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#### ASK THE STAFF

Homebrew Con 2019 takes place June 27–29 in Providence.

What are you most excited about?



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# Wicked Good Times

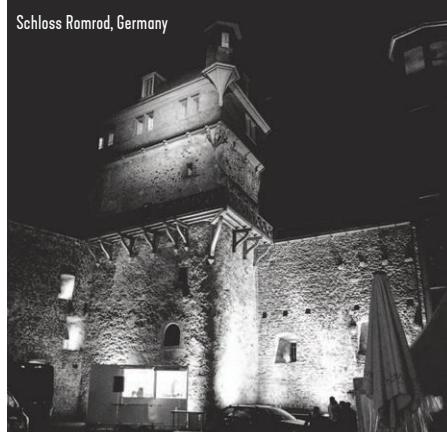
I had the great pleasure of judging in not one but two AHA/BJCP-sanctioned European homebrew competitions this past March. The first took place March 9 and was organized by Jan Brücklmeier, whose article “Decoction Mashing: History and Modern Approaches” opens on page 44 of this issue. The competition accompanied the first ever Heimbrau Convention (HBCON) from German homebrewing forum Hobbybrauer.de and was hosted at Schloss Romrod, a castle-turned-hotel about 50 miles (80 km) north and east of Frankfurt, Germany.

The evening before judging, at the opening social evening, I sampled one of the finest homebrewed examples of Berliner weisse I have ever tasted. I also intermittently made my acquaintance with a hazelnut liqueur-infused English porter that servers cleverly dispensed using a nitrogenized whipped cream charger. I intend to make use of this neat little trick myself next time I’m craving a nitro beer but don’t want to devote a whole line to beer gas. Many thanks to Jan and to Hobbybrauer.de for inviting me to be part of the inaugural Heimbrau competition and conference at Schloss Romrod.

Two weeks later, on March 23, I helped judge the 2019 competition for Ireland’s National Homebrew Club at Urban Brewing in Dublin. After evaluating 12 pale lagers in the morning, I participated in a terrific best-of-show round in the afternoon. There, 20 very deserving homebrews suffered intense scrutiny from five judges in a bid for the top three spots and an honorable mention. Thank you to Richard Lubell, Dean Dunne, my lager judging partner Karen McHugh, and the Irish National Homebrew Club for a great day in Dublin.

## HOMEBREW CON 2019

Switching to the western side of the Atlantic, I can’t tell you how excited I am to see some of you—hopefully lots of you—in Providence this June. I love New England in summer. I love it even more in autumn, but we’re not rescheduling



Homebrew Con just so I can go fawn over some kaleidoscopic leaves and eat the better part of my weight in fresh-picked McIntosh apples. So, summer it is.

New England summer days are famously long. During Homebrew Con 2019, you can expect a solid 15 hours of sunlight. Include dawn and dusk, and that number jumps to more than 17. Homebrew Con attendees who are up at dawn may very well have been awake since dusk because Providence night owls have plenty of options.

Don’t take my word for it, though. I could probably navigate a small, well-behaved crowd around Boston’s better-known cannoli shops, but I’m of no use at all as a tour guide in Providence. However, Chris Meringolo, a Rhode Island homebrewer who co-chairs the local committee for this year’s Homebrew Con, is a local expert. He was kind enough to pen an excellent visitor guide that’s well worth bookmarking if a trip to Providence is on your calendar. Check it out in the Now on Tap section of this issue of *Zymurgy*.

## GOODBYE, BRIDGEPORT

Finally, I feel obliged to mark and mourn the closing of BridgePort Brewing Co. in Portland, Ore., which shut its doors on March 10, 2019. BridgePort was Portland’s oldest brewery and had been turning out beer for 35 years. Every homebrewer is shaped by mem-

orable encounters with commercial beer, and I got to know BridgePort’s lineup when I was at my most impressionable.

I retained a soft spot for BridgePort IPA right up to the end, and I will miss its classic hop profile, bottle-conditioned effervescence, and refreshingly moderate alcohol content. It had become something of a stubborn exception in recent years when considered alongside increasingly alcoholic examples of the beer style, but I feel sorry for those who will never get to enjoy the subtle pleasures of one of the first examples of American IPA. BridgePort IPA went on innumerable camping trips with me, and enjoying a creamy pint served from a beer engine in Portland’s Pearl District remains a vivid highlight of my sensory journey.

It wasn’t just the IPA, though. BridgePort Black Strap Stout was one of my first always-in-the-fridge stouts whose name didn’t rhyme with “thinness.” Many a six-pack accompanied me through my first extract batches to help me relax and not worry when I was not yet in a position to have a homebrew.

Change is inevitable, true. But I don’t have to like it.

I do like homebrewing, though, and I like you. I look forward to seeing you in Providence!

**Dave Carpenter** is editor-in-chief of *Zymurgy*.

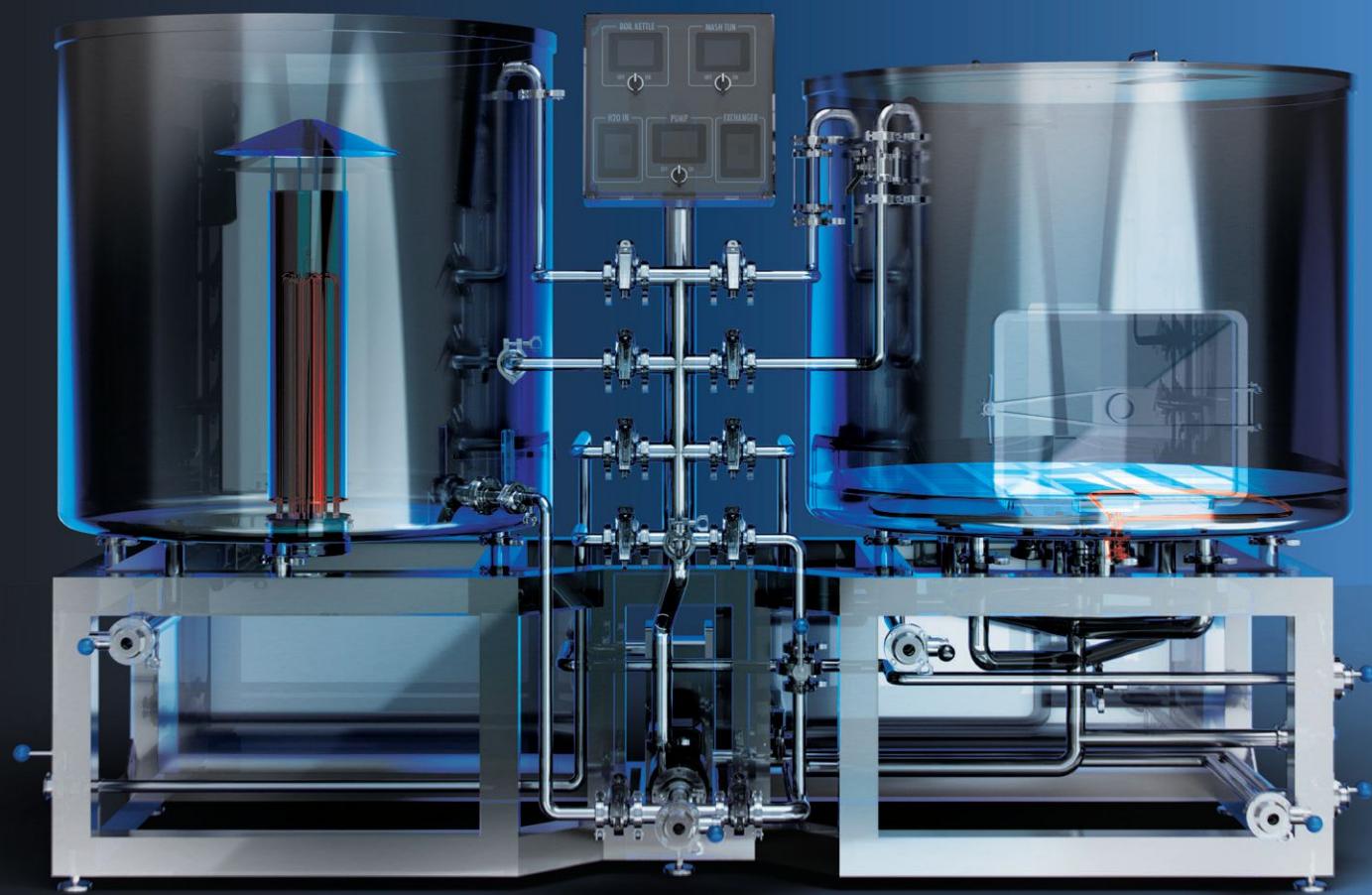
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Homebrewers have long been taught the benefits of a vigorous boil, but science suggests otherwise. Learn why long, vigorous boils may be neither necessary nor desirable.

*By Martin Brungard*

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## DECOCTION MASHING: HISTORY AND MODERN APPROACHES

Removing part of the mash, boiling it, and mixing it back in is essential for classic Continental beers, but why spend so much time and energy? Flavor, that's why.

*By Jan Brücklmeier*



## BREWING A CULTURE OF COMMUNITY

Residents of the Aspen Ridge Retirement community in Bend, Ore., gather each week to brew, bottle, and keg their award-winning homebrew. Turns out beer keeps you young!

*By Matt Wastradowski*



## IMPROVING EFFICIENCY IN THE ALL-GRAIN HOMEBREWERY

Brewhouse efficiency considers the whole process from mill to fermenter, including wort and beer losses along the way. Learn simple tricks for boosting yours.

*By Amahl Turczyn*

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## SIMPLE WATER ADJUSTMENT

To make great beer, there's no way around getting to know your water and what you need to do with it to nail the style. Let's make this as simple as possible, shall we?

*By Drew Beechum  
and Denny Conn*

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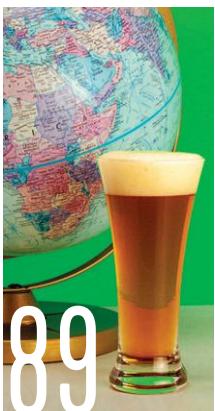
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May/June 2019

# zymurgy®

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homebrew-recipes](http://HomebrewersAssociation.org/homebrew-recipes)

# NOW ON Tap



## Sour Power

Belgium's Brouwerij Rodenbach, brewers of iconic sour beers such as Rodenbach Classic, Alexander, and Caractère Rouge, recently announced plans to brew a collaboration beer with Dogfish Head Craft Brewery. It will be the first time Rodenbach has made a collaboration brew in its two centuries of history.

"This is an historic moment for our brewery," said Rudi Ghequire, master brewer of Rodenbach. "We found an incredible partner and kindred spirit in Sam Calagione and the Dogfish Head brewing team. Though centuries and an ocean apart, our breweries share many similar values and principles. ... We couldn't have found a more perfect partner in our first collaboration voyage, and we're excited for the journey ahead."

Sam Calagione is equally excited. "I have been a huge fan of Rodenbach beers since the early 2000s when legendary beer writer Michael Jackson turned me on to them at the Brickskeller in DC," he said. "We have a lot to learn and explore together—and getting to know Rudi, David and the Rodenbach team has been rewarding and fun. I am confident we are going to make a beautiful, unique beer together."

Although planning is still in its early stages, Ghequire and Calagione plan to brew and blend the collaboration beer in the United States this year. Expected availability is early 2020 in the United States and soon thereafter in Belgium.

"We see great opportunity for the years ahead," added Ghequire and Calagione. "While we're taking things one step at a time, we have great hope and expectations that this will be the beginning of a long-term relationship between our breweries for several years to come."

## Charlie Bamforth joins Sierra Nevada Brewing Co.

Brewing and malting scientist Charlie Bamforth has joined Sierra Nevada Brewing Co. as senior quality advisor. He retired from his position as Professor of Malting and Brewing Sciences at UC Davis in December 2018.

"It would have been very easy to have completely retired after leaving UC Davis," said Bamforth. "However, when Ken Grossman invited me to be a part of the brewing company that has impressed me hugely for so long, I just could not miss the opportunity."

"Charlie brings an amazing level of scientific depth, teaching and lecturing expertise, but he also brings a deep and practical understanding of the challenges inherent in operating a brewery," said Sierra Nevada cofounder Ken Grossman.

Among Bamforth's many publications are *Standards of Brewing: A Practical Approach to Consistency and Excellence* (Brewers Publications, 2002), *Beer: A Quality Perspective* (Academic Press, 2011), and *Beer is Proof God Loves Us* (Pearson FT Press, 2010).



## Spike FLEX

Spike Brewing is well known for its line of full-featured, stainless-steel conical fermenters, brew kettles, and turnkey electric systems. Now they're getting into the small-batch game with the brand-new Spike FLEX.

"We're excited to bring you a small-batch, 5-gallon (18.9-liter) fermenter that will open doors to quality, flexibility, and functionality," says Ben Caya, owner of Spike Brewing. "With all sanitary welded, 1.5" tri-clamp fittings and over 20 available accessories, you'll be able to control temps, carbonate, pressure transfer, and more all from one vessel. With accessories available à la carte, we've made sure that you can grow into it and purchase accessories to upgrade as you go."

Spike's base model FLEX comes standard with sanitary welded 1.5" tri-clamp fittings, a three-piece ball valve with 5/8" quick connect racking arm, and a stick-on thermometer. The included domed lid features a 4" tri-clamp access hatch with a clear cap, an airlock, and a bung. It's pressure capable to 2 psi (138 mbar), which is enough to conduct closed transfers under CO<sub>2</sub>.

Opting for the FLEX+ earns you a suite of upgraded accessories, but the biggest upgrade is a high-pressure lid that's rated to 15 psi (1.03 bar), perfect for forced carbonation (or spunding, if you're into that sort of thing). Spike is also selling this high-pressure lid as a separate accessory, so homebrewers can start with the base model and upgrade when they're ready.

Spike FLEX stands 21.25" (54 cm) tall and is 18.5" (47 cm) wide, which makes it perfectly suited to small spaces. FLEX starts at \$250.

## RateBeer Now 100 Percent Owned by AB InBev's ZX Ventures

ZX Ventures, a venture capital group wholly owned by Anheuser-Busch InBev, has acquired 100 percent of beer ratings website RateBeer. ZX Ventures had purchased a minority stake in RateBeer in October 2016, which remained undisclosed until June 2017.

In a statement on RateBeer's forum, site cofounder Joe Tucker said, "While this won't impact the day-to-day for anyone using on the site, I wanted to let you all know that ZX Ventures, a division of AB InBev, has fully acquired RateBeer. ... Now, with access to greater resources, we'll be able to continue modernizing the site, and expand into new areas, like an affiliate marketplace in Australia."

ZX Ventures' portfolio also includes homebrew shop Northern Brewer (and its subsidiary Midwest Supplies) and beer-and-culture website October.



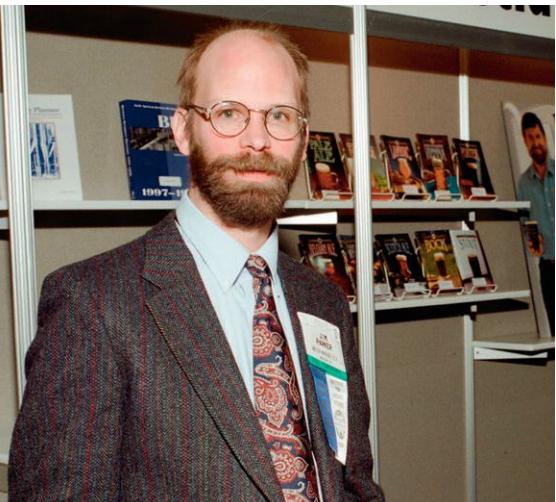
+



## Homebrew Pints

From Vital Industries in Rhinelander, Wis., come these homebrew-themed pint glasses. Whether you opt for the expressive HOMEBREW design or the beer tools pint (featuring carboy, wort chiller, and other brewing gear), you'll enjoy drinking your own creations while you make more of them.

Pint glasses start at \$12, with free shipping on orders of \$45 or more.



Left to right: Jim Parker working the bookstore at the 1998 Craft Brewers Conference®, Kathy McClurg at the 2017 Great American Beer Festival® and in 1986.

## Remembering Zymurgy Editors Past

Jim Parker, a former *Zymurgy* editor, former AHA director, and well-known fixture of Oregon's beer scene, passed away February 5, 2019. Jim served as executive director of the Oregon Brewers Guild for seven years and was involved with numerous Oregon breweries, including Rogue, Green Dragon, Fort George, Baerlic, and many others.

Jim is also credited with the invention of totchos, nachos made from tater tots rather than tortilla chips.

Former *Zymurgy* editor Kathy McClurg passed away on February 12, 2019. Involved in the American Homebrewers Association from the very beginning, she also copyedited many Brewers Publications

books, as well as the first and second editions of Charlie Papazian's *The Complete Joy of Homebrewing*.

Of Kathy, Charlie Papazian said, "She was the founding keystone of literary quality for the American Homebrewers Association and helped set the beginning of our continuing high standards."

To Jim and Kathy, we raise a glass and a generous serving of totchos. Thank you for making the world a beerier place.

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# Define Providence

By Chris Meringolo

I remember heading southbound on I-95 through Providence in the early 1990s to visit relatives in New York City. I was just a boy in my dad's Volkswagen Rabbit convertible, getting ready for a long, boring trip. The white dome of the State House could be seen catching the last few golden rays of a late autumn day while the valley below was already engulfed in darkness and mystery.

I had been through that valley before, when it had appeared little more than a large mud pit with derelict cars dotting its streets. Soon after this trip, Providence would host the Summer X Games, heralding the rebirth of the city for the 21st century.

With that rebirth came a renaissance of art, culture, food, and, of course, beer. I have been fortunate to watch this evolution unfold, and I am fortunate to share my favorite parts of the city with Homebrew Con attendees this June.

## DOWNTOWN

Providence is best described by its neighborhoods, each of which has its own unique flavor. Let's start with Downtown, which is bordered by I-95 and the bay and runs up to the Rhode Island State House in the north and College Hill to the east. Downtown is where you will find a lot of the grit, but it also serves as a good first course for the curious traveler. The area is home to the Providence Place mall, which, in place of that old dirt pit, offers a large array of stores, an IMAX movie theater, a video game arcade, and most of the city's chain restaurants.

A very short walk from there is the Rhode Island Convention Center, Dunkin' Donuts Center (a.k.a. "The Dunk"), and the Omni Providence Hotel, all of which you'll be familiar with after you attend Homebrew Con 2019. Adjacent to the convention center is the meat of the city, filled with all kinds of kitschy shops, quirky eateries, and good old-fashioned watering holes.

