!

If you keg, you're on easy street. Add potassium metabisulfite and Sorbistat K (potassium sorbate) to help prevent fermentation from re-starting. (Note: This doesn't stop active fermentation). At that point, add the sweetener of your choice — frozen juice concentrate adds extra sugar and apple goodness with minimal dilution. Other sugar sources can add interesting flavors such as raw sugars or honey. Then force carbonate your cider in the keg.

If you bottle, things become trickier. Natural carbonation requires fermentation. That means active yeast, eating sugar and generating CO_2 while removing the sweetness. It's an inherent conflict of the explosive variety. Want fizzy bottles? Our best recommendation for easy success is to keg the cider as above and then counter-pressure fill your bottles. Sterile filtration is another possibility if you have the capability. If you must bottle with yeast, go with sturdy Champagne-style bottles or better yet, plastic soda bottles. Store the bottles cold and drink sooner rather than later.

One final option is something known as the pét-nat style of making sparkling wine. This cider would be bottled in Champagne-style bottles during active fermentation and the increasing pressure will eventually stall fermentation, leaving some residual sugar. This is a more advanced technique you can read more about here: https://winemakermag.com/article/pet-projects

One good tip for all natural-carbonation bottlers — fill a plastic 2-L with your cider, seal and when the bottle becomes rigid thanks to the carbonation — you're ready to chill and drink.

We can't recommend one of the popular methods you find online, bottle pasteurization, due to the inherent dangers of putting pressurized liquids in explodable vessels into hot liquids.

All of this has just barely scratched the surface of cidermaking. It's a long-lived art (as befits what must be one of North America's first alcoholic beverages) and thus there are lots of twists, turns, methods, and styles to explore. And we didn't even start to talk about adding spices, fruits, and other flavors to the mix!

Give cider a go this fall. It's both easier and harder than you think and the rewards are pretty dang tasty.

Self-Promotion Alert — you can find scads more information in Drew's *The Everything Hard Cider Book* – available at all your finest bookish retailers. BYO

BY FEDERICO TONDINI

A FOCUS ON ENZYMES

Micro-fermentation technique for non-alcohol beers

Non-alcoholic beer (NAB) is beer with very low or no alcohol content (less than 0.5% ABV in the U.S.), which in the past were generally known for their poor taste. However, in recent years, major alcohol companies including Heineken, AB InBev, and Molson Coors have started promoting more and more NAB options; for instance, as sponsors of sporting events.

NABs are now becoming increasingly popular. The preference for low- and alcohol-free beverages has been driven up not only by greater interest in health and warnings about alcohol consumption, but also by younger consumers interested in alcohol-free gatherings. In this scene, NABs are seen as more crafted, sophisticated, and flavorful than seltzers or sodas, and therefore more appealing. Lower alcohol content also provides a lower-energy alternative, with an approximate 60% reduction in calorie content between a pale ale and its low-alcohol counterpart. So, whether for lifestyle choices or personal reasons, the low- and non-alcoholic beer market has skyrocketed and is expected to continue to grow in the coming years as more adults become interested in this category.

Smaller craft brands, which used to exclusively brew high-alcohol craft beer as a way to distance themselves from mainstream ale and lager beers, have also arrived on the scene. Their bigger struggles, however, are the production cost on a smaller scale and the organoleptic limitation of the dealcoholization process. Other methods, in which the production of alcohol is instead prevented, could represent a cheaper and more feasible alternative on a smaller scale, but also have their organoleptic faults to be circumvented. More on some of these other production methods feasible on a small-scale, such as using maltose-negative yeast, can be found in the September 2022 issue's "Mr. Wizard" column. Table 2 describes many production means to produce NABs although many are equipment-intensive, require massive capital investments, and some may cost a lot to operate. My goal was to produce a shelf-stable NAB product using one of the changed mashing processes.

For producing lower-alcohol beer, changing the ability of the enzymes to release sugars and the yeast to ferment could result in a less alcoholic final beer.

Image courtesy of Shutterstock.com

Interest in the production of full-flavored low- and non-alcohol beers continues to grow in both the professional and homebrewing worlds.