A few standouts are

- The Eddy (cocktail bar)
- The Dorrance (cocktails and food)
- Trinity Brewhouse (brewpub)
- AS220 Foo(d) (restaurant)
- The Malted Barley (beer bar)
- Red Fez (restaurant)
- Fortnight (wine bar)

Providence is home to America's oldest shopping mall, the Arcade. The Arcade is home to several small shops as well as Rogue Island Local Kitchen & Bar, which has killer meals and a great beer selection. You'll also find New Harvest Coffee & Spirits, which offers cocktails with coffee or locally made spirits.

Speaking of arcades, there are two video game (bar)arcades in town, Shelter Arcade Bar and Free Play Bar Arcade. You can relive your high score glory days and enjoy a cold beer while you're at it. Right outside Providence Place mall is Waterplace Park, home to the world-renowned WaterFire installation. On weekend nights in spring and summer, bonfires on the Providence River create illumination and an unbeatable atmosphere for exhibits, demonstrations, art galleries, and other outdoor activities.

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## ON THE WEB

Learn more about Homebrew Con in Providence, RI, June 27-29, 2019 and register today at: [HomebrewCon.org](http://HomebrewCon.org)

There's much more to Downtown than can possibly be covered in one article, so I recommend you explore as much as you can while you're here this summer.

## COLLEGE HILL AND FOX POINT

To the east of Downtown is the College Hill area, home to Brown University and the Rhode Island School of Design (RISD). Most of the activity in this neighborhood is clustered around Thayer St. and Wickenden St., both of which are just 10 minutes' walk from downtown. On Thayer, you'll find all kinds of small shops and quick foods targeted at the myriad college students. I would recommend stopping in at the Grad Center Bar for its extensive beer selection. If you're hungry,



Providence is home to America's oldest shopping mall, the Arcade.

“  
**Long Live Beerworks (LLBW), the West End’s only brewery ... has already gained a large following and is well regarded by the local beer community.**

check out Geoff's Superlative Sandwiches, East Side Pockets, Antonio's Pizza, or Durk's Bar•B•Q. And while you're on College Hill, a visit to the RISD Museum is always enjoyable.

To the south of College Hill and east of Downtown is Fox Point. The Wickenden Pub and Wild Colonial Tavern are some of my favorite watering holes in this area because they have the largest and best selections of beer. The Hot Club is another favorite for a late-night drink in the summer—the selection is OK, but a waterfront location more than compensates. Some nights, Captain Tom runs his boat (Providence River Boat Company) from the dock there, and it only costs a few dollars for a cruise around the harbor.

If you need a pick-me-up or something other than beer (perish the thought), you'd be wise to stop in at Coffee Exchange or PVDonuts, which has been the stuff of legend since it opened. For slightly more substantial fare, stop in at Fellini Pizzeria or the Duck and Bunny.

#### EAST AND WEST

Just a short drive north from College Hill puts you on the East Side, known for its trees, expensive houses, and upscale eateries. You won't find quite as many bars in this residential area, but Ivy Tavern, Craft Burgers & Beer, The Met, and The Parlour are noteworthy. The first two have good fare and good beers, while the latter are better for taking in some local music.

If you're in the mood for only food, check out Three Sisters for all-day break-

fast, The Wurst Kitchen for sausages and other meaty goodies, Wildflour for vegan and gluten-free options, and my personal favorite, Sandwich Hut. If you are in the mood for baked goods, definitely hit up Seven Stars Bakery or Providence Bagel.

Across the highway is the East Side's chief rival, the West End. Residents' refusal to call it the "West Side" tells you a bit about how rebellious and gritty things can get in this section. We'll start with the important stuff, Long Live Beerworks (LLBW), the West End's only brewery. It's only been around for a few years but has already gained a large following and is well regarded by the local beer community. It has such a large following, in fact, that it is opening a larger facility, which should be open in time for Homebrew Con.

Right next door to LLBW is The Slow Rhode, which is great for cocktails and small plates—if you have to wait for a table, you can grab a beer from LLBW to help pass the time. In the mood for a quicker bite? Stop in at Bucktown for fried chicken, seafood, and Southern fare.

If you prefer small plates and a more eclectic beer selection, roll down to Bayberry Beer Hall. On the other hand, if you like 60s trailer parks, good beer, and gourmet tater tots, take a ride to Ogie's Trailer Park, one of the more unique places in town. Right off Luongo Square—actually, it's more of a triangle—is The Avery, one of the better kept secrets in the West End. This small bar has no sign outside, and the dark lighting hides the incredible cocktails and good beers they have ready at hand.

Julian's and Pizza J are both the operation of mastermind, Julian Forgue. Julian's offers a small but very well-curated tap list and unique dinner options. PizzaJ is relatively new and focuses on pizza and good beer.

#### FEDERAL HILL

Getting hungry yet? Fahghettaboutit and head up to the Federal Hill neighborhood, which is known for Italian eateries and delis. Most of the action in this section is on Atwells Ave., the eastern end of which features a large arch adorned by a pine cone sculpture that locals call "The Pineapple." No trip to the Hill would be complete without a stop in DePasquale Square, which is a little slice of Europe right here in Rhode Island. In the center of the square is a large fountain surrounded mostly by

Italian restaurants. In summer, most of the tables are outside, and there are frequently musical performances. Venda Ravioli and Constantino's are great for a quick snack or luxurious dinner, respectively.

Rhode Island is known as the Ocean State, which is particularly good to know if you like seafood. You'll find plenty all over the state, but it's worth stopping at Providence Oyster Bar for some fresh oysters. Harry's Bar & Burger is well known by locals and has a location on Atwells (the other is closer to downtown).

For Mexican food, stop in at Mexico Restaurant Garibaldi. You'll think you're in a residential neighborhood and that you've gone too far, but stick with it and look for the sign that says "Mexico."

If you didn't get enough grit in your teeth from the oysters, take a ride to Nolan's Corner Pub. It's a bit of a dive bar and has a pool table, arcade machines, karaoke, and a meat-and-potatoes beer list.

## OLNEYVILLE

Going from grit to grittier we find ourselves in the Olneyville neighborhood. No trip to Rhode Island is complete without some "gaggers," one of our unofficial state foods. Commonly known as wieners, you can find

them at the Olneyville New York System Restaurant. If you're squeamish, be aware that servers line up the buns on their bare forearms as they make them. I think that just adds extra flavor to the experience. Ask for a wiener "all the way" to get meat sauce, mustard, and raw onions.

If you're in the mood to separate meat and bone, check out Wes' Rib House, one of the better barbecue joints in town. There are a number of Mexican restaurants in this area, but El Rancho Grande is widely regarded as one of the best.

Libations are a bit sparse in this neighborhood, but if you're looking for moody atmosphere and unique cocktails, stop in at Justine's. If you want to go in the opposite direction and get a big dose of dive bar, hit up The Scurvy Dog.

A couple of off-the-beaten-path establishments also deserve a nod. Los Andes, in the Elmhurst neighborhood, pairs Bolivian and Peruvian food with tasty cocktails. It can get pretty crowded here, so reservations are recommended. On the South Side of Providence, you'll find two unique bars with good atmospheres and good beer. Nick-A-Nees is a small bar with a somewhat basic beer list, but they are known for Bluegrass throwdowns, local musical

acts, and dog friendliness. What Cheer Tavern has changed hands several times but remains a great place for a small bite to eat. It has a good selection of local beers and an outdoor area to relax in.

## WELCOME TO PROVIDENCE

Providence offers many more neighborhoods, each with its own little secrets to discover. I could waste a small tree trying to describe them all here. Hopefully the info I've shared is enough to get you oriented and help you create some great memories during and outside Homebrew Con.

To learn what's happening on the days you are in town, pick up a copy of *Motif Magazine*, a free publication that has articles, theater listings, show listings, and much more. (Full disclosure: I do freelance work for them from time to time.) For more local advice, just find a member of the Rhode Island Brewing Society (RIBS) or the Rhode Island Fermentation Technicians (RIFT) homebrew clubs and ask for recommendations. (We know a guy.)

*Chris Meringolo serves on the local planning committee for Homebrew Con 2019 and is a member of the Rhode Island Brewing Society (RIBS) homebrew club.* 



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# Trappist Tripel

Recipe courtesy Kurt Elia

A unique aspect of this recipe is the small yeast starter I add to the bottling bucket. When I have brewed high-alcohol beers in the past, bottle conditioning has been slow. Sometimes it never reached the desired level of carbonation. Tripels are supposed to be nicely effervescent, so I didn't want to take any chances. This method worked well, and I will make this a regular part of my process for big, bottle-conditioned beers in the future.

**Batch volume:** 5.75 US gal. (21.8 L)

**Original gravity:** 1.079 (19.1°P)

**Final gravity:** 1.008 (2.1°P)

**Color:** 5 SRM

**Bitterness:** 35 IBU

**Alcohol:** 9.5% by volume

## MALTS AND SUGARS

14.5 lb. (6.58 kg) Continental Pilsner malt

2.5 lb. (1.13 kg) white sugar

4 oz. (113 g) aromatic malt

## HOPS

4 oz. (113 g) Tettnang pellets, 3% a.a. @ 60 min

0.5 oz. (14 g) Czech Saaz pellets, 2.2% a.a. @ 10 min

## ADDITIONAL ITEMS

1 tablet Whirlfloc @ 15 min

10 drops Fermcap S, added to primary

0.25 oz. (7 g) Polyclar 10 mixed in 350 mL boiled water, added to secondary

1.4 oz. (40 g) dry malt extract boiled in 500 mL water for bottling yeast  
starter

6 oz. (170 g) corn sugar, boiled in 500 mL water for priming at bottling

## YEAST

White Labs WLP500 Monastery Ale. Ideally, collect 300 to 400 mL thick slurry from a previous batch of light golden Belgian ale to ensure a large pitch of viable yeast.

## BREWING NOTES

Conduct a single infusion mash for 75 minutes at 149°F (65°C), adjusting strike water with gypsum and lactic acid to achieve a mash pH of 5.4. (I used 1 tsp. gypsum and 3 mL 88% lactic acid solution to achieve this, but your mileage may vary!) Fly sparge with 170°F (76.7°C) water to collect 7.3 gal. (27.6 L) wort. Add white sugar to hot wort, stirring well to avoid scorching, and then boil for 60 minutes, adding hops and Whirlfloc as indicated, to yield 5.75 gal. (21.8 L) wort. Rack to fermenter, chill to 62°F (16.7°C), oxygenate well, and pitch yeast slurry. (Be sure to reserve some yeast for bottling—see below.)

Allow the temperature to rise slowly to 70°F (21.1°C) as fermentation progresses over the course of the next 4 to 5 days. If desired, add 10 drops of Fermcap S once the kräusen forms. When fermentation has slowed (about 6 to 7 days into fermentation), allow the temperature to rise to 72°F (22.2°C) and hold it there for another week prior to bottling. Midway through this week, add a solution of Polyclar mixed with 350 mL boiled water, stirring gently to avoid too much oxygenation.

The day before bottling, make a mini yeast starter using 1.4 oz. (40 g) dry malt extract in 500 mL water. Do not add hop pellets or Fermcap to the starter, as it will



go directly into the bottles. After boiling for 30 minutes, chill the starter to 62°F (16.7°C) and add 10 to 15 mL of thick yeast slurry. Allow starter to grow on a stir plate at room temperature for about 18 hours or until it has reached high kräusen.

Rack beer into bottling bucket and measure volume of finished beer. The goal is to add enough priming sugar to provide 3.3 vol. (6.6 g/L) CO<sub>2</sub>. For 5 gal. of beer at 72°F (22.2°C), this would be about 6.7 oz. (190 g) of corn sugar, but I reduced this to 6 oz. (170 g) to account for unfermented extract in the actively fermenting mini-starter. An even 6 oz. (170 g) worked well for me. Bottle in heavy glass bottles that can handle the high carbonation of this beer, and allow bottles to condition at room temperature for 4 weeks.

## EXTRACT VERSION

Replace Pilsner malt with 9 lb. (4 kg) Pilsner liquid malt extract syrup. Steep the crushed aromatic malt for 30 minutes in 150°F (65.6°C) reverse osmosis water in your brew kettle. Remove grains, dissolve malt extract and sugar, top up with water to desired boil volume, and proceed as above.



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# AHA Governing Committee Election

Congratulations to Donna Reuter of Akron, Ohio, and Carvin Wilson of Mesa, Ariz., your newly elected Governing Committee members. Congrats also to Denny Conn of Noti, Ore., on his reelection to the Governing Committee. **The new Governing Committee members officially join the group on June 1** and will participate in the annual in-person meeting at AHA Homebrew Con in Providence.

The Governing Committee sets the course for the future of the American Homebrewers Association, offers input to AHA staff on how to best serve AHA members, and helps connect members to their local homebrewing communities. I am truly grateful to those who volunteer their time to serve on the Governing Committee and ensure that the AHA appropriately serves the members and the entire homebrewing community.

You can find pictures and email addresses for all the Governing Committee members in the Community section of HomebrewersAssociation.org.

Thank you to the 15 candidates who ran in this year's election, **and thanks to all the AHA members who voted!**

## BREW GURU 3.0

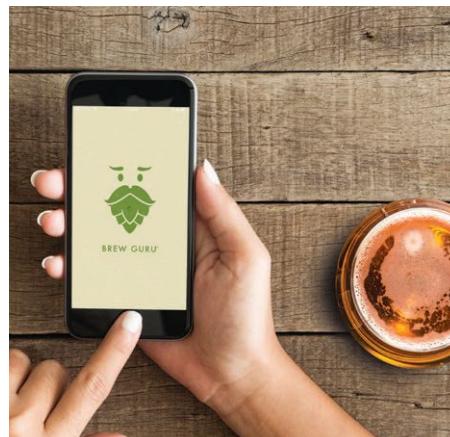
In May, the AHA will launch the **latest version** of the Brew Guru app. The updated version is on a new platform that provides a better user experience through faster load times and a more native look and feel.



Donna Reuter



Carvin Wilson



Additionally, the app will regain the capacity to notify users when they are near an AHA Member Deal location.

For those unfamiliar with Brew Guru, this app is available for free via the Apple and Google app stores. It provides access to your digital AHA membership card; displays a map of all the breweries, beer bars, and homebrew supply shops in our database; highlights nearby AHA member deals; features a library of AHA homebrew recipes, including National Homebrew Competition medal winners, brewery clone recipes, and recipes found in *Zymurgy* magazine; and delivers AHA news updates.

Members can also use the app to nominate businesses that have not yet signed on for AHA Member Deals.

Brew Guru is a great way to introduce fellow homebrewers to the AHA: non-members can start a 30-day, no-obligation trial membership right from the app. These memberships come with digital access to *Zymurgy* magazine and members-only content on HomebrewersAssociation.org, but they do not include member registration for AHA events.

If you are a current Brew Guru user, be sure to update to the new version when it is released. If you haven't yet checked out Brew Guru, now's a great time to do so.

## BIG BREW

The annual celebration of (Inter)National Homebrew Day (May 7), Big Brew, is coming up quick. On **Saturday, May 4**, for the **22nd straight year**, homebrewers from around the world will gather to brew the 2019 Big Brew recipes. Will you be joining in on the fun? Big Brew is an opportunity for homebrewers everywhere to celebrate the hobby we all love. At noon Central

# BIG BREW MAY 4, 2019



For National Homebrew Day

Daylight Time, Big Brew participants join in a simultaneous toast to homebrewing.

As AHA Homebrew Con will be held in New England for the first time since 1991, we are featuring a New England IPA (NEIPA) as one of the featured Big Brew recipes. The clone recipe for Battlecow Galacticose comes from Providence Brewing Company of Providence, R.I., host city for Homebrew Con 2019. The second Big Brew recipe comes to us from Denny Conn and Drew Beechum's soon-to-be released book *Simple Homebrewing*. They provide a blonde ale recipe called Trans-Atlantic Blonde that can be brewed as either an American or Belgian variant, depending on yeast choice.

More information on Big Brew and a form to register a Big Brew site are available via the Events section of [HomebrewersAssociation.org](#).

## HOMEBREW CON 2019

As mentioned, Homebrew Con 2019 brings us to New England for the first time in 28 years. The conference takes place June 27 to 29 at the Rhode Island Convention Center in downtown Providence. You will be within walking distance of great beer



JUNE 27-29  
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(the nearest brewery is just one block away), great food from scores of independent restaurants, and lots of history. Founded in 1636, Providence is one of the oldest cities in the USA. If you want to expand your New England experience, Boston is just half an hour away by train.

Registration is open and space is still available, but hotels are filling up quickly.

We have more than 90 speakers covering a huge range of topics at this year's Homebrew Con. Our keynote speaker is Dan Kleban, founder of Maine Beer Company, one of the fastest-growing breweries in the country. The story behind Maine Beer Company is truly inspiring, so you won't want to miss this keynote.

Check out [HomebrewCon.org](#) for registration and event details. See you in Providence!

## NATIONAL HOMEBREW COMPETITION

With 9,187 entries submitted by 3,492 AHA members to 13 regional judge centers, the 2019 AHA National Homebrew Competition set a new record for entries and is once again the world's largest beer competition. First-round judging wrapped up in mid-April. All the first-, second-, and third-place entries in each of the 34 categories advance to the final

round, which takes place June 27 at AHA Homebrew Con.

Good luck to all the AHA members who entered this year's competition!

## HOMEBOREW CLUB INSURANCE

Since 2014, the AHA has offered homebrew clubs in the US an affordable general liability and liquor liability insurance option, available at a cost of just \$3.75 per club member. There is also a separate directors and officers policy available. The AHA works with our partner, West's Insurance, to provide this policy.

To minimize the cost, the AHA doesn't take any revenue from this program. In fact, the AHA will cover the general and liquor liability insurance premium of any club taking advantage of West's liability insurance if 75 percent or more of its club members are also AHA members. As of the March enrollment deadline, more than 400 clubs have taken out policies through this program, and the AHA has reimbursed premiums for 47 of them.

The next open enrollment period for club insurance is July 1 through September 1. Now is the time to encourage your club members to join the AHA to get your club's premium reimbursed. To help clubs with AHA membership recruitment, the AHA offers our Referral program, through which clubs can earn a portion of their club members' AHA membership dues to help fund club activities. Contact AHA business programs coordinator Millie Shamburger ([millie@brewersassociation.org](mailto:millie@brewersassociation.org)) to learn more about this program.

For more information on club insurance and AHA premium reimbursement, go to the Community section of [HomebrewersAssociation.org](#).

## GOVERNMENT AFFAIRS

In January, the AHA submitted written testimony in support of Nebraska's LB 235, which would permit use of homebrew at events such as homebrew competitions, festivals, and nonprofit fundraisers. LB 235 passed a final reading on March 7 and will become law three months after the legislative session ends on June 7. Thanks to all the Nebraska homebrewers who contacted state legislators in support of this bill. Congratulations on the passage of LB 235!

In North Carolina, the AHA is continuing to work with local homebrewers who are considering legislation to clarify the law regarding homebrew competitions and transporting homebrew.

The AHA is also working with homebrewers in Virginia on potential legislation to loosen restrictions on transport of homebrew and use of homebrew on licensed premises for competitions.

AHA Governing Committee members Elmer Steingass and Roxanne Westendorf (chair) are working on new efforts to introduce reasonable homebrew legislation in Ohio. With the seating of new legislators, we are hoping to have a bill introduced in 2019. Currently there is no state homebrew law in Ohio.

Until next time, happy homebrewing!

*Gary Glass is director of the American Homebrewers Association.*

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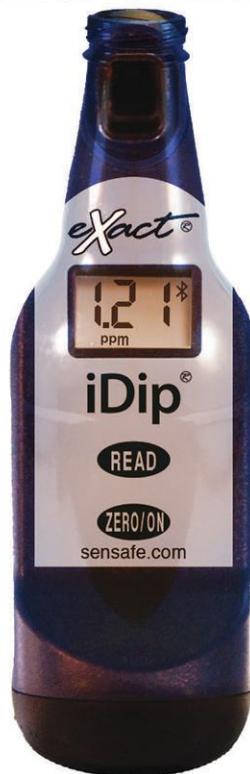
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# Welcome

# to the Family



**Dear Zymurgy,**

I recently discovered homebrewing from some friends in my village. As a newbie to the hobby, I found the AHA and joined to get some good tips and learn more. After joining, I received a "Welcome to the family" letter and, to my surprise, a cool sticker! I was so happy to get the sticker that I put it on my car right away.

Now I travel the roads of the Golan Heights proudly displaying my AHA membership! I co-brewed my first batch and am now hooked on the hobby and going for batch number two!

Photo © Getty/tzahiv

I produce virtual events for a living, so I decided to organize a free homebrewing summit to learn more about the hobby, help people brew better beer, and have fun, too! I just interviewed Marty Nachel and learned I've been pouring beer wrong my whole life! Check it out at [HomebrewingSummit.com](http://HomebrewingSummit.com).

Abraham Venismach  
*Keshet, Golan Heights*

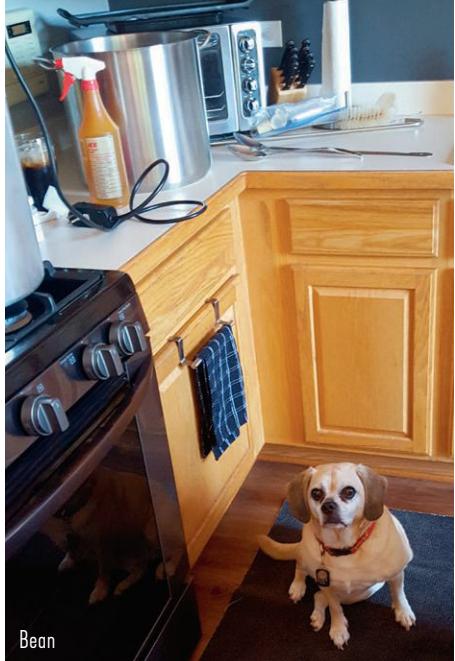
## HIGH(ER) OCTEN

**Dear Zymurgy,**

On page 32 of the March/April 2019 issue, the compound responsible for that musty iron odor is listed as 1-octen-2-one. This is not chemically possible, and it should be 1-octen-3-one.

Regards,  
Bob March  
*Bear, Del.*





Bean

### BREW PETS

This is our loyal brew dog Bean, patiently waiting for a few grains to fall to the floor. He loves to eat any pieces he can get!

Jen & Scott Rosenbaum  
Chicago, Ill.

---

This is Penny on her first brew day. The day was filled with rain, wind, and a good deal of hail, but she stuck with it to see it through until the weather cleared and the beer finished!

Andy Dolecek  
Denver, Colo.



Penny



Zeke  
This is my brewing assistant Zeke, who can't wait for the removal of that brew pot. Yum, yum from the mash tun. I love your magazine, especially the articles on real ale.

Robby Robertson  
Chester, Va.

---

These are my two furry brewing assistants, Waylon and Willie. For being just 10 months old, both are super helpful in the brewery. Willie inspects the crush of the grain, and Waylon is in charge of monitoring mash pH. This is usually followed by cat treats and a long nap.

Ben Pelletier  
Kingsley, Mich.



Waylon & Willie



Teddy  
This is my brewer's assistant Teddy. He loves to help on brew day, especially as taste tester of the spent grain dog treat recipe you posted, which has become a brew day tradition. Thanks for all the great work, information, and culture.

Colby Hinkson  
Tucson, Ariz.

**DEAR ZYMBURG**  
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[zymurgy@brewersassociation.org](mailto:zymurgy@brewersassociation.org).  
Letters may be edited for length  
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## HOMEBREW LABEL SUBMISSIONS

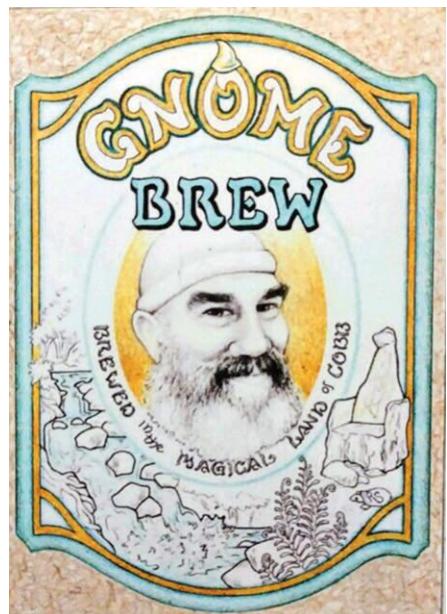
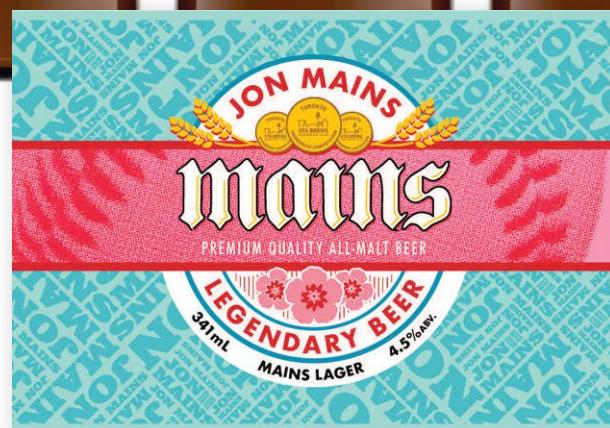
This design was created to honor the memory of Jon Mains, a homebrewer, gardener, ball player, cyclist, businessman, and friend to all. Jon was a founding member of GTA Brews and an endless source of inspiration to our club. His lagers were unparalleled on the Brewer of the Year (BOTY) circuit in Canada, and rightly so.

The design pays homage to three of Jon's passions: brewing, baseball, and Korea. Jon left behind a vast quantity of homebrew, and through the help of his friends and his club, the beer was bottled and shared with his friends and family at his celebration of life.

I have been homebrewing for five years and an AHA member for two.

Cheers, Jon.

James Kennedy  
GTA Brews  
Toronto, ON



The portrait is of me, a large forest gnome. I live in the woods near a year-round spring-fed creek whose waters I use in my brewing. The chair was carved by my friend Kelly Fletcher with a chainsaw, and it resides right next to my brew shed, where I sit and watch the water flow and the seasons change as I drink my beer. My friend Rose Starchild created the label. I note the beer style on a separate tag.

Larry Allen  
Cobb, Calif.

This label is based on a drawing that reminds me of my now-deceased English bulldog, Dante. It also has two hop cones and the date I started brewing.

The name Graco is my firstborn's nickname. He is named after me, Graciany. We used to call him Graco, and I liked it so much I decided to name my "brewery" after it.

I have been an AHA member and a homebrewer for three years.

Graciany Miranda  
Brewers Anonymous  
Clermont, Fla.

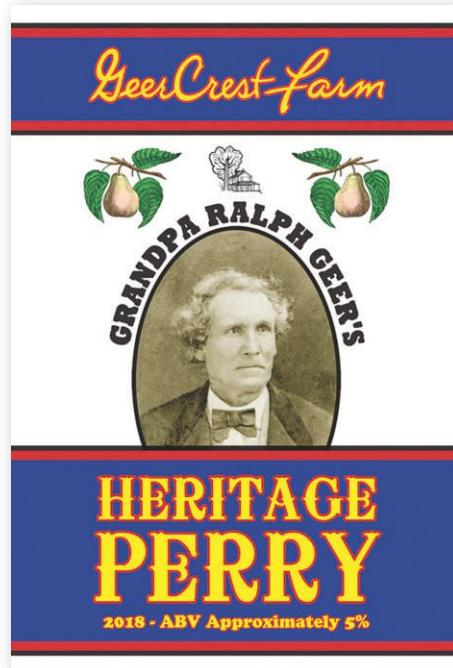




In 1850, Ralph and Mary Geer established their homestead in the Waldo Hills along the east edge of the Willamette Valley. Ralph soon planted his apple and pear orchards from cuttings and seeds brought across the trail by covered wagon.

Many of these trees still produce fruit on what is now known as GeerCrest, a working heritage farm managed by Geer's descendants. Part of that history is Grandpa Ralph's award-winning perry, which we have been attempting to recreate using a mix of 19th- and 21st-century methods for our monthly Farm Fresh Dinners and other activities at GeerCrest.

The label design is built around a period portrait of Ralph Geer shot in the early 1850s. Retro Western fonts were used as well as several scanned images from a 19th-century antique book on cider and perry production.



I have homebrewed for more than 40 years and am a relatively new AHA member.

Gus Frederick  
Foothills Spargers  
Silverton, Ore.



#### SUBMIT YOUR LABEL

Do you make custom labels for your homebrew? Want them featured here in the pages of *Zymurgy* for all to see your work?

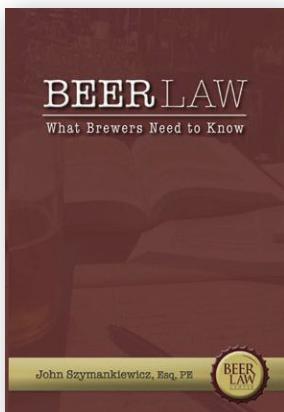
Send them to us at [HomebrewersAssociation.org/magazines/submit-bottle-label](http://HomebrewersAssociation.org/magazines/submit-bottle-label) and we will take it into consideration!

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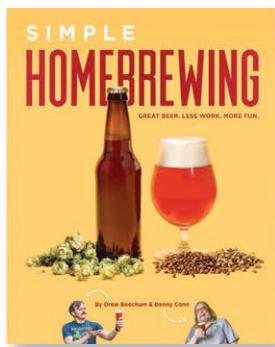
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# Clone Recipe Conundrums

## AGED LIKE DRAGON'S MILK

In the clone recipe for New Holland Dragon's Milk in the Jul/Aug 2018 issue of *Zymurgy*, Amahl Turczyn says to boil the wood chips, soak them in cheap bourbon for a week, and then toss the cheap bourbon and soak them in good bourbon. In the print issue, it says the soak in good bourbon should last 4 to 7 days, but the recipe posted online at [HomebrewersAssociation.org](https://HomebrewersAssociation.org) says to soak for 47 days. Which is right?

Frostman via the AHA Forum

*Forty-seven days is a long time! The figure of 4 to 7 days in the print issue is correct. We contacted New Holland Brewing Co. and were delighted to get further advice from head brewer Darren Osborne:*

Solid recipe! The production recipe is designed to really be a canvas for the barrel-aging process, so it's obviously going to be a different result using oak chips. That said, I'd suggest playing around with a slightly higher mash rest temperature, potentially adding a bit of honey malt to the grain bill, and a little cane sugar to the boil to help the final gravity finish closer to 5.5 to 6.0 degrees Plato [1.022 to 1.024 SG]. Good luck!



## ONE WHEAT, TWO WHEAT, RED WHEAT, WHITE WHEAT

I have a question about Amahl Turczyn's clone recipe for Allagash White in the Jul/Aug 2018 issue of *Zymurgy*. Allagash's four-pack carton says red wheat malt and white wheat malt are used, but the recipe

in *Zymurgy* doesn't include red wheat. What's the difference?

Thank you so much,  
Jake Kirk  
*Brew Free or Die*  
Hampstead, N.H.

**Zymurgy associate editor Amahl Turczyn responds:** Hi Jake, the differences between red and white wheat are generally more critical to bakers than brewers. Red wheat tends to be slightly higher in protein than white. Many describe red wheat as having a richer, fuller, nuttier taste than white wheat.

Protein is great for bakers, but not so great for brewers, as it can cause haze problems and instability, but since all wheat is grown for the baking industry, we have to put up with some of it. Then there's gluten. For bakers, red wheat is a "hard" wheat, meaning it has more gluten, making it better for breads. White wheat

is "soft," meaning less gluten, which makes it more suitable for cakes and pastries.

So, with all that in mind, I'm guessing the Allagash brewers use a portion of white wheat malt to lower protein and a portion of red wheat malt for better flavor. Personally, I can't tell much of a difference between them in wheat beer, but I think it's worth experimenting with your own recipes to see if you prefer one to the other. As long as the total amount of wheat malt remains the same, you should be able to use them interchangeably.

## REFRACTOMETER WOES

After several years using a hydrometer, I recently started using a refractometer. On my first batch using the refractometer, the original gravity (OG) was about what I was expecting for a West Coast-style IPA, but the final gravity (FG) was significantly higher than what I typically get. I made sure to calibrate the refractometer before



use, and it's supposed to automatically compensate for temperature.

For my next two batches I took measurements using both a hydrometer (corrected to 60°F/15.6°C) and the refractometer for comparison. Here's what I got:

Batch	Original Gravity	Final Gravity
1	Hydrometer: 1.071 Refractometer: 1.072	Hydrometer: 1.012 Refractometer: 1.037
2	Hydrometer: 1.071 Refractometer: 1.073	Hydrometer: 1.014 Refractometer: 1.038

What's going on here? I expected slightly different readings between the two due to differences in how each measures specific gravity, but why the bigger difference between the two in the FG readings? Or do I just have a bum refractometer?

Thanks for the help!

John Fogarty  
Bethesda, MD

**Zymurgy editor-in-chief Dave Carpenter responds:** Hi, John, your refractometer is just fine! Professor Surteit addressed a similar question in the Sept/Oct 2018 issue of Zymurgy before he hung up his cap and gown, but it's a question that pops up enough that it's worth revisiting.

A refractometer does not measure specific gravity directly but rather infers it from the refractive index of the liquid, which is a function of density and, in turn, related to the relative proportions of water, ethanol, and unfermented sugar. A refractometer should give you the same result as a hydrometer for original gravity, and yours certainly appears to do so within a reasonable margin of 1 to 2 gravity points.

Final gravity readings, however, drastically vary between the refractometer and hydrometer because of the different ways they measure density. The hydrometer gives it to you directly, but to measure FG with a refractometer, you need to know the original gravity of the beer, which you do. That's because the refractive index of the fermented sample—a blend of water, sugar, and ethanol—changes as the rel-

ative proportions change during fermentation. Fortunately, if the original gravity is known, basic stoichiometry tells you what those proportions will be as fermentation progresses.

Brewing software often has a refractometer calculator that will do this for you. I plugged your numbers into BeerSmith, and batch 1 is predicted to have an FG of 1.015. Batch 2 is predicted to have an FG of 1.016. The slight differences between the hydrometer and refractometer here could be due to several variables, of which temperature is just one. Carbonation can throw off a hydrometer reading, so be sure to de-gas your beer sample first.

For an in-depth look at refractometer correction, take a look at Petr Novotny's article "Revisiting the Refractometer" in the Jul/Aug 2017 issue of Zymurgy. And for more on the chemistry of fermentation, you'll want to read Petr's upcoming article in the Jul/Aug 2019 issue. Stay tuned!



### MALT LIFE

I have some Pilsner and Maris Otter malts that are about a year old (both uncrushed). About 15 pounds (6.8 kg) of each is left. I keep them in a sealed container in my basement, where the humidity is between 25 and 40 percent and the temperature is 58 to 65°F (14 to 18°C). Is there any test I can run to determine if they are still good?

Thank you in advance.  
David S. (via the AHA Forum)  
Cedar River Association of  
Zymurgy Enthusiasts (CRAZE)  
Cedar Falls, IA



### ASK THE AHA

Have a question for our motley crew of brewing geeks? Hit us up at [asktheaha@brewersassociation.org](mailto:asktheaha@brewersassociation.org)

Ask 10 different brewers the same question and you'll get 13 different answers.

**Malt manufacturer Briess says:** Store malts in a temperate, low-humidity, pest-free environment at temperatures of less than 90°F. Improperly stored malts are prone to loss of freshness and flavor. Whole kernel diastatic and preground malts are best when used within 6 months from date of manufacture. Whole kernel roasted malts may begin experiencing a slight flavor loss after 18 months. Flaked oats, due to their high oil content, are best used within 3 months.

**AHA Governing Committee member**

**Goose Steingass says:** You can tell pretty quickly if the malt has gone slack (meaning, it's picked up too much moisture to remain viable). It will be pasty when you chew it rather than crunchy. If humidity penetrates the bag, you will notice it when you chew it. If the bags are sealed like you mentioned, though, you can reduce that problem.

**AHA Governing Committee member**

**Denny Conn says:** My own experience is that seven-year-old sealed bags are fine.

**Our take?** Treat malt as you would any food product. Manufacturers will set expiration dates and offer recommended shelf lives according to their quality assurance standards. However, many consumers are quite content to use products that have gone past their "official" best-by dates.

You can very clearly tell when perishable foods like dairy products, meats, and vegetables have gone bad. Dry goods like flour, coffee, and—you got it—malt don't so much go bad as continuously degrade in quality as they age. You can brew coffee from beans that are two days, two weeks, two months, or two years past the roast date. Purists would say anything older than a week or two is stale, while very few people would want to drink two-year-old coffee. Most consumers are quite content with something in the middle.

If your malt tastes good, hasn't gone slack, and hasn't been infested by weevils, why not brew a small batch with it? Worst case scenario, you're out a gallon or two of underwhelming beer. Best case scenario, you've got bonus malt to use.

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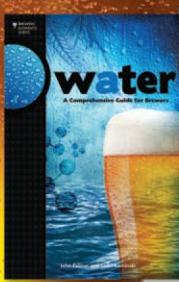
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# Makgeolli

**M**akgeolli (“MAHK-uh-lee”, 막걸리) is an ancient, traditional, working-class Korean fermented beverage made from rice. It also goes by the name of *nong-ju* (농주), or “farmer’s liquor.” Like Japanese *sake*, it is produced with a special blend of yeast and enzymes that break down rice starches to supply sugar for yeast to ferment.