Table 1: Beer calories calculator

Caloric source		Examples:	**5% ABV 12 oz. (355 mL)**	**0.4% ABV 12 oz. (355 mL)**
Alcohol	7 cal./g (1 mL = 0.789 g)		5% x 355 x 0.789 x 7 = ~98 cal.	0.4% x 355 x 0.789 x 7 = ~8 cal.
Fat	9 cal./g		negligible	negligible
Carbohydrates	4 cal./g		10 g = ~40 cal.	10 g = ~40 cal.
Protein	4 cal./g		1 g = ~4 cal.	1 g = ~4 cal.
		TOTAL:	~142 cal.	~52 cal.

Table 2: The Various Methods to Produce NABs

	NAB Production Process	Pros	Cons
Thermal	Evaporation	Low capital investment	Considerable loss of flavor
	Vacuum Rectification	High output capacity	Significant change of sensory properties, high energy requirements
	Spinning Cone Column	Easy to operate and service	High maintenance and high energy requirements
Membrane	Reverse Osmosis (RO)	Lower cost than distillation	High energy requirements, significant loss of aroma compounds
	Dialysis	Low operational costs	Loss of beer body
	Osmotic Distillation	Higher energy efficiency compared to RO	Loss of aroma compounds
	Pervaporation	Most effective membrane system for aroma	Only partial ethanol loss
Biological	Arrested/Limited Fermentation	Very few changes to brewing process required	Fermentable sugars left — unstable product if not pasteurized. Off-flavors like diacetyl may be present.
	Specialized Yeast	Very few changes to brewing process required	Fermentable sugars left — unstable product if not pasteurized
	Changed Mashing	Very few changes to brewing process required	Non-fermentable sugars left — adds sweetness and possibly unstable product
	Cold-Yeast Contact Process	Can display characteristics of common beer	Special temperature control required

CHANGING THE BIOCHEMISTRY

For producing lower-alcohol beer, changing the ability of the enzymes to release sugars and the yeast to ferment will result in a less alcoholic final beer. The simplest method is arresting fermentation by cold crashing, centrifugation, or microfiltration. Other options are changing mashing temperature that alters the ratio between fermentable and non-fermentable sugars and/or choosing alternative yeasts that do not consume maltose: In both cases less alcohol is produced. All these beers have a detrimental residual sweetness that not only can impact overall quality but also be dangerous in the case of refermentation in package.

This is the reason why a newly conceived protocol, exploiting new ideas and integrating these strategies has been a particular interest of mine: To deliver a craft non-alcoholic beer full of sought-after aroma and flavors.

DESIGNING THE GRAIN BILL

When applying these biological methods you typically start with a lower concentration of fermentable carbohydrates. This is because it is anticipated that sugars will not be completely consumed, and the resulting beer will have a lower ethanol content. In the design of a new recipe or in the adaptation of an existing one, you should aim for 3.3 °P (1.013 SG) initial gravity for your wort. In order to do it but keep the malt flavors and color you are aiming for, you reduce the amount of base malt, while keeping the same amount of specialty malts such as Vienna, Munich, wheat, or crystal. No dextrin malts are allowed, as they don't undergo sufficient amylolysis during malting. Amylolysis is the process of initial degradation of starch into amylopectin-based ordered structure, making starch more soluble, without any other enzyme intervention.

THE MASHING PROCESS

Mashing is the process of mixing the crushed malt or grains with water and heating it to convert the starches in the grain to sugars. The temperature of the mash is important as it affects the conversion of the starches to sugars as well as the extraction of flavors and aromas from the grain. The mashing temperature of my ale is typically between 152–160 °F (67–71 °C). Brewing outside of this "window," allows for less conversion of carbohydrates to fermentable sugars.

In order to produce a real NAB, the enzymes need to be deactivated completely! Allowing amylases to work for even a very limited amount of time could result in more ethanol than 0.5%. So the mashing temperature has to immediately be 176 °F (80 °C) at mash-in to block any enzyme activity, and the mash time reduced to 15 minutes to extract color and aroma but not excessive tannins. Doing so, you allow gelatinization of starch and solubilization of the amylose, amylopectin, and dextrins to happen but not the saccharification, leaving behind only a small fraction of fermentable sugars.

For these reasons, a thinner mash is preferred and then once the grains are removed you can proceed to bring the wort up to volume (sparging is optional and cannot extend the time). Boiling and hop regime are *business-as-usual,* keeping in mind the absence of ethanol increases the bitterness perception and therefore lower IBUs are suggested (15 IBUs is a good starting point, mainly from whirlpool hop additions).

The devil is in the details: Due to the lower amount of grains, the wort is going to have a higher pH. It is imperative to check and adjust the pH with an acid (e.g., phosphoric or lactic) to the normal range 5.2–5.4 during mashing to limit extraction of undesired tannins. This needs to be done again to a pH less than 5.6 before the hop additions, to limit harsh

bitterness. Because of the lower buffer capacity of this wort, even small water addition can increase the pH to 5.8–6.

THE FERMENTATION

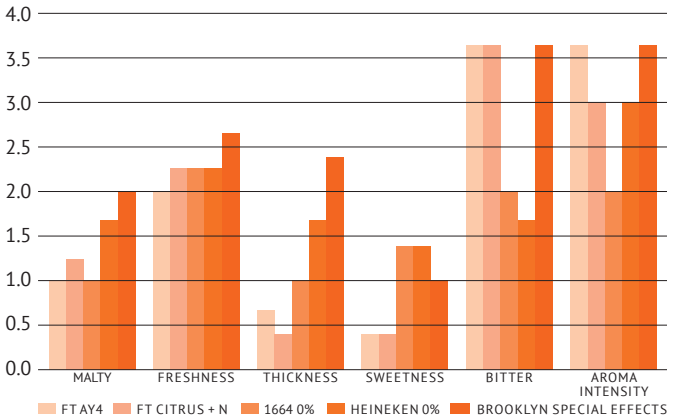
The fermentation process for this non-alcohol beer is the same as for regular beer, except that the yeast can only convert a limited amount of sugars into alcohol. In this protocol, yeast fermentation is restricted by the higher amount of unfermentable sugars (amylose and dextrins) and the amount of ethanol is directly correlated to the limited glucose, maltose, and maltotriose present in the wort. The desired attenuation is from 3.3 to 2.7 °P (1.013 to 1.010 SG). Because fermentable sugars are already limited, the choice of the yeast can be focused on aroma production, which usually falls (but is not restricted) to aromatic dry wine yeast for speed of fermentation, ease of use, and especially their higher ester production in the first phase of fermentation. The addition of yeast nutrient rich in amino-acids, compared to the "inorganic" ammonium sulfate or phosphate (such as DAP or diammonium phosphate), will also boost the aroma production (e.g., isoamyl alcohol, 2-phenylethanol, and relative acetate esters).

Big dry-hop additions are a dangerous attraction, because of their glycoside molecules that have aromatic compounds and (fermentable) sugars that can be released. At the end of fermentation, before carbonation, add a small amount of lactic acid to drive the pH down to 3.9 in order to increase the protection of your beer against spoilage microorganisms, now that ethanol is not present.

THE TASTING

In order to evaluate this process, we brewed a single malt (Weyermann Pilsner malt), single hop (Magnum hopped to 20 IBUs) "base" wort and fermented one batch with a California ale yeast and the second batch with a wine yeast plus nutrients (FT CITRUS + N - Fermobrew Citrus + Fermoplus DAP free, AEB). Both of the beers ended up with less than 0.4% ABV and were judged for different characteristics (from 0–5 scale). The industry panel tested these two beers against three commercial examples (Chart 1) and found many of the undesired characteristics were addressed by this method. Sweetness and malty perceptions were reduced and the aroma intensity paired or exceeded the counterpart.

Chart 1: Comparing our changed-mash beer to commercial NABs



The lack of body and bitterness can easily be addressed by developing the complexity of the recipe. For example, finely tuning the initial amount of grain or by the addition at the end of gum arabic and/or maltodextrin, which are both body enhancers (1.7 cal/g and 4 g/cal respectively). Similarly, the bitterness sensation can be reduced by using aromatic hops towards the end of boiling. So, did the NAB that we produced taste better than the commercially available alternatives? There is no definitive answer to this question, as everyone's taste buds are different. However, this experiment gave a good indication that with this method you can craft your own non-alcoholic beers at home.