But makgeolli fermentation has a little more going on than a sake ferment. In addition to the *Aspergillus* molds that contribute amylase, there are bacteria at work lowering the pH. The result is a tangy, slightly sweet, cloudy, alcoholic, fizzy, milky-white drink meant to be enjoyed cold. Think of it as a full-bodied *nigori*-style sake with slightly more rustic flavors and aromas, including those of chestnuts, yogurt, bananas, and grain.

## INGREDIENTS

All these fermentation aids are supplied by something called *nuruk* (누룩), which is to makgeolli as *koji* is to sake. You can’t make makgeolli without it. Nuruk bears much similarity to the symbiotic colony of bacteria and yeast (SCOBY) used for kombucha fermentation, but it comes in a convenient dry, powdered form.

If you live near an Asian supermarket such as H Mart, there’s a good chance it carries nuruk. Several manufacturers produce it commercially, and it’s usually labeled simply as “enzyme powder,” even though there’s much more to it than that. If you don’t live near a market like this, or near a Korean community, you can order nuruk online, but it will be more expensive.

Nuruk is typically sold in 1-pound (454-gram) bags, which is enough to produce around 10 to 12 liters of makgeolli, depending on strength. Haioreum, Haio, and Choripdong brands can be found at H Mart; Wang Korea and Assi brands can be found at online retailers like Amazon.



Haio brand nuruk.

Nuruk, like koji, can be made at home, but there is a very specific traditional process whereby wheat and barley are roughly ground, made into a paste with water, shaped into disks, coated in wheat or rice straw, and suspended (sometimes from the rafters of a warm, humid building)

to grow the requisite molds, yeasts, and bacteria. When dry, the cakes are sold as-is or roughly crumbled into a coarse powder somewhat resembling pale granola, which is then bagged for sale.

There is a bit of terroir involved as well. That's not to say nuruk can only be made in Korea, but if you are looking for the traditional flavor profile of makgeolli, it's probably best to at least start with nuruk made in this way by a trusted Korean producer.

Although you can find commercially produced makgeolli (it's usually readily available in those same supermarkets), it's generally sweeter and weaker in strength than the homemade stuff. And that sweetness often comes from artificial sweeteners like aspartame. Commercial manufacturers, for the understandable sake of consistency, produce their own nuruk in carefully controlled laboratory conditions, and even if they were willing to share, the result might not be quite the same.

Rice for makgeolli is typically either glutinous sweet rice or short-grain table rice. As with sake, the rice must be washed thoroughly and cooked to gelatinize its starches, but without excessive hydration. Sake rice is traditionally steamed to achieve this balance, and makgeolli is no exception; steaming the rice produces a stronger, more favorable result.

You can, of course, make makgeolli with ordinary cooked table rice. You'll just end up with a more dilute result, which may be fine with you. After all, it's often diluted from 14 to 18% ABV to more like 7 to 9% before bottling anyway. But if you want to do the full-strength version, one endlessly creative Korean cuisine specialist, Emily Kim (who goes by the name of Maangchi on her charming YouTube videos) offers a workaround for people who don't have the equipment to steam rice easily.

Kim proposes using another piece of equipment to achieve a similar result, namely a food dehydrator. With her meth-

od, you can use a rice cooker to make rice as you normally would for the table, and then remove a portion of the excess water by drying the cooked rice in the dehydrator for a few hours.



Using a food dehydrator to dry cooked rice.

## FERMENTATION

The only other ingredient you need for makgeolli is dry baker's, brewer's, or wine yeast, even though there are already wild yeast strains in the nuruk. The added yeast "kick starts" fermentation. I've also used actively fermenting sake for this purpose.

One major difference between makgeolli and sake is fermentation temperature. Sake yeast is very cold tolerant, and most sake brewers recommend conducting the main parallel fermentation at 46 to 48°F (8 to 9°C). Makgeolli is a warm-weather beverage that ferments best at room temperatures of around 70 to 75°F (21 to 24°C). In fact, the yeast and enzymes won't even get going if fermentation starts any colder than the mid 60s °F (upper teens °C).

Kim suggests putting the fermentation vessel on the kitchen counter and comments that fermentation will create enough heat to make it warm to the touch at the height of activity. The ambient temperature will have a direct effect on how fast fermentation takes to finish.

Fermentation traditionally takes place in an *onggi* (옹기), a large earthenware jar of the sort that's used for another Korean fermented staple, kimchi. The porous clay allows oxygen ingress and helps makgeolli ferment faster. However, you can also use a bucket or some other non-porous vessel. You stir the ferment twice a day anyway, so oxygen uptake should not be too much of a problem.

## TECHNIQUE

Your first task in making makgeolli is to measure, wash, and soak the rice.



# Easy Makgeolli

**Batch volume:** 12.6 U.S. quarts (12 L)

**Alcohol:** 12–14% by volume, before dilution

## FERMENTABLES

5 lb. [2.27 kg] short-grain rice

## OTHER INGREDIENTS

4 qt. [7.6 L] water

1 lb. [454 g] nuruk

0.25 cup [31 g] sugar (optional)

## WATER

Carbon filtered water.

## BREWING NOTES

Measure rice and wash it until the water runs clear. Soak rice 30 minutes. Cook in batches with a rice cooker. (Optional: for stronger makgeolli, steam rice instead of boiling it.) Allow rice to cool to room temperature. (Optional: for stronger makgeolli, dry cooked rice in a food dehydrator for 3 hours, and then cool to 70°F/21°C).

Hydrate nuruk in 4 qt. (7.6 L) water for 30 minutes. Add rice to sanitized fermenter, add nuruk solution, and stir to blend evenly. Cover and allow to ferment at 70–75°F (21–24°C) for 9–14 days, stirring twice daily. It's done when no more bubbles are seen rising to the surface.

Strain through a fine sieve, add sugar if desired, dilute to desired strength, and bottle in plastic pressure-safe bottles. Refrigerate and enjoy.



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## Measure

You will need to cook 5 pounds (2.27 kg) rice for 1 pound (454 g) of nuruk; with boiled rice as you would serve at the table, this will yield about 12.6 quarts (12 L) of 12 to 14% ABV makgeolli, and you can dilute that further if you wish. Remember that if you use a rice cooker, the cup that comes with the cooker is a rice industry-standard 180mL, or about 6 dry ounces by volume. So, 5 pounds of rice will be 13.3 of these cups. If your cooker can do 4 cups at a time, you'll need to do three batches of a little over 4 cups each.

## Wash

Washing is important; as with sake, you want to wash the rice until the rinse water runs clear. I've found this is easiest with a fine-mesh colander and the sink sprayer. Scrub the rice around to get all the talc powder off. This is somewhat labor-intensive, but it's not difficult.

## Soak

Next, the rice needs to soak for 30 minutes. This hydrates the rice so that it cooks evenly. If using a rice cooker, place your 4 "cups" of washed rice in a bowl of cold (filtered) water. It will turn from translucent to opaque white.



Soaking washed rice.

Finally, the rice needs to be cooked in your rice cooker (or steamed over boiling water for an hour) and then cooled. Cooling is critical since you will next introduce your rice to the nuruk culture that contains the yeast, enzymes, and bacteria necessary for fermentation. If you skip the cooling step, you'll still get makgeolli, but hot rice makes for sour makgeolli by handing the advantage to lactic bacteria instead of promoting balance between yeast, enzymes, and lactic cultures.

For the easy version of this recipe, you are pretty much done once all your rice is cooked. Scoop it out onto a cookie

“  
**Makgeolli offers many of the same benefits as other lactic fermented foods such as kimchi, sauerkraut, and pickles.**

sheet and allow it to cool, maybe with the help of a fan. While you wait, mix the contents of a 1-pound bag of nuruk with 4 quarts (7.57 liters) water and hydrate 30 min. Scoop the cooled rice into a sanitized fermentation vessel, add the nuruk solution, and stir with a sanitized spoon, breaking up clumps as best you can. Sprinkle in the packet of dry yeast at this point if you want to make sure things get off to a quick start. The mixture will be gravel-like and fairly dry, like wet sand.

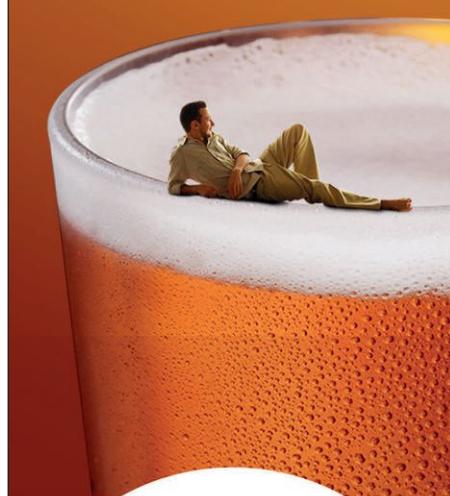
For stronger makgeolli, you will need to steam the rice. Steam gelatinizes the starches without adding much moisture, as the rice is steamed over rather than cooked in the water. Another option, per Emily Kim, is to go ahead and use the rice cooker (or cook all the rice at once in a kettle without burning it if you are up to that challenge), and then dry the cooked rice. Scoop it in even layers onto the trays of a food dehydrator.

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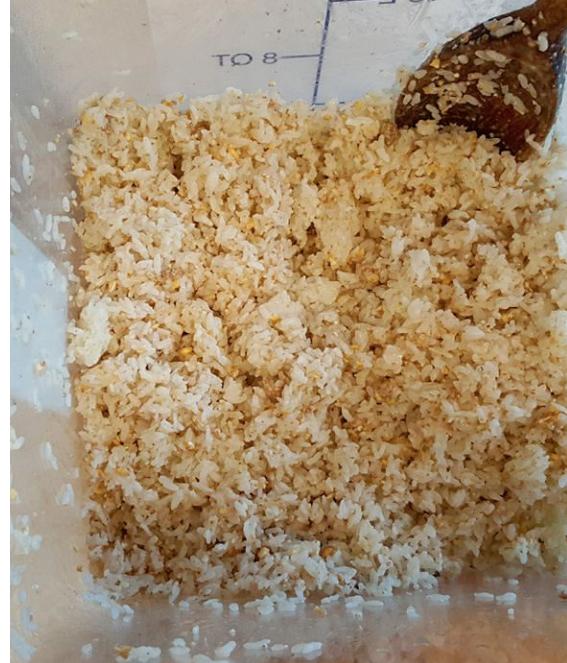


It can then be dried at 160°F (71°C) for about three hours. It usually helps to rotate the trays from bottom to top halfway through. You'll know it's done when the edges of each tray's rice are crusty and dry, while the center remains stiff but chewy.

The dried rice can then be cooled, broken up, and added to the fermenter along with the nuruk solution and yeast. Stirring this mixture into a homogeneous mass is a lot tougher with dried rice, but do the best you can to mix everything up. This will yield about 10.6 quarts (10 liters) of 15 to 18% ABV makgeolli.

Cover the onggi or fermenter and let the vessel sit at 70–75°F (21–24°C), stirring twice a day. In winter, when the ambient temperature is much lower, I've used an electric heating pad on the lowest setting to keep temperatures in the proper range. On the second or third day, the enzymes in the nuruk will have begun to liquefy the starches in the rice and stirring will become a little easier.

Continue to ferment for 9 to 14 days. On about day five, the ferment will become more liquid than solid. It may rise to as high as 80°F (27°C), which is fine. If the ambient temperature is cooler, fermentation



Makgeolli fermentation initially looks rather dry, as shown here on day 1.

may take longer. The best way to monitor fermentation is to observe the CO<sub>2</sub> bubbles produced. Eventually, a layer of clear, amber liquid will form on top of the makgeolli, and when no more bubbles are seen breaking the surface of the liquid, it's done.



Day 3 of makgeolli fermentation.

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### PACKAGING AND CARBONATION

Use a sanitized screen colander to strain the remaining solids from the milky liquid. You'll notice familiar-looking grains in with the solids, usually barley and wheat, from the nuruk. As with *kasu* (the solids left over from sake making), these lees can be used to make pickles or to marinate meat.

Collect the filtered makgeolli in a large vessel. Some people add a quarter cup (60 mL) of sugar at this point, more to boost alcohol than sweeten, as the yeast will consume the extra sugar in a few days. You can also dilute the makgeolli at this point up to 50 percent with water for a lower-strength beverage.

Then bottle in plastic PET bottles that can take a good amount of pressure; these can be purchased from most homebrew shops, or you can purchase inexpensive club soda or seltzer water and use those bottles.

Makgeolli is more tolerant to light exposure than beer, so don't worry if the plastic bottles are clear. But don't use glass because this drink will continue to ferment in the bottle. You can easily test the amount of pressure building up in plastic bottles by squeezing them, and "burp" them by loosening the cap if they get too carbonated. Glass bottles have too much potential to become bottle bombs.



Finished bottles of makgeolli.

When carbonated to your satisfaction, refrigerate the bottles to slow further fermentation, checking them every day or so for the next week to make sure they don't over-carbonate. When you are ready to enjoy your beverage, shake the bottle gently to mix up the sediment first, and drink cold.

It may seem odd to drink all that sediment—your brewer's instincts are probably telling you that yeast is going to disagree with you in some way or another—but makgeolli is quite nutritious. The bacterial cultures are probiotics, the yeast has a host of B vitamins, and while it isn't gluten-free (nuruk contains wheat and barley), it offers many of the same benefits as other fermented foods like kimchi, sauerkraut, and pickles, without the sodium.

Makgeolli pairs well with spicy Korean dishes like barbecue, kimchi, bulgogi, and kalbi. Spend an afternoon throwing together a batch and impress your Korean friends!

*Amahl Turczyn is associate editor  
of Zymurgy.*

YEASTS  
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A man in a light-colored shirt and pants is sitting relaxed in a large, shallow pool of white foam on top of a large glass of beer. The beer has a thick head of foam. The background is a solid orange color.

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# **ADVANCES IN WORT BOILING**

*By Martin Brungard*





B oiling wort has been an integral component of the brewing process for millennia. Boiling sterilizes wort, isomerizes hop alpha acids, drives off unpleasant compounds, and coagulates proteins, all of which are critical for producing quality beer. For years, homebrewers have been taught the benefits of a long, vigorous boil, but this may not be necessary or desirable for producing high-quality beer.

Boiling is the process of vaporizing a liquid. Heating wort to the boiling point at your local elevation creates the bubbles that are evidence of boiling. Since wort is mostly water, water's boiling point of 212°F (100°C) applies at sea level; for every 526 feet of elevation gained, the boiling temperature falls by 1°F. (A 258-meter increase lowers the boiling temperature by 1°C). This reduction becomes a concern for those brewing at higher elevations.

## WORT STERILIZATION

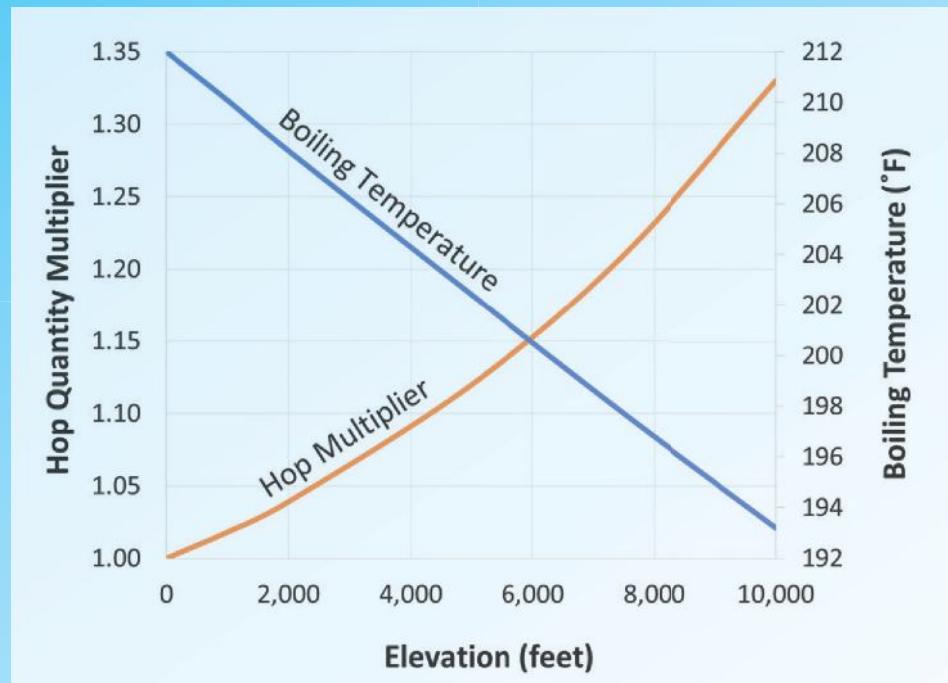
For most fermentations, we want specific organisms in our wort, and boiling kills most of the ones we don't want, but it's often overkill. Less than one second of contact with 200°F (93°C) wort or 15 minutes' contact with 150°F (65°C) wort will kill those spoilers. From this perspective, boiling may not be necessary at all.

## EFFECT ON BITTERING

Wort temperature directly affects the hop alpha acid isomerization rate, which exponentially decreases as elevation increases. The combination of a lower boiling temperature and the decreased alpha acid isomerization rate at that temperature produces that exponential drop in hop utilization.

The hop utilization versus elevation data presented in Figure 1 were created by combining standard water boiling point information with temperature-dependent hop isomerization data produced by

**FIGURE 1: Elevation Effects on Temperature and Bittering**



Malowicki and Shellhammer.<sup>1</sup> The figure shows how much extra hop mass is needed to produce the same bitterness at various elevations compared to sea level. This variation can wreak havoc when a recipe is perfected at one elevation and brewed at another.

About 75 percent of the U.S. population lives below 2,000 feet (610 meters), so most U.S. brewers don't need to worry about high elevation effects on hop utilization. However, low-temperature boiling is a reality for brewers living at higher elevation, and it is becoming a reality for other brewers, too. Some modern brewing equipment, such as Picobrew, does not boil the wort it produces. Instead, it relies on a near-boiling wort temperature and pumped wort circulation.

Research shows that appreciable alpha acid isomerization still occurs when wort temperatures are greater than about 185°F (85°C).<sup>1</sup> But as with high-elevation brewing, reduced temperature brewing means more hops are needed to produce the same bitterness as a sea-level boil. The information in Figure 1 can be used to estimate the increased hop quantity needed when conducting sub-boiling temperature brewing.

Boiling more vigorously doesn't help increase bitterness either. Since wort temperature cannot go any higher than the boiling point at your elevation, alpha acid isomerization occurs at the same rate, regardless of boil intensity. Isomerization will be the same whether you have a volcano in your kettle or a light simmer.

The rate of alpha acid isomerization is initially high, but it decreases as the boil continues.<sup>2</sup> Research shows that isomerized alpha acids degrade when boiled for extended periods.<sup>2</sup> Alpha acid isomerization peaks after about 60 to 80 minutes of sea-level boiling, and isomerized alpha content can fall with continued boiling. High-elevation brewers can worry less about this degradation because a lower boiling temperature does reduce the iso-alpha degradation rate. All brewers should understand that excess boiling can decrease bitterness and hop utilization.

## EFFECTS OF LONG AND HARD BOILS

Boil intensity and duration do have other effects. Many brewers know a long, hard boil helps form melanoidin compounds, caramelize sugars, and oxidize polyphenols. All these changes can be desirable in

styles such as strong ale and barleywine. However, that same process creates thio-barbituric acid (TBA), an oxidant that has been proven to accelerate beer staling.<sup>3</sup> Some oxidation can add warmth to rich beers, but it rarely benefits paler and lower-gravity styles. Longer and more intense boiling increases TBA production.

Modern brewing texts and journal articles have long cautioned professional brewers to reduce TBA to improve beer stability and avoid premature oxidation,<sup>3</sup> but this information may not have reached homebrewers. Li et al. found very strong correlation between TBA and early flavor staling.<sup>3</sup> The negative impacts of boiling wort too hard or too long are real.

Sales brochures for some pro brewing systems mention their ability to gently boil wort and avoid excessive heat stress. Using jacketed kettles, avoiding excessive heat loss, and controlling evaporation are typical ways to achieve this. These systems often focus on saving energy costs—pros want just enough energy to get the job done and nothing more.

Total evaporative loss is defined as the wort volume lost during the boil divided by the starting wort volume. Typical pro-brewing systems report total evaporative losses of between 2 and 12 percent. Typical homebrew systems boil off 1 gallon of every 6, a loss of almost 17 percent!

Reducing evaporation and energy loss is easy. Evaporation is a function of the wort surface area in your kettle and its degree of exchange with the open atmosphere. For most brewers, wort surface area can't be changed, but covering the kettle does reduce contact with the open atmosphere. Once that exchange is reduced, evaporation and heat loss are reduced, and you can reduce the heat.

Most modern brewing kettles have a gasketed hatch with battening knobs to control the draft up the vent stack. Reducing evaporation is fine for a portion of the boil, but brewers know that some open boiling is needed to avoid dimethyl sulfide (DMS).

## DMS REDUCTION

DMS imparts flavors and aromas resembling corn, cabbage, celery, or shellfish that are often regarded as defects. DMS is a natural product of malting, and it is easily

driven out of wort by boiling. With a taste threshold in beer of 30 parts per billion (ppb), DMS can benefit the taste and aroma of some lagers at up to 100 ppb.<sup>4</sup> Style guidelines for many beers made with high Pilsner malt content allow perceptible DMS character, but keeping it at or near the taste threshold is best for most styles. Some yeasts and other organisms can also produce DMS during fermentation, so a poor boil isn't always to blame.

The science of DMS reduction is relatively young. Only in about the last 40 years have brewing scientists fully understood the mechanisms and causes of DMS in beer. Considering that widespread homebrewing in the U.S. has been around for about the same time, it's no wonder that rules of thumb persist regarding DMS reduction.

Malted cereal grains contain S-methylmethionine (SMM), which transforms into DMS when malt or wort is heated. Factors such as malt variety, growing conditions, and malting conditions influence SMM content. Some SMM can be driven out of malt or be converted to DMS during the malt kilning process. Fortunately, base malt color (in degrees Lovibond or EBC)

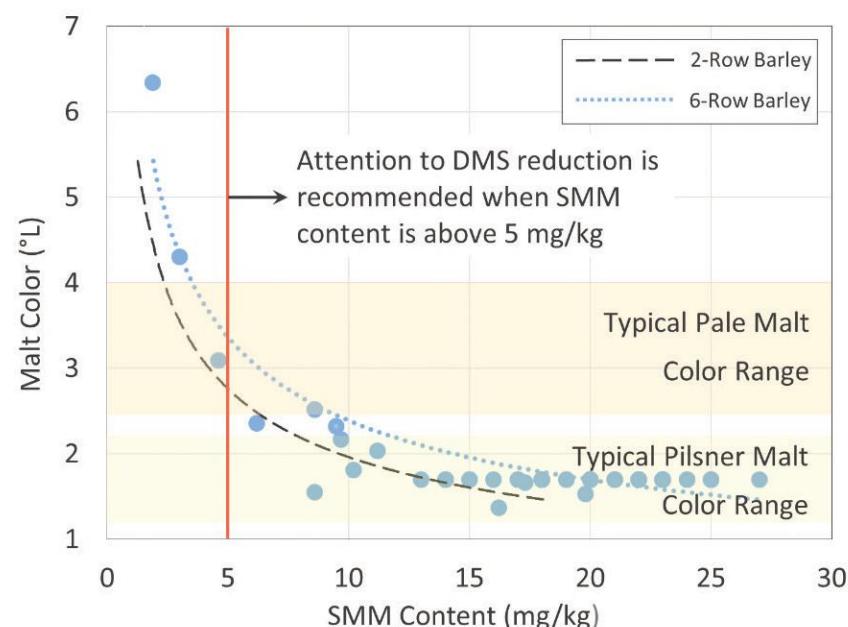
has proven to be a good predictor of SMM content in malt.

A summary of SMM content and malt color from a series of malting and kilning trials produced the information in Figure 2.<sup>5</sup> The original data are for six-row barley, which typically has higher SMM content than two-row barley. The typical SMM content for two-row is also estimated and shown. Figure 2 illustrates that lightly kilned malt typically contains more SMM than darker-kilned malt.

While nomenclature varies from maltster to maltster, base malts with color ratings between 1.2 and 2.2°L (2.4 and 4.5 EBC) are referred to as Pilsner malts in this article. Malts with color ratings between 2.5 and 4°L (5 and 8 EBC) are referred to as pale malts. Pilsner malts are kilned at lower temperatures than pale malts.

Pitz<sup>5</sup> found it impossible to produce Pilsner malt with SMM content below 5 mg/kg (they ended up with too much color or toasted flavor). Malts with SMM content higher than about 5 mg/kg have significant potential to impart DMS into finished beer. Know, too, that unless a maltster states that a malt is made with two-row barley, it may

**FIGURE 2: SMM Content vs. Malt Color**



\*Original data taken from Pitz, 1987  
SMM data without color information is shown as 1.7°L  
Original data is for 6-Row Barley

**TABLE 1: SMM Conversion Time vs. Elevation**

Elevation	Boiling Point	Approximate Time to Achieve Significant SMM to DMS Conversion
0 ft. (0 m)	212°F (100°C)	30 minutes
5,000 ft. (1,524 m)	202.4°F (94.7°C)	90 minutes
10,000 ft. (3,048 m)	193.2°F (89.6°C)	210 minutes

be produced with a six-row variety. Brewing with significant Pilsner malt content requires brewing measures to avoid DMS.

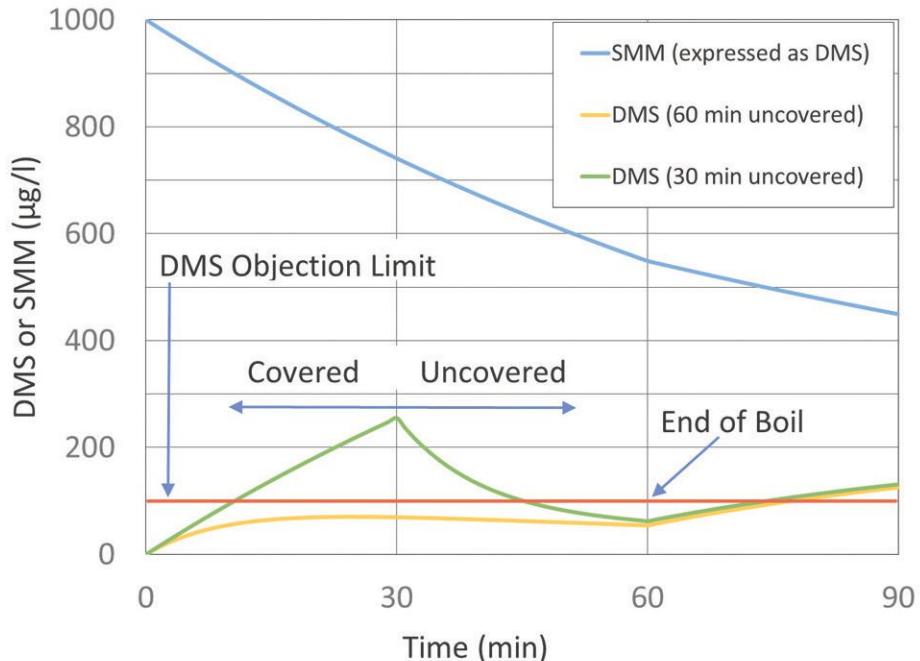
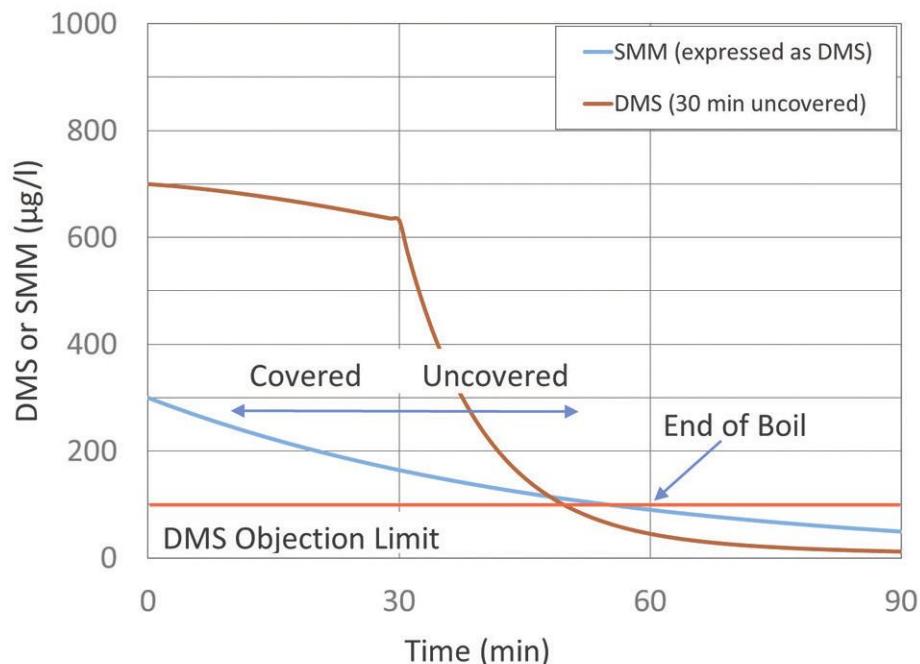
With their darker kilning, pale malts can generally be expected to have less SMM than Pilsner malts. Increased kilning converts a portion of the SMM directly into DMS. Malts darker than about 6°L (12 EBC) are unlikely to have significant SMM or DMS. While definite SMM content data for wheat malt was not found in literature, wheat malt's SMM should be similar to that of barley. Unmalted grains, crystal malts, and roasted malts do not contain significant SMM content.

Many brewers boil Pilsner malt-heavy wort longer to reduce DMS. However, brewing trials by Brülosophy<sup>6</sup> found that boiling Pilsner wort for as little as 30 minutes produced a beer that tasters perceived to be as free of DMS as a beer produced from the same wort boiled for 90 minutes. While that evidence shouldn't be taken as conclusive, it suggests that extra-long boils are not always necessary.

DMS is highly volatile and easily removed during the boil. Dickenson showed that DMS is easily reduced to acceptable levels with 30 minutes of open boiling.<sup>7</sup> Wilson and Booer also showed that DMS removal is *not* improved by more active boiling or increased wort evaporation.<sup>8</sup> But the problem is that DMS is constantly produced when there is appreciable SMM in the wort. Fortunately, the rate of DMS removal does not strongly depend on temperature or pH. As long as most SMM is converted by the end of the boil, DMS is likely to be low.

The rate at which SMM converts into DMS is driven largely by wort temperature and pH. Higher temperature and pH increase the SMM conversion rate. Because elevation drives your local boiling temperature, higher elevation means more time is needed to convert SMM to DMS. Table 1 shows how the SMM-DMS conversion time increases exponentially with elevation and lower boiling temperature.

A high-elevation brewer may find it difficult to convert SMM as effectively as a sea-level brewer. This phenomenon may be the reason behind the rule of thumb that long boil times should be used when brewing with Pils malt (after all, the AHA is headquartered in Boulder, Colo.,

**FIGURE 3: Potential SMM & DMS Variation with Pilsner Malt****FIGURE 4: Potential SMM & DMS Variation with Pale Malt**

5,430 ft./1,655 m above sea level). While this practice may be necessary for some brewers, elevation should drive that decision, not a rule of thumb.

At modest elevations, a high-Pilsner-malt boil can be conducted with about 30 minutes of covered simmering (to convert SMM) followed by about 30 minutes of more energetic, uncovered boiling (to expel DMS) to produce quality wort while reducing heat stress and evaporation loss.

Figure 3 helps illustrate the typical variation in SMM and DMS during initially covered and uncovered, 60-minute boils when Pilsner malt is used. While the figure is not intended to be definitive, it is based on known SMM decomposition behavior.<sup>9</sup> After enough SMM is converted to DMS, the wort can be brought below objectionable DMS levels. Note that DMS content will rise if the wort isn't cooled quickly after the boil.

If the wort has little or no Pilsner malt content, it can be feasible to reduce or eliminate the SMM conversion time and conduct a short, uncovered boil to eliminate DMS. Pale malt can still contain low SMM content and have significant DMS content in its kernels, and an uncovered boil is likely needed to bring DMS down to an acceptable level.

Figure 4 presents the potential variation of SMM and DMS during an initially covered boil when pale malt is used. The figure shows that even with SMM and DMS content, the pale malt wort can be brought down to an acceptable DMS level with a short, uncovered boil. Including the initial covered boil period improves hop utilization and helps reduce SMM content to a very low level, however the covered period may not be required.

Because extended boils can degrade wort compounds, brewers may prefer a fully covered simmer for the early period of the boil. If your elevation requires much more than 30 minutes for SMM conversion, conducting an extended, fully covered wort simmer very near the boiling point can reduce heat stress on the wort while promoting SMM conversion. Once the extra simmer time is complete, the wort can be uncovered, boiled, and bittered like a typical beer.

If the palest beer color or honey-sweet malt flavors are desired in a beer, Pilsner malt is a necessity. If you find your beers display too much DMS character, consider

substituting pale malt for Pilsner in those grists where Pils malt isn't strictly needed.

Extended open boiling just increases heat stress with no measurable improvement in DMS reduction compared to the covered simmer approach.<sup>8</sup> But the undesirable effects of excessive boiling reach well beyond concerns over SMM and DMS.

### OTHER BOILING EFFECTS

Coagulable nitrogen (CN) is present in raw wort and it must be reduced to improve the colloidal stability of beer (haze reduction). However, boiling wort too long or hard can reduce CN too far and damage beer's head retention ability. Excessive boiling is a reason that some beers have poor head production and retention.

Wort boiling also increases wort color. The typical color increase in pale wort during boiling is around 2 SRM (4 EBC). The color increase is from Maillard reactions, and the effect is increased when wort pH is elevated. Keeping wort pH below 5.4 (measured at room temperature) reduces this darkening effect in pale beers. If even paler beer is desired, limit wort boil duration and vigor.

Extended boils increase the production of Maillard reaction by-products that are often perceived as roasted, toasty, cooked, or browned. Those might be desirable in barleywine, wee heavy, and old ale, but they may be less desirable in pale beer styles. The decision to boil more than 60 minutes depends on whether Maillard by-products are desirable.

### BOILING IMPROVEMENTS

We can improve our brew kettles to improve brewing outcomes. The most important thing is to cover your kettle to limit heat and evaporation losses for portions of the boil. For most brewers, that is as simple as having a lid, knowing when to use it, and adjusting the heat input accordingly. Bolted hatches in today's professional kettles can be secured early in the boil to prevent evaporation and heat loss while the brewer assesses boil vigor through the clear glass. The hatch is then opened near the end of the boil to create a draft that carries DMS-laden vapor up the stack.<sup>10,11</sup>

Another improvement is to increase the frequency with which every molecule of wort contacts the atmosphere. While a typical boil does bring wort to the kettle surface, it is often at haphazard frequency and duration. Strong and effective wort circulation promotes effective atmospheric contact. Two options for improving kettle circulation are pumping and convection.

Modern professional brewing systems now commonly employ a pump to bring wort in contact with the heat source and expose it to the atmosphere. Some systems run wort over an exposed metal plate (calandria) within the kettle or spray wort across the kettle.<sup>11</sup> In either case, wort is regularly exposed to the atmosphere, where components like DMS can be expelled. Homebrewers using a recirculating infusion mash system (RIMS) could repurpose their heater and pump to brew this way, too. While that equipment would limit how hot the wort can get, the hop utilization factor in Figure 1 can help to correct for any bitterness reduction.

Convection is the movement of hot wort within the kettle. A significant improvement can be produced by bringing order to that convection with a strong rolling wort circulation within the kettle. For some gas- and steam-heated kettles, the kettle is heated fairly uniformly across its bottom. However, to produce a strong rolling action in a kettle, the wort heating should be concentrated in a limited area.

For gas-heated kettles, moving the kettle slightly off center of the heat source preferentially heats one side and encourages rolling action. For electrically heated kettles, locating the heating element(s) around the periphery of, or in a single line across, the kettle can promote a rolling boil. With the preferred rolling circulation in the kettle, wort is more regularly brought to the surface to discharge undesirable compounds. The wort speed across the kettle surface should be at least an inch (25 mm) per second to keep trub and hop particles suspended. For those using hop socks or spiders, a good rolling boil may improve the bitterness efficiency by increasing wort flow through the hop matter.

Of course, if your boiling process is amended to reduce evaporation, you will need to plan for that change in your recipe and wort production procedures. Your

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#soulofbeer

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pre-boil volume will need to be reduced and your pre-boil gravity will need to be increased to accommodate this change. In many cases, that just means you'll mash or sparge with a little less water.

### MODERN RULES OF THUMB

While wort boiling is seemingly simple, there are reasons to revisit how you do it. Most importantly, this information will help guide you away from blindly following outdated brewing myths and rules of thumb. Here is a list of important wort boiling concepts that should produce better beer.

- Wort boiling is not required to make beer (but it helps!).
- Your local elevation affects wort boiling temperature.
- Low wort temperature and a pH less than 5.4 reduce hop utilization and the rate of SMM conversion to DMS.

- Additional hop quantity is needed when brewing at high elevation or at reduced boiling temperature.
- Boiling hops for more than 70 minutes can reduce their bitterness contribution.
- Additional boiling time may be needed to reduce SMM content when brewing at high elevation or at reduced boiling temperature.
- Limit boil intensity and duration to improve beer longevity and flavor stability.
- Limit wort evaporation to improve energy efficiency and avoid damaging beer.
- A vigorous, uncovered boil as short as 30 minutes can sufficiently expel DMS.
- Good wort circulation is more important than boil vigor for DMS reduction.
- Excessive boil intensity or duration can reduce head retention.
- Reduce boil intensity and duration and

keep wort pH around 5.4 to reduce the darkening of pale beers.

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Martin Brungard is a homebrewer from Carmel, Ind., a member of the Foam Blowers of Indiana (FBI) homebrew club, and a member of the AHA Governing Committee.

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# DECOCTION



# MASHING



Historic brewery with wooden mash tun (front) and brick-set kettle (back), open air museum Markus Wasmeier, Schliersee, Bavaria, Germany.

# History and Modern Approaches

By Jan Brücklmeier

It's impossible to discuss modern pale lager without mentioning Pilsner. It's unthinkable to discuss Pilsner without mentioning the holy of holies, Pilsner Urquell, brewed in the city of Pilsen, the birthplace of this wildly successful beer style. The original Bohemian Pilsner is known for its soft, round bitterness and rich, mellow, bready maltiness. Incredibly soft water and Saaz noble hops deliver pleasant hop aroma and bitterness.

Have you ever wondered, though, why Bohemian Pilsner has such a mellow, bready maltiness and a deeper gold color than, say, a typical German Pilsner? After all, both share a grain bill of 100 percent Pilsner malt. The answer lies in a process that today sounds a bit like a dinosaur: decoction.

Heating a mash by removing part of it, boiling it, and mixing it back in was, and is, so essential to Bohemian and Bavarian beers that decoction was long referred to as the Bohemian or Bavarian method. But why should one spend the time and energy to cook part of the mash?

## HISTORICAL IMPERATIVE

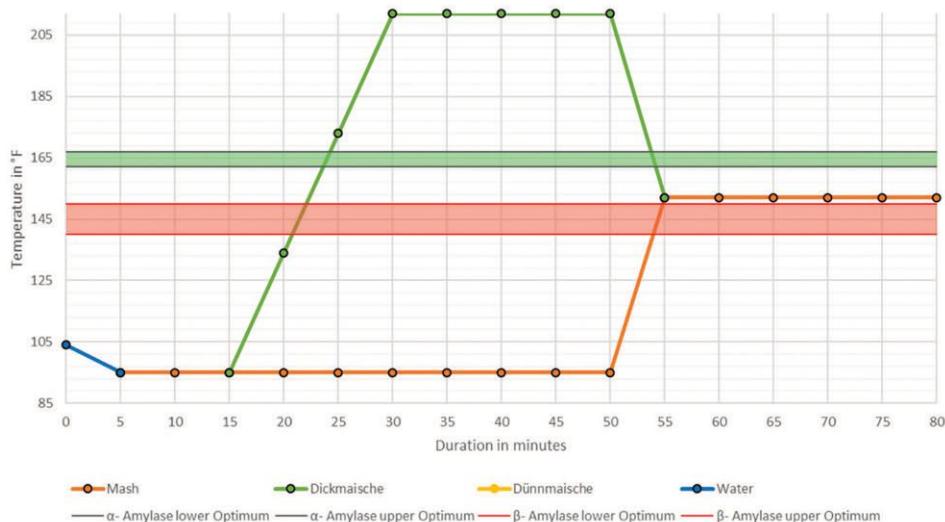
The decoction mash was developed more for practical than for gustatory reasons. Measuring (or at least estimating) temperature is essential to mashing with multiple rests, but Daniel Gabriel Fahrenheit didn't build the first reliable thermometer until 1714. More than a century would pass before thermometry became widespread, but brewers had

developed other methods to reach mash rest temperatures.

Mashing without a thermometer is actually simple. Water and mashes both boil at around 212°F (100°C) at sea level, and brewers historically used well water that had quite stable temperatures. Our ancestors learned through experience what volume of boiling water or mash (fixed temperature) needed to be mixed with well water or resting mash (relatively stable temperature) to efficiently convert starch to fermentable sugars.

Even if well water temperature might have varied slightly over the course of the year, the influence on strike temperature is marginal. Assuming the well has a temperature of 60°F (15.6°C) in summer and 50°F

**FIGURE 1: SINGLE-STEP DECOCTION MASH PROFILE**



(10°C) in winter, mixing 3 gallons (11.4 liters) of well water with 5.5 gallons (20.8 liters) of boiling water achieves a temperature of 152°F (66.7°C) in summer and 149°F (65°C) in winter. Both temperatures are suitable for starch conversion.

The process only depended on well temperature for mash-in. After that, the resting mash always settled at a stable temperature after a certain time, and the boiling mash always had a fixed temperature.

Couldn't brewers achieve temperature increases by just adding boiling water to the mash instead of boiling a part of the mash? Yes, they could—many homebrewers raise mash temperature through hot water infusions—but adding water dilutes the mash, which leaves less water for sparging and decreases yield. This is especially critical in a multi-rest mashes because every step that introduces additional volume means even more added volume is needed to get to the next rest.

## SENSORY EFFECTS

Cooking the mash also breaks down cell walls and starch granules, which helps to increase yield. This was important for getting the most out of malts in the old days, when grains were far less modified than today's products and inconsistently converted. A higher yield, combined with a richer body, allowed brewers to both save on grain and maximize their profit.

Modern malts used by homebrewers are almost always well modified, and everyone can afford a precision thermometer. So why has decoction mashing become popular again, after having nearly disappeared in the 1970s?

The answer is easy: taste matters, and there is no alternative for the unique flavors and aromas that come from a decoction mash. Born of technical necessity, decoction became synonymous with some beer styles, including Bohemian Pilsner and Bavarian dunkel.

When the mash is boiled, husk compounds are extracted, creating a nuttier, earthier, more robust profile. And cooking the mash promotes caramelization and Maillard reactions, the latter of which arise when amino acids and sugars react under the influence of heat. Both are highly aromatic.

Even though caramelized and Maillard products can also be found in caramel and roasted malts, many brewers, especially in Bavaria and Bohemia, are certain that specialty malts cannot recreate the compounds produced by decoction. Others insist that decoction mashing is obsolete, anachronistic, and a waste of time and energy.

There may be merit to this argument, but it is interesting to note that even large breweries continue to invest in decoction technology. When Paulaner moved its operations to the outskirts of Munich in 2015, its brand new facility—two brew-houses producing up to 835 barrels (980 hectoliters) per batch, 10 times a day—was built for classic double-decoction mashes. With an annual production of 1.8 million barrels (2.2 million hectoliters), Paulaner is no small-scale craft operation. But, using the latest technology for energy savings and recuperation, Paulaner's brew-house is more efficient than many modern infusion-mash breweries.

The most important argument for decoction mashing remains, however, the distinct aroma and flavor. If you taste a typical Bavarian dunkler bock made with decoction, you might agree.

Enough history: let's get practical.

## DECOCTION IN PRACTICE

The general process begins with grist mixed with water at a certain temperature to reach the first rest temperature. Then a calculated portion of the mash, called the *decoction or boiling mash*, is moved from the mash tun to the kettle and heated to a boil. After boiling for 5 to 45 minutes, the decoction is returned to the mash tun, which raises the temperature of the entire mash to the next rest temperature. This can be repeated several times.

Decoction protocols can be defined according to four process variables:

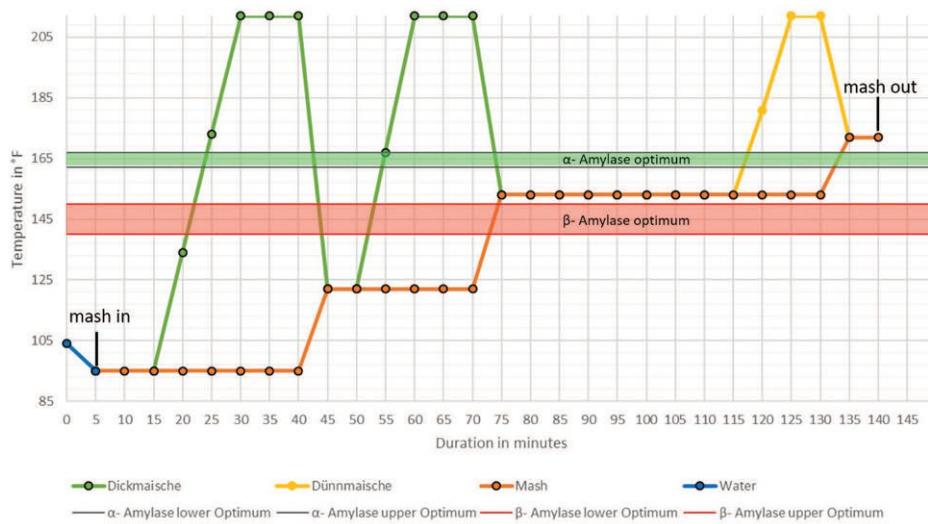
1. Number of decoctions
2. Rest temperature
3. Rest duration
4. Decoction thickness

Single-, double-, and triple-decoction programs are traditional, and the rest temperature and duration are commonly varied according to the style being brewed. Decoction thickness is typically classified as either *Dickmaische* (German for “thick mash”), which contains a lot of grist, or *Dünnaische* (German for “thin mash”), which means the liquid part with little to no grist. To understand the differences, it is helpful to understand the different characteristics of the *Dickmaische* and the *Dünnaische*.

Thick mash is loaded with starch. Boiling helps to break down starch granules and



**FIGURE 2: CLASSIC BOHEMIAN PILSNER MASH SCHEDULE**



make them more accessible to the enzymes during the following rest, which increases yield. In the process of heating to a boil, the decoction should be stirred constantly to avoid scorching the grains. Thus, for practical reasons, the *Dickmaische* must still contain enough liquid to allow easy stirring. Once the mash starts boiling, thermal convection currents create enough motion so that stirring can be stopped.

The liquid part of the mash, on the other hand, contains most of the dissolved enzymes, which are important for starch conversion. Thus, most decoction mash procedures start with boiling the *Dickmaische* and leave the *Dünnmaische* in the mash tun. This helps starch break down, making it more accessible for the

enzymes, which are preserved at moderate temperatures in the *Dünnmaische*.

Near the end of the mash schedule, the *Dünnmaische* is brought to a boil to reach higher rest temperatures. The enzymes are no longer needed, and we don't want to free up more starch, which could end up unconverted in the wort and cause turbidity. Avoiding boiling the *Dickmaische* in later stages of decoction also helps limit excessive tannin extractions from the husks.

Figure 1 plots temperature versus time for an easy decoction schedule with just one rest. This procedure is basically a single infusion mash, but the decoction can be used to add that "certain something" to a beer. Since there is only one

decoction, you need a mash tun that can be heated if you want to increase the temperature for mash-out after the main saccharification rest. If you skip mash-out, a non-heated tun is fine.

So far so good. The principle of decoctions doesn't need to be rocket science. But, how can we determine how much mash needs to be boiled to reach a certain rest temperature? Different formulae exist, some of which are very complex, that consider heat capacity of the grains and the mash tun, as well as temperature losses during the transfer back into the mash tun. In my experience that's not necessary. This simple formula gives you an accurate enough volume.

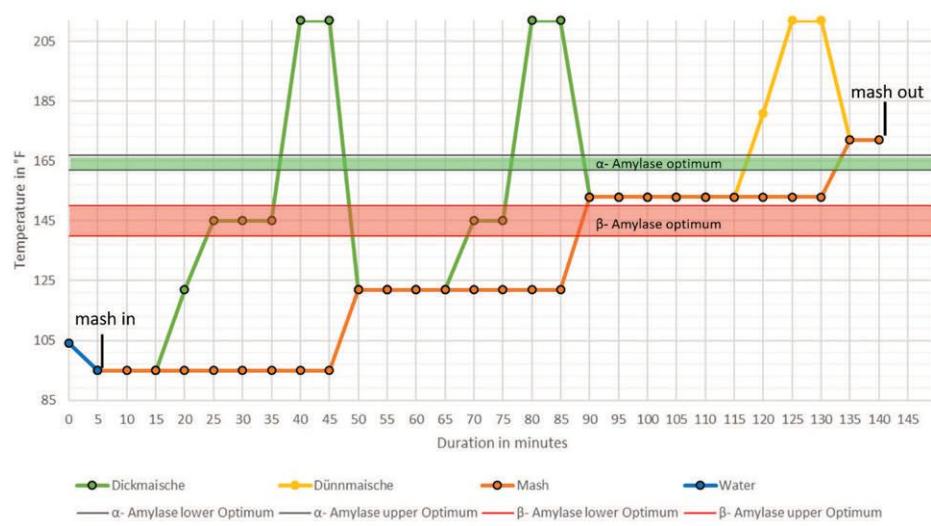
$$V_{boiling} = \frac{V_{entire\ Mash} \cdot (T_{target} - T_{start})}{(T_{boil} - T_{start})} \cdot \left(1 + \frac{f}{100}\right)$$

$$= \frac{V_{entire\ Mash} \cdot (T_{target} - T_{start})}{(T_{boil} - T_{start})} \cdot 1.15$$

In this equation,  $V_{boiling}$  is volume of mash to be boiled,  $V_{entire\ mash}$  is the total mash volume (volume after mash in, but before the first decoction),  $T_{target}$  is the desired rest temperature after mixing the boiled decoction back into the mash tun,  $T_{start}$  is the mash temperature before the decoction is removed,  $T_{boil}$  is the boiling temperature (you can specify this to correct for high elevation), and  $f$  is a correction factor.

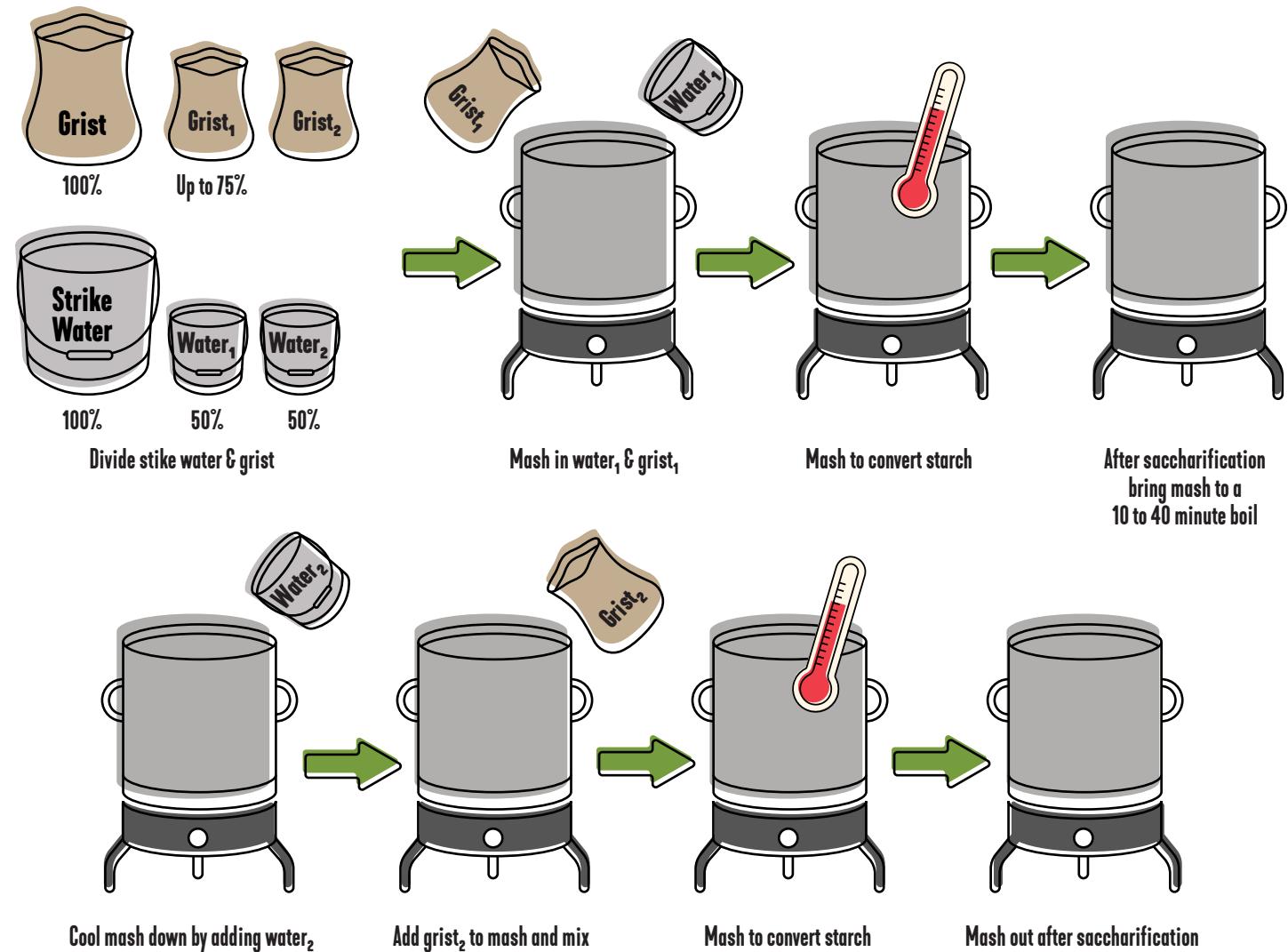
In this equation, a correction factor of  $f = 15$  increases the decoction volume by 15 percent over the needed volume. The idea is to boil a little more than is necessary as insurance. Once the decoction is boiled, it is added back to the mash tun a little at a time, while thoroughly stirring the mash to avoid local overheating and destroying →

**FIGURE 3: MODERN TRIPLE-STEP DECOCTION MASH PROFILE WITH BRIEF SACCHARIFICATION RESTS IN THE DECOCTIONS THEMSELVES**



“  
Paulaner’s brand new facility was built for decoction mashes.

**FIGURE 4: PROCESS FOR THE “EARL’SCHES” MODIFIED DECOCTION MASH SCHEDULE**





# Meister Groll

Bohemian Pilsner

Courtesy Jan Brückmeier, Aurora, Ohio.

This classic Bohemian Pilsner uses a traditional triple decoction mash.

the enzymes. If you know your brew system well, you can adjust the correction factor up or down to better capture the details of your system.

As the decoction is mixed back in, the temperature is constantly measured, and once the desired next rest temperature is reached, the remaining decoction is left to cool and returned to the mash tun when it is close to the current rest temperature. In case of a multi-step mash program, it can simply be left in the kettle. It is better to have some decoction volume left than not reach the next rest temperature. The next decoction is then added on top of this remainder and cooked. When the mash is then heated to mash-out temperature, it remains in the kettle until it cools down to around mash-out temperature and then added directly into the lauter tun as well.

The classical Bohemian Pilsner mash schedule follows the same principle. The only difference is it uses three different rests, hence triple decoction (Figure 2).

The first rest at 95 to 97°F (35 to 36°C) is called an acid rest. This rest was traditionally conducted to adjust the mash pH before acidulated malt or lactic acid became common to use. A *Dickmaische* decoction is then removed and boiled. After the decoction is returned into the mash tun, a protein rest of 122 to 133°F (50 to 56°C) takes place. The second *Dickmaische* decoction takes the mash to a saccharification rest temperature of 150 to 160°F (66 to 71°C). After conversion, when an iodine test does not show remaining starch, a *Dünnmaische* decoction is boiled and returned to heat the mash to a mash-out temperature of 172°F (78°C).

## MODERN METHODS

A modern twist on the classic triple decoction mash includes brief saccharification rests for the first two decoctions before they are boiled. This allows enzymes in the decoctions to do their jobs before they are destroyed. Obviously, this contemporary adjustment is only possible with a thermometer and a decoction vessel that can maintain the saccharification rest temperature (Figure 3).

The need for a second kettle in which to boil the mash and the time-consuming process of decoction was a thorn in Earl →

**Batch volume:** 5.28 US gal. [20 L]

**Original gravity:** 1.048 (12°P)

**Final gravity:** 1.012 (3°P)

**Color:** 3 SRM (6 EBC)

**Bitterness:** 40 IBU (Tinseth)

**Alcohol:** 4.8% by volume

## MALTS

9.2 lb. [4.2 kg] Bohemian floor-malted Pilsner malt

8 oz. [227 g] acidulated malt

## HOPS

0.7 oz. [20 g] Saaz, 3.5% a.a. @ 110 min

1.8 oz. [52 g] Saaz, 3.5% a.a. @ 45 min

0.9 oz. [25 g] Saaz, 3.5% a.a. @ 15 min

## WATER

Soft water like that in Pilsen:

Ca 7 ppm, Mg 2 ppm, Na 2 ppm, SO<sub>4</sub> 5 ppm, Cl 5 ppm, carbonate hardness 13%

## YEAST

200 billion cells Wyeast 2206 Bavarian Lager or similar

## BREWING NOTES

Heat 18.7 qt. [17.7 L] water to 103°F (39°C) and mash in the 9.7 lb. (4.4 kg) grist. This should stabilize at about 100°F (38°C). Let the mash rest for 30 minutes.

Remove about one-third of the mash, approximately 7.1 qt. [6.7 L] *Dickmaische* (thick mash) from the mash tun, heat it to 151°F (66°C), stirring constantly, and rest 20 minutes. Heat the decoction to 162°F (72°C) and rest 10 minutes, then bring to a boil.

After a 10-minute boil, stir the decoction mash into the main mash thoroughly and evenly. The mash should now be around 151°F (66°C). Rest for 10 minutes.

Remove one-third of the *Dickmaische* from the mash tun. Heat the decoction to 162°F (72°C) while stirring, and rest for 10 minutes before you bring it to a boil. Boil for 10 minutes and reunite the mash in the mash tun while stirring. The mash should now reach around 162°F (72°C). Rest for 10 minutes and check for saccharification with an iodine test.

Once again, remove one-third of the mash from the mash tun, but this time take the liquid portion of the mash, containing no grist. Bring this *Dünnmaische* directly to a 10-minute boil. Reunite the mashes in the mash-lauter tun, and hold a mash-out rest for about 10 minutes before you start lautering. Sparge with 172°F (78°C) water until you reach a gravity of around 1.038 (9.6°P) in the kettle.

Boil for 120 minutes. Add 0.7 oz. [20 g] Saaz pellets 10 minutes after the wort starts to boil. Add another 1.8 oz. [52 g] Saaz 45 minutes before the end of the boil. Add the last 0.9 oz. [25 g] of Saaz 15 minutes before you finish the 2-hour boil. Your wort should now have a gravity of 1.048 (12°P).

Cool wort to about 50°F (10°C) and pitch the yeast. Let the temperature rise to about 52°F (11°C) and wait until the beer reaches a gravity of about 1.016 (4°P), before you transfer the beer to a secondary fermenter. Let the beer complete fermentation under a top pressure of 16 psi (1.1 bar) for another week before you cool the beer down to about 32°F (0°C). Allow the beer to mature for at least another 4 weeks before serving.

Brew  
This!



# May the Bock Be with You

## Maibock/Heller Bock

Recipe courtesy Jan Brücklmeier, Aurora, Ohio

May 1 is a bank holiday in Germany (Labor Day), and May is very often a transition month from the cold winter to a warmer spring in Bavaria. The same is true for a well-brewed Maibock, or heller bock. It is a real bock, i.e. a strong beer, but it is brewed with an eye to high drinkability. With its pale color, it is not as rich and malty as its darker brothers and sisters, which are typical for fall and winter in Bavaria. With high drinkability and an alcohol content of 6.3 to 7.4% ABV, heller bock can be quite a “dangerous” beer.

**Batch volume:** 5.28 US gal. (20 L)

**Original gravity:** 1.068 (16.5°P)

**Final gravity:** 1.012 (3°P)

**Color:** 7.5 SRM (15 EBC)

**Bitterness:** 35 IBU (Tinseth)

**Alcohol:** 7.4% by volume

### MALTS

8 lb. (3.6 kg) Pilsner malt

3.75 lb. (1.7 kg) Vienna malt

11 lb. (500 g) acidulated malt

14 oz. (397 g) pale caramel malt (25 EBC)

### HOPS

0.7 oz. (20 g) Magnum, 12.5% a.a. @ 60 min

0.4 oz. (11 g) Hallertauer Mittelfrüh, 4.5% a.a. @ 15 min

0.7 oz. (20 g) Hallertauer Mittelfrüh, 4.5% a.a. @ 5 min

### YEAST

300 billion cells      Alcohol tolerant lager yeast like White Labs WLP833  
German Bock Lager Yeast or Wyeast 2487 Hella Bock Lager

### BREWING NOTES

Heat 21.5 qt. (20.3 L) water to 104°F (40°C) and mash in the 13.8 lb. (6.3 kg) grist. This should lower the temperature to about 100°F (38°C). Let the mash rest for 30 minutes.

Take about one-third of the mash as the first decoction. Use *Dickmaische*, which is the part with grist that settles at the bottom of the mash tun, heat it to 151°F (66°C), and rest for 20 minutes. After the rest, heat the decoction further to 162°F (72°C) for a 15-minute rest before you bring the decoction to a boil. Don't forget to stir while heating.

After a 15-minute boil, reunite the decoction with the remaining mash. Again, don't forget to stir to avoid local overheating and enzyme destruction. The mash should now have a temperature of around 151°F (66°C). Rest for 10 minutes.

Again, remove one-third of the mash from the mash tun. This time use *Dünnaische*, the part with less grist, which will collect in the upper portion of the mash tun. Heat the decoction to 162°F (72°C) while stirring. Rest for 10 minutes before you bring the decoction to a boil. Boil for 15 minutes and reunite the mash in the mash tun while stirring. The mash should now reach around 162°F (72°C). Rest for 15 minutes and check saccharification with an iodine test.

Heat the mash to 172°F (78°C) and hold a mash-out rest for about 10 minutes before you start lautering. Sparge with 172°F (78°C) water until the wort is diluted to a gravity of around 1.057 (14°P) in the kettle. Heat up for a 90-minute boil.

Add 0.7 oz. (20 g) Magnum 30 minutes after the wort starts to boil. Add 0.4 oz. (10 g) Hallertauer Mittelfrüh 75 minutes into the boil. Add the last 0.7 oz. (20 g) Hallertauer Mittelfrüh 5 minutes before you finish the 90-minutes boil. Your wort should now have a gravity of 1.068 (16.5°P).

Cool wort to about 48°F (9°C) and pitch the yeast. Let the temperature rise to about 50°F (10°C) and wait until the beer reaches a gravity of about 1.018 (4.5°P), before you transfer it to a secondary fermenter. Let the beer ferment under a top pressure of 16 psi (1.1 bar) for another 2 weeks before you cool it to about 32°F (0°C). Allow the beer to mature for at least another 5 weeks.

If you bottle condition your brew, pitch at 48°F (9°C) and let the temperature rise to 50°F (10°C). Wait until the gravity doesn't change for at least 3 consecutive days before you transfer the beer to your filling bucket. Add sugar for a carbonation of 4.5 g/L [if you ferment at 50°F/10°C, this should be 4.5 g sugar per liter].

### “EARL’SCHES” VARIATION

This beer can be also brewed using Earl's decoction process.

Split the grist into a 9.5 lb. (4.3 kg) portion and a 4.3 lb. (2 kg) portion. Prepare two portions of water with 10.4 qt. (9.8 L) each.

Stir the 9.5 lb. (4.3 kg) grist into one of the 10.4 qt. (9.8 L) portions of water. Heat this mash to 149°F (65°C) and rest for 30 minutes. Raise temperature to 162°F (72°C) and rest for 30 minutes. Check for saccharification with an iodine test. When the mash is fully converted, bring it to a boil and boil for 20 minutes.

Add the second portion of the water to the mash. This should reduce the mash temperature to below 149°F (65°C). If not, add more cold water. Stir in the remaining 4.3 lb. (2 kg) grist. Heat the entire mash to 149°F (65°C) and rest for 30 minutes. After the rest, raise the mash temperature to 162°F (72°C) and rest for 30 minutes. When an iodine test shows full saccharification of the mash, heat to 172°F (78°C) and mash out. Begin lautering and follow the remaining instructions above.

Scheid's side. The German homebrewer wanted to brew beer with a traditional robust-yet-mellow flavor, but he didn't have enough space for additional equipment.

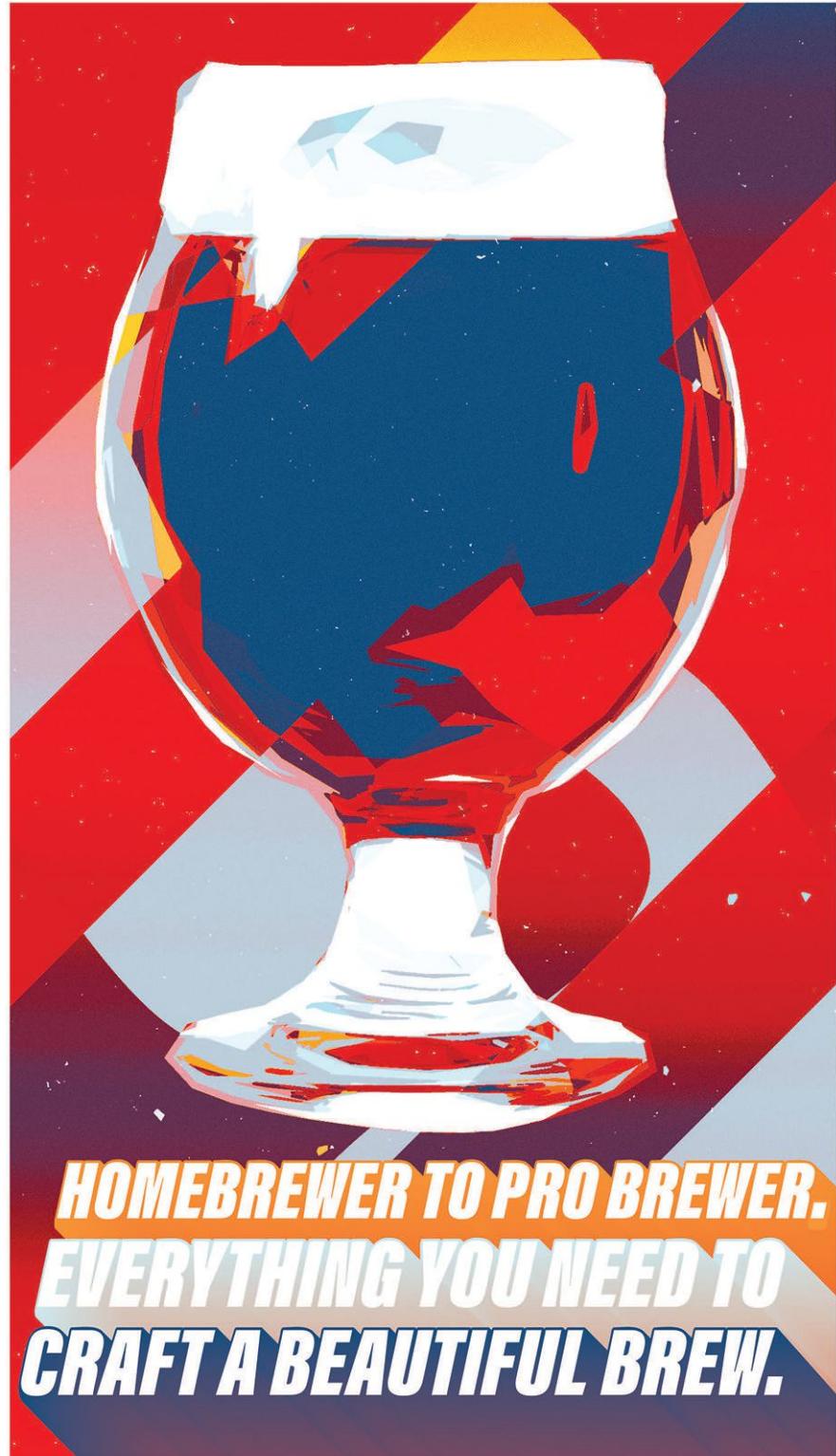
After some experimentation, he found a solution that only needs one kettle, requires much less time, and can be performed without any pumps to move the decoction to the boiling kettle and back. Thus, the "Earl'sches" decoction process was born. The technique takes advantage of the flexibility that comes with small-scale operations. The grist and the strike water can be divided, and the decoction's focus is not starch conversion, but flavor development. Here is how it is done.

The grist and strike water are split into two parts:  $grist_1/grist_2$  and  $water_1/water_2$ . The water is divided into equal portions, while  $grist_1$  can represent as much as 75 percent of the total grain bill. A first mash combining  $grist_1$  and  $water_1$  is mashed in, and the starch is converted either by single infusion or by a multi-step mash. After that, the mash is brought to a boil.

When the mash has boiled for 10 to 40 minutes, the remaining water ( $water_2$ ) is mixed into the mash to cool it back to mash-in temperature. Then, the remaining grist ( $grist_2$ ) is mashed in, followed by another single-infusion mash or multi-step program to convert its starches. Since the first part of the grist can be such a large fraction of the grain bill, this process is well-suited for adjuncts, which need to be gelatinized before they can be converted. These adjuncts would be part of  $grist_1$  (Figure 4).

Whether you follow a traditional triple-decoction mash schedule or opt for a modern variation like the "Earl'sches" mash, decoction can add depth and character to your homebrewed German- and Bohemian-style beers. So, next time you brew, opt for a mellow Bohemian Pilsner or a hearty Bavarian weizenbock, and plan your next brew day using a decoction mash.

*Jan Brücklmeier is a BJCP Certified judge, homebrewer, and author of *Bier Brauen*, a comprehensive German-language guide to homebrewing.*



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# BREWING A CULTURE OF COMMUNITY





ASPEN RIDGE  
BREW CREW  
REDEFINES THE  
RETIREMENT HOME  
EXPERIENCE

By Matt Wastradowski

**It's** never an easy choice to move a loved one into a retirement community. Will your mother or grandfather receive high-quality, attentive care? Will they meet others, take part in activities, and enjoy the new setting?

At the Aspen Ridge Retirement community in Bend, Ore., would-be residents and their family members face another crucial question: stout or IPA?

No, executives aren't trying to get potential residents drunk on tours; rather, they're showing off the residents' commitment to craftsmanship, camaraderie, and, yes, good beer.

That's because a handful of Aspen Ridge residents gather each week—as they've done for seven years and counting—to brew, bottle, and keg their own beer. Staff members assist in setup, but the residents take it from there, and they have racked

up awards at local, regional, and statewide homebrew competitions.

The Aspen Ridge Brew Crew, as they're known, aren't just brewing beer for the occasional free six-pack, though. They're forming connections with other residents, building relationships with Bend's legendary craft beer scene, and redefining how senior citizens can spend their golden years.

## A BREW CREW IS BORN

The Aspen Ridge Brew traces its roots to 2011, when the retirement community's leadership team brainstormed new activities for its residents. Rather than default to bingo, arts and crafts, and so forth, Frontier Management, Aspen Ridge's corporate parent, advocated for activities reflecting local community interests. With more than a dozen breweries dotting Bend and the

broader Central Oregon landscape, the conversation soon turned to beer, and starting a homebrew club.

Bryan Carnahan, executive director, joined Aspen Ridge in 2013, two years after the Aspen Ridge Brew Crew first came together. He heard about the Brew Crew while interviewing for the job and remembers having what he calls "one of those 'yeah!' moments."

"So often, the perception is that the residents are put here because they can't take care of themselves," he says. "Yes, they may not be able to complete the full care needs they have, but they're adults, they have histories, and they have desires ... to be relevant and do something unique and fun. That doesn't go away."

Corporate was a tougher sell, however. "They were in disbelief," Carnahan says of Frontier. "They didn't think seniors living in a senior living community would do something so 'young and hip,' so to speak."

But leadership eventually agreed to the program. Aspen Ridge staff and residents toured nearby brewpubs to get a feel for the process and posted an ad on Craigslist for a homebrew instructor. The Aspen Ridge Brew Crew was born.

## GROUP FINDS A HOME IN THE COMMUNITY

Tim Koester didn't see that first Craigslist ad, but the member of the Central Oregon Homebrewers Organization (COHO) read an article about the nascent group and was instantly smitten. "I thought that would be a fun group to get involved with," he says, impressed to learn of this group of seniors taking on a new hobby and brewing great beer.

Koester, then teaching homebrewing at the nearby Central Oregon Community College, wanted to help them transition from extract to all-grain brewing and, in effect, challenge the brewers to solve new problems. "It challenges us in all kinds of ways," Koester says. "It can be very artistic, very scientific, very creative. Brewing is really open to all people."

The Brew Crew took to the new system and, before long, Koester suggested that COHO move its monthly meeting and annual Spring Fling Homebrew



Competition to Aspen Ridge. The competition routinely draws 350 entries from the region's best homebrewers, and the Aspen Ridge Brew Crew has won several awards over the years. "The brewing community here in Bend is open and friendly to Aspen Ridge," Koester says. "They've always been well received; it's a friendly, warm community."



## All-American Blonde Ale

Recipe courtesy Aspen Ridge Brew Crew

Batch volume:	11 US gal. (41.6 L)
Original gravity:	1.048 (11.9°P)
Final gravity:	1.012 (3.1°P)
Color:	3-4 SRM
Bitterness:	25 IBU
Alcohol:	4.6% by volume
Brewhouse Efficiency:	72%

### MALTS

20 lb. (9.07 kg) pale malt

### HOPS

2 oz.	(57 g) Cascade, 5.5% a.a. @ 60 min
1 oz.	(28 g) Cascade, 5.5% a.a. @ 15 min
2 oz.	(57 g) Cascade, 5.5% a.a. @ 2 min

### YEAST

4 packs Wyeast 1099 Whitbread Ale

### ADDITIONAL ITEMS

2 tablets	Whirlfloc @ 15 min
2 tsp.	(5 g) yeast nutrient in primary

### BREWING NOTES

Mash 75 minutes at 150°F (65.6°C) with 7 gal. (26.5 L) water, and fly sparge at 168°F (76°C) with 9.75 gal. (36.9 L) water. Boil 60 minutes, adding hops, Whirlfloc, and yeast nutrient as indicated. Ferment at 64°F (17.8°C) until final gravity is reached, and keg or bottle with 2.3 volumes (4.6 g/L) CO<sub>2</sub>.

## BREWS START LONG BEFORE RESIDENTS ARRIVE

On any given Tuesday, Zachary Ellis, the community's life enrichment director, shows up around 8 a.m. to prep for the week's brew session. For up to two hours, Ellis cleans and sanitizes equipment, loads gear into the community's kitchen-turned-brewhouse, and boils water for the day's batch. Later, he'll round up supplies and order pizza for whomever shows up; otherwise, Ellis lets the residents take charge. "We try to do as little as possible for the residents," he says.

The workload varies, depending on the number of beers in production and where they are in the process.

On a crisp, sunny Tuesday in October, the Aspen Ridge Brew Crew juggles three beers. A few members fill the blue and orange water cooler mash tuns with the ingredients for a Belgian-style beer; an hour later, three more bottle and cap a blonde ale while another cuts and applies labels designed by Ellis. After lunch, the group will keg an IPA for their annual Oktoberfest party.

Ellis started brewing with the residents in 2015. He wasn't much of a beer geek—"I like Guinness," he says—and greeted the experience with mixed feelings. On one hand, Ellis appreciated that residents could take part in such an innovative activity and that leadership didn't try to limit what seniors might (or might not) be capable of. On the other hand, homebrewing seemed only slightly easier than learning Latin.

"I remember coming in, looking at things, and having no idea what anything was," he says. "When you hear *fly sparge*, I thought 'Who's sparge?' Or *mash*? Yeah, I love that show!"

Three years later, Ellis knows his way around a homebrew system. He also enjoys seeing the bonds that form. "It gives them a sense of camaraderie and workmanship they've had in their lives and continue to have," he says. "Everyone wants to feel that they're needed and that they're doing a good job. This is really built around a team working together."



## RESIDENTS FORM BONDS ON BREW DAY

On this Tuesday, a few residents head outside to set up the cooling system while others remain indoors to bottle their All-American Blonde Ale. Most grew up drinking Coors and other macro lagers, so they're eager to try the 4.7% ABV beer.

Taking a break from bottling, residents pass around a few half-filled Styrofoam cups. Charlie Young, who's been with the Brew Crew for three years, takes a sip. "This beer is good," he says. "My kind of beer." Don Haag, who joined six months ago, agrees. "Of course, it is," he says, smiling. "Because we made it."

Haag grew up on a farm in North Dakota and joined the group to meet other residents—"You can only sit and read for so long in your room," he says—but grew to love the challenges of a new hobby. "I was interested in realizing how much I didn't know about beer: the temperatures, the adjustments, closely following a recipe," he says. "I didn't realize there was that much work in doing it right."

None of the residents brewed beer before coming to Aspen Ridge, and while most enjoy experimenting with various styles, few express a devout passion for beer. For most of the Aspen Ridge Brew Crew, it comes down to community.

Shirley Ryder, who's been with the group for six months, saw a chance to meet other residents after moving in. "If you come in new, it's hard to get acquainted with other residents beyond, 'What are we having for dinner?'" and 'Is it good or not?'"

Another resident, John Reed, agrees. "You probably know everyone's name in the dining room, but you don't *really* know these people," he says. "So, this is very much a social enterprise."

## BREWING BEER FOR A WORTHY CAUSE

Since the Brew Crew launched in 2011, roughly 30 residents have brewed about 50 beers in all. Some beers wind up in the community's "pub," an open area adorned with ribbons won at past competitions; others are reserved for community-wide get-togethers like the annual Independence Day celebration; and yet others are passed on to friends and family.

Taking a break from cutting out labels for the freshly bottled blonde ale, Ryder says her son has enjoyed four of the group's beers so far. "He's all for Mom supplying him with more," she says before



## Aspen Ridge Cream Ale

Recipe courtesy Aspen Ridge Brew Crew

Batch volume:	10 US gal. (37.9 L)
Original gravity:	1.051 (11.9°P)
Final gravity:	1.011 (2.8°P)
Color:	4–5 SRM
Bitterness:	20 IBU
Alcohol:	5.4% by volume
Brewhouse Efficiency:	70%

### MALTS

7 lb.	(3.18 kg) pale malt
7 lb.	(3.18 kg) Pilsner malt
2 lb.	(907 g) Carapils malt
2 lb.	(907 g) flaked maize
1.5 lb.	(680 g) flaked rice
12 oz.	(340 g) honey malt

### HOPS

1 oz.	(28 g) Liberty, 4.3% a.a. @ 60 min
1 oz.	(28 g) Liberty, 4.3% a.a. @ 30 min
2 oz.	(57 g) Mt. Hood, 6% a.a. @ 5 min

### YEAST

4 packs Wyeast 2565 Kölsch yeast

### ADDITIONAL ITEMS

2 tablets Whirlfloc @ 15 min

### BREWING NOTES

Mash 75 minutes at 152°F (66.7°C) with 7 gal. (26.5 L) water, and fly sparge at 168°F (76°C) with 8.75 gal. (33.1 L) water. Boil 60 minutes, adding hops and Whirlfloc as indicated. Ferment at 67°F (19.4°C) until final gravity is reached, and keg or bottle with 2.3 volumes (4.6 g/L) CO<sub>2</sub>.

noting the irony. "I never thought I'd ever supply my son with beer."

Ryder's son isn't alone, and that curiosity led to the creation of a beer that has, over the years, raised more than \$15,000 for the Alzheimer's Association.

Aspen Ridge can't legally sell its homebrew, but Carnahan knew that a local brewery could. So, in 2014, Aspen Ridge teamed up with Bend's Worthy Brewing to brew Machine Gun Maggie, an imperial IPA, on the brewery's pilot system.

That fall, residents, some working full eight-hour shifts, joined members of the Central Oregon Homebrewers Organization and the Worthy staff on their brewery floor, adding yeast and hop pellets to the brew, capping and bottling 60 cases of bombers, and moving them into Worthy's walk-in cooler for shipment.

Zach Brenneman, now the head brewer at Worthy Brewing, said it was one of the brewery's first collaborations with an outside group. He initially worried about welcoming two dozen visitors into such a tight space, but his caution quickly gave way to an enthusiasm matched only by that of the residents. "It was an army that came in, and they couldn't have been more thrilled about the experience," he says. "It was like kids in a candy store."

Area bottle shops sold the bombers, and local pubs poured the beer on draft, with proceeds going to the Alzheimer's Association. In all, that 300-gallon (11.4 hL) batch raised more than \$5,000.

Aspen Ridge teamed up with other local breweries in subsequent years for the Alzheimer's Association. The Brew Crew has inspired other communities within the Frontier Management system to tackle similar fundraisers and think differently about their own activities.

## BREW CREW REDEFINES RETIREMENT EXPERIENCE

To Carnahan, teaming up with Worthy was a natural extension of his community's mission to zig where other senior centers zag. "We take pride in not doing what other retirement communities are doing," he says. "We're changing the face of that, and it's pushed into our industry, not only within our company, but within the senior living industry throughout the U.S."

He points to other centers within Frontier Management's 85 communities as proof that Aspen Ridge tapped into something new and unique. Since the Aspen Ridge Brew Crew

launched, he's heard of other Frontier communities making infused spirits, artisan soaps, perfumes, and wine. His own community even tried its hand at coffee roasting, a far cry from the days of half-empty bingo halls.

And, as the number of older Americans swells in the United States, the demand for engaging activities is expected to increase. According to a 2014 housing study from Harvard University, 73 million Americans will be 65 or older by 2030, up from 40 million in 2010.

As Haag tells it, those seniors want to learn new skills, bond with other residents, and try new experiences. So far, those efforts have paid off. "When you get older, you don't expect to learn a lot," he says. "But you certainly do."

**Matt Wastradowski** is a travel and outdoors writer based in Portland, Ore. He has written about beer, outdoor adventure, and travel for numerous outlets, including Northwest Travel & Life, REI Co-op Journal, and OnTrak magazine. He is a co-author of the upcoming 2020 edition of Moon Pacific Northwest Hiking, which highlights the region's best, most beautiful hiking trails. Connect with Matt at [wastro.net](http://wastro.net).

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# Improving Efficiency *in the* All-Grain Homebrewery

*By Amahl Turczyn*

**E**fficiency in all-grain breweries comes in two parts. Yield, or mash efficiency, is the amount of sugar you can extract from your grain from mill to kettle. Brewhouse efficiency considers the whole brewing process, from mill to fermenter, and includes wort and beer losses along the way.

Many factors affect these measures of efficiency, some more than others. Many of them are equipment and method specific, so some of the following suggestions may not necessarily apply to you and your individual setup or technique. For example, brew-in-a-bag fans are going to have a different set of efficiency parameters than fly sparge folks, and a picnic cooler mash tun with a steel mesh screen may see different results than a heated mash tun with a false bottom.

Beyond mash efficiency, brewers can tweak a lot of process options to enjoy higher brewhouse efficiencies throughout. In many cases, a lot of wort or beer can be recovered without much effort, driving up overall efficiency numbers.

### The Big Picture

For a brewery like New Belgium Brewing Company in Fort Collins, Colo., process losses are carefully monitored. At that scale, even the tiniest leak, spill, or low-fill can have serious volume consequences. Wort losses to hops, trub, and line transfer all become big deals when you produce beer a thousand barrels at a time.

New Belgium brewer Matty Gilliland, whose job is to monitor process efficiency, wrote a great piece on process losses for *The New Brewer* that's well worth a read for efficiency-minded homebrewers. But even at

our scale, every bit of sweet wort we allow down the drain hurts brewhouse efficiency. It might not cost us thousands of dollars, but as climate change affects raw materials production and availability worldwide, and prices inevitably begin to climb, it's not a bad idea to practice economy at all levels, especially for those homebrewers who have it in their minds to go pro at some point.

So here are a few ideas—small-scale, but depending upon how much you brew, they do add up.

### Who Cares?

Achieving 90 to 95 percent efficiency may not be your goal, especially if you are pressed for time. For many homebrewers, time is far more valuable than stretching



a grain bill as far as it will go. In this case, anything above 65 percent mash efficiency is perfectly OK, and if you want a few extra gravity points, simply add a few more pounds of malt and call it good. Achieving *consistent* efficiency is more important to most of us than is squeezing out every possible drop of wort.

For those who want to go the extra mile to maximize beer produced per batch, though, here are a few tips. Some may seem insanely obsessive or downright cheap, but others may be worth adopting. An open mind for greater efficiency is always a good thing.

### Economies of Scale

Brewing larger batches can make you more efficient. Consider parti-gyle mashing, in which one mash yields several beers of different strength. Homebrewers are well equipped to make use of this technique to extend mash efficiencies. After mashing in an imperial Pilsner, for instance, consider brewing a second small beer from the remaining sugars in the mash instead of chucking the spent grain right after running into the kettle.

Those who don't have the time or equipment to boil off two separate batches can

conduct an extended sparge and boil wort "tailings" separately for storage. Reduced to 9 or 10°P, then canned in mason jars and kept in the fridge, this wort can be used for yeast propagation, making up short volume in the fermenter, or even cooling down a subsequent brew. Mark the original gravity and date on the lid and store for up to a month—it's like free (or nearly free) beer.

Pro brewers almost always see better efficiencies than amateur brewers, and it's not just because of fancy commercial equipment. In general, the more you brew

“

Investing in a mill allows greater control over grind, grist, and efficiency.

at a time, the better efficiencies you can realize. Pros have much more at stake because efficiency directly affects their bottom line. Most would rather take the extra steps to maximize wort and beer production, even if it means a longer brew day, because they are in it to maximize profit. But even on the homebrew scale, bumping your batch size from 5 to 10 gallons will get you a noticeable efficiency boost. Why? Several reasons.

First, you only invest in your brewing equipment once; the more you brew, the lower your overhead costs are amortized over the several months or years you can reuse the same equipment. Second, you can buy grains and fermentables in bulk; the more you buy at one time, the lower the cost per unit weight, the cheaper the shipping, etc. Finally, for some ingredients like hops, you don't need to double the amount when scaling from a 5-gallon to a 10-gallon batch for the same level of bitterness. The larger your batch size, the less hops you need to bitter or flavor a given volume.

This also works to some degree with time efficiency. Some styles—German wheat beer, for instance—work better bottled, but for most beers, it is quicker to clean two 5-gallon kegs than four cases of bottles, and once you've invested in the equipment, filling and carbonating two kegs goes more quickly than priming, filling, and capping those cases of bottles. Likewise, brewing 10 gallons doesn't really take much longer than brewing five.

### Milling

Once batch size is determined and bulk grains are purchased, the biggest improvements in both efficiency and consistency come with milling your own. Pre-milled grain isn't always well-milled. Brew shop mills vary and are heavily used, and most shops don't allow you to adjust the rollers.





Investing in a good-quality adjustable mill allows greater control over grind, grist, and efficiency.

Good mill choices are, just to name a few, the Monster Mill, the Cereal Killer, and the Schmidling. Mills with more than two rollers generally do a better job, but knurling, roller width and adjustability should all be considered. A setting of about 0.03" (about the width of a credit card), ensures that no grain escapes unscathed.

I tend to err on the finer side and leave it up to my mash tun and rest temps to sort out problems with grist flour or glucans. The risk, of course, is a longer sparge time, but for most styles, if I'm using highly modified barley malt for the majority of the grist, the mash tun can almost always handle a fine grind.

Traditional advice suggests milling only to crush the barley kernel, leaving the hull mostly intact to act as filter bed material. This is a safe approach, but with the right mash tun design, what would normally be considered over-milling can still produce an acceptable runoff rate and increase mash efficiency by 10 to 20 percent. If there are any doubts, as when using wheat or rye malt, or unmalted adjuncts, rice

hulls are cheap, increase wort flow substantially, and have negligible effect on the quality of the finished beer.

### Grain Quality

Some malts have higher kernel plumpness that must be accounted for. Wheat malt generally has smaller kernel plumpness, and depending on the harvest season and maltster, barley malt kernels can have inconsistent size. This can result in a lot of uncrushed kernels, or possibly a mix of properly milled kernels and flour.

There's also the question of a given malt's degree of modification and diastatic power. These vary from season to season, and with some malting companies, batch to batch. You may get a bag from the bottom of the maltster's silo that's more husk material and grain dust than malt; it happens rarely, but it happens, and it can really throw your efficiency for a loop if you don't examine the quality of your barley carefully before it hits the mill. Most retailers will happily replace a bag if this happens, however. Go with a quality malting company. Avangard base malts from Germany tend to have higher potential yield, particularly their

Pils malt. Briess's base malts tend to be consistently high in diastatic power and are an easy choice for adjunct beers. All these factors need to be considered when targeting maximum efficiency.

### Mash-In

An even contact between hot liquor and grist goes a surprisingly long way towards improving efficiencies because it ensures a consistent mash bed, minimal dry chunks of grist, or "dough balls," and optimal bed suspension. Most commercial breweries have specialized equipment to blend hot liquor and grist in even proportions, so they can mix evenly; most homebrewers have to make do alternating wet and dry manually, then stirring to break up chunks. But the more access those amylase enzymes have to grist starches from the beginning, the higher the yield.

### The Stirring Question

With enzyme-to-starch accessibility in mind, how much stirring of the mash is necessary? And when? Our tendency is to leave the mash alone during conversion, either because of some latent fear of disturbing the carefully set mash bed, or, if



“Wort absorbed by kettle solids and hops can be up to 10% of the boil volume.”

using a picnic cooler setup, because we don't want to lose any heat by popping the lid off (obviously not a concern for heated tuns). But neither is really a concern and stirring periodically during the mash allows enzymes to work faster, more efficiently and allow access to dead spots in the bed.

Some channel sparge water by raking or cutting the grain bed during the sparge, but stirring goes further, by moving and resetting nearly all the mash. This isn't practical or even possible with BIAB, but in a batch or fly sparge, it accomplishes several things. First, stirring breaks up accumulations of that fine, greyish layer of silt from the fatty germ material in the malt kernel that have settled in and on top of the bed, allowing more even percolation of sparge water. Second, it relieves compaction pressure above the filtration manifold, mesh, or false bottom. Third, it allows for consistent temperature throughout the grain bed. And it achieves all these far more efficiently than merely raking or cutting.

Keeping the level of sparge water above the grain bed, stir at an angle without exerting downward force on the bed and lift the mash paddle to blend the sparge water in. The danger of course is stirring too deep and upsetting the filter bed layer directly over the screen, leading to a suddenly-tur-

bid runoff. But with practice, you can reach down to within a couple of inches of mash over your filter device and still maintain a bright runoff. Diverting the runoff flow from the kettle to another vessel while you stir leaves you a bit of a safety net if you happen to go too far; if you do, you can recirculate again until clear wort flows. Even a conservative shifting of the top two-thirds of the bed during the sparge can pay dividends with your mash efficiency without fear of interrupting that crystal-clear runoff.

### Temperature and Mash-Out

The higher the sparge temperature, the less viscous the wort and the better the flow. A mash-out step may help efficiency for wheat and high-adjunct beers, but it isn't necessary for most grists. Eliminating mash-out actually allows enzymes to continue converting starches during runoff. Of course, once starch conversion is complete, enzyme activity only makes the wort more fermentable, but taking your time to reach the ideal sparge temperature range of 168 to 173°F (76 to 78°C) won't adversely affect efficiency.

### Bed Suspension

Another factor that can affect wort flow with a fine grist is liquor-to-grist ratio: this

is the ratio of mash water to grist in liters per kilo (or quarts per pound). A thinner or thicker mash won't affect beer quality or enzymatic efficiency, but thinner is better for fine-grind mashes, simply because the better-suspended mash is less likely to get stuck.

### pH

More important to efficiency than temperature or water-to-grist ratio is mash pH. If you don't have a reliable