KILLING IT NAB

(5 gallons/19 L, all-grain)
OG = 1.013 FG = 1.010
IBU = 16 SRM = 2 ABV = 0.04%

INGREDIENTS

2.1 lbs. (1 kg) Pilsner malt
0.5 lb. (0.23 kg) Vienna malt
0.25 lb. (113 g) crystal malt (20 °L)
½ tsp. yeast nutrients (10 min.)
2.1 AAU Perle hops (60 min.) (0.35 oz./10 g at 6% alpha acids)
1.5 oz. (43 g) Saphir hops (0 min.)
SafAle US-05 or LalBrew BRY-97 (West Coast Ale)

STEP BY STEP

You are looking for 85% of the total volume to be water, so roughly 15.8 qts. (15 L). Heat brewing water to 185 °F (85 °C) then add grains slowly. Treat brewing water with acid to adjust pH to 5.2–5.4. Hold for 10 minutes, then begin a 5 minute vorlauf. Sparging is optional. Add water to the kettle to reach boiling volume. Readjust the pH to make sure wort is under 5.6. Boil for 60 minutes with a 20 minute post-boil whirlpool.

Ferment as you normally would, at below 64 °F (18 °C). The goal is to reach a final gravity of ~1.009–1.010. If you want to dry hop, be sure to cold crash prior and dry hopping cold. Be sure that the final pH is under 4 to guard against spoilage organisms. You may consider adding gum arabic or maltodextrin as a body enhancer if needed. BYO

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BY JOHN BROWN

JOCKEY BOX CONVERSION

Using push-to-connect adapters

A couple of years ago I built a jockey box as part of a portable bar intended for camping. The beauty of it is that no power is needed for it to function. All you need is a supply of ice, so this works for any type of car camping. While I still occasionally backpack, these days my camping is as an RV'er, so this unit rides along with my travel trailer. I built this jockey box in two stages, first as a two-tap unit, then I added on another set of taps. The extra taps were always part of the plans but I had to wait to purchase the additional parts. Four kegs fit on the lower shelf of the portable bar, but due to its compact size, taller ball-lock kegs present something of a knuckle-busting experience when putting the quick disconnects on or off.

Duotight has new ball-lock quick disconnects that are shorter and have push-to-connect (PTC) adapters. The shelf on my portable bar was a tight fit for ball-lock kegs and getting at the quick disconnects (QDs) was proving to be difficult as mentioned. Meanwhile, the beverage lines were connected to the jockey box using wing nuts screwed onto shanks that pass through the cooler walls. Although the wing nuts were meant to be removable they were still bulky and occasionally would stick . . . not my ideal connector. Once the beer is in the cooler, the lines are connected to the heat exchange coils that cool the beer down.

Basically I was looking for a nearly complete overhaul of the connections and soft tubing found in the jockey box. I opted for EVABarrier tubing for both beverage and gas lines due to its performance, limited CO_2 loss, and oxygen ingression. This tubing also has the benefit of connecting directly to the Duotight QDs without any additional hardware needs. Neither the stainless steel heat exchange coils, the faucets, or the shanks needed to be replaced, but everything that connected the carbon dioxide regulator and Corny kegs to the faucet shanks was scheduled to be replaced.

By design, a jockey box is meant to be portable and is not typically going to be in continuous use. This four-tap box is on the heavier side for one person to carry, with the beverage lines being somewhat awkward. Since I originally built my jockey box many new options have become available, which I took advantage of. In this project write-up, I will cover the required changes needed to create the ultimate PTC, version three of my camping jockey box. Obviously if you pour at homebrew fests and use a jockey box, this is a great upgrade to make all fittings easy to connect and disconnect for cleaning and sanitation purposes. The PTC fittings also allow you to create a draft cleaning system such as this one: https://byo.com/project/tap-cleaning-system/

Since I originally built my jockey box many new options have become available, which I took advantage of.

Photos by John Brown

Tools and Materials

- EVABarrier tubing 8-mm x 5-mm x 26 ft. (8 m)
- EVABarrier tubing 8-mm x 4-mm x 26 ft. (8 m)
- (8) ⅝-in. BSP x 8-mm tubing adapters
- (5) ¼-in. flare x 8-mm tubing adapters
- (4) 8-mm PTC (push-to-connect) couplings
- (4) Duotight ball-lock beverage quick disconnect (gas-in)
- (4) Duotight ball-lock beverage quick disconnect (beverage-out)
- Shutoff check valve with ¼-in. flare threads
- 8-mm tubing locking clips
- 4-way gas manifold (Komos)

1. SAYING GOODBYE TO THE OLD ADAPTERS

The first step was to disassemble the old system in preparation for the new material. I had had issues of a gas leak somewhere in the system, the wing nuts were extremely hard to remove, the worm-driven clamps and barbed fittings were all wished a not-so-fond adieu.

Tip: There are two shank nuts that hold the pass-through shank in place. Pass-through shanks may spin depending on configuration when attaching to the walls of the cooler. To prevent this, thread another shank nut onto either side and tighten it and the next nut against each other. This pair then can be used to keep the shank from spinning when tightening.

2. GAS MANIFOLD DECISION

The old gas manifold used barbed connections for all tubing. To use the EVABarrier lines, PTC is needed at the valve connection. I had several possible solutions: 1) Change to a PTC manifold, but limited options are available. 2) Build my own PTC-style manifold out of tees and rigid tubing. 3) Replace the barbed shutoff check valves on my current manifold with new flare shutoff check valves. 4) Purchase a completely new four-way manifold.

It turned out that new four-way manifold was the same cost as replacing the check valves with four new flare fitting valves. A reasonably priced and well-reviewed PTC manifold was not found. Building the manifold out of PTC tees, ball valves, elbows, and check valves was similar in cost but introduced multiple connections and would ultimately be bigger in size. The new four-way manifold also is angled, which I didn't know when I ordered it but kind of like even though it sticks out a little more. It would be particularly nice in a keezer in my opinion but works here too. I moved the manifold up to the jockey box shelf as well to allow better access on the back side to the keg shelf.

3. CO_2 REGULATOR

Just like with the gas manifold, my old setup had a barbed shutoff valve on the CO_2 regulator.

My solution was to replace the shutoff check valve on the CO_2 regulator with one with ¼-in. flare threads. This is a great replacement versus the barb as it allows for easy swapping of the tank since I have several tanks and regulators. An additional ¼-in. flare x 8-mm adapter is needed here to allow for the Duotight fitting and the gas line to the manifold was 8 mm x 5 mm. Using zip ties, I also routed the line between the regulator and the manifold to underneath the jockey box shelf and over to the regulator.

4. PASS-THROUGH SHANK TO COIL

The connection was comprised of a beer nut, silicone grommet, and ferrule.

Okay, so this is the connection I chose to keep the same. But I want to discuss as other systems may benefit. More than likely new silicone grommets should be used. I was unable to reuse any as they kept slipping. Also, a ⅝-BSP x 8-mm adapter could have been used here but I think the metal nut is a better choice for rigidity. One could also go with a ⅝-BSP x 8-mm adapter, a short piece of tubing and a coupling, which here would be 8 mm. This is the way to go if your heat exchange coil and shank does not line up spatially.

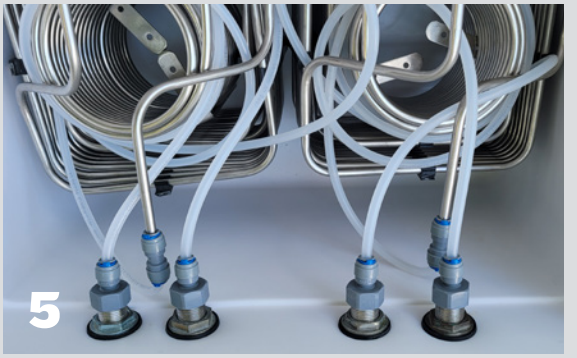
If you don't have a pass-through shank, just a hole for the beverage-in, it's probably already bigger than 8 mm or 9.5 mm. There are PTC bulkhead adapters that would function like a pass-through but be aware they may be a little short as the ones I have seen measure 15⁄16 in. (24 mm) as the wall thickness maximum. Those might still work but my jockey box cooler wall was 1-in. (25.4-mm) thick. Besides, I already had big holes for the pass-through shanks.


4

5. COIL TO FAUCET SHANK

In version two, I had two shanks with barbs, and two that used a beer nut, gasket, and tailpiece. The existing connection was 5.5 ft. (1.7 m) of 3⁄16-in. ID vinyl tubing from the coil to either the barb or tailpiece.

I cut the shank barbs off using a Dremel® and cutting wheel. I didn't realize it, but two new shanks would have cost me about the same as the cutting wheel package, which included the stem necessary for the wheel. I do have a pack of cutting wheels now though. The now mostly flush face accepts a ⅝-BSP x 8-mm tubing adapter. The constrictor line is 5.5 ft. (1.7 m) of 8-mm x 4-mm tubing with an 8-mm PTC coupling to connect it to the coils. I wrapped the lines around the two round coils to keep them chilled.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6. THE FINAL TOUCHES TO THE SHELF

The bar is a wire three-shelf portable cart with wheels. I mounted a drip tray to it using two flat stainless steel bars using a couple of nuts and bolts. The bars slide into the wire shelf and are held down by the jockey box. I added Velcro straps for the CO_2 tank.

All PTC connections have a locking clip except I leave off the clips on the beverage line connected to the cooler's shanks. I lock them once the jockey box is in operation.

While not completed at this time, I will be adding a hanging chalkboard or whiteboard sign for in front of the kegs combined with some numbered tap tags. BYO


6

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BY NORM RYDER

THE HOMEBREW MILKMAN

COVID-19 brewing reflections

It all started with a group of local guys that met in a neighborhood brewpub on Saturday afternoons for a pint or two and shared appetizers. These meetings took place prior to March 2020 and the ensuing COVID-19 restrictions. I had just met the group and had attended a handful of gatherings, so was just getting familiar with the names and faces. But that all ceased once lockdowns went into effect.

In a weak moment, I suggested that I could brew the beer and we could meet in our garages (or via Zoom) each Saturday. Little did I know this would continue for such a long period of time! A total of nine were in the beer group. I paid for all the brewing supplies and the rest of the group was expected to donate $5 each week to the local food bank and to the women's emergency center. It was easy to start this offering as I had several kegs in the fruit cellar. Coming up with fast turn-around new recipes each week was the next challenge.

On Saturdays, depending on the latest social gathering guidelines, we would either meet on Zoom or in a garage. I would describe the beer, either verbally or with a handout, regarding the process and the history of the style. Each label stated the ABV, IBUs, and SRM as well as a short description of the named beer. Masks were worn until everyone sat down and was spaced six feet (1.8 m) apart. After 22 weeks we had raised $1,350 for the designated organizations.

On weeks when my beer was not conditioned enough, the group received complimentary beer from the old brewpub after the owners heard about the financial donations our group had provided. Other craft breweries also assisted to fill in for other weeks.

This system continued until session 38; by that time I had brewed a total of 51 kegs of beer and the group had tasted over 50 different beers. In my home province of Ontario, Canada you can produce as much as you want but cannot sell it. After that session the COVID-19 protocols allowed the group to meet back on brewery patios and my services were no longer required. Since I had a lot of beer in inventory conditioning in kegs, with no demand, it allowed me to start the "milk" route. You know the old story of when one door closes another one opens!

The "milk" route started out with me delivering my homebrew to neighbors who I knew liked beer. I left the required number of beers on each neighbor's doorstep and rang the doorbell to let them know they had a new surprise awaiting them. If they did not come to the door I messaged them so the beer would not freeze (as it was winter at the time). I did this each time I brewed a new batch and they in turn were most gracious realizing that beer costs money to make. We started to receive interesting gifts in return, sort of a *quid pro quo*. It came in the form of bottles of wine, fresh perch and pickerel, bottles of scotch, cookies, desserts, chocolates, and so on.

When the weather improved, we started having social hours in our driveway with everyone bringing their own chairs. Usually the group size was restricted based on government guidelines, so say two couples might gather at one time. When things opened up more we had two COVID-19 parties and I supplied two kegs using my custom stainless steel beer dispenser. I also supplied the glasses and guests were told to sanitize their hands with supplied sanitizer before they poured beer each time.

Think outside of the box and share your bounty with others. You may be surprised as to the responses! BYO

Since I had a lot of beer in inventory conditioning in kegs, with no demand, it allowed me to start the "milk" route.

Photo courtesy of Norm Ryder

The author out on his "milk" route, making deliveries to neighbors with his latest batch of homebrewed beer.

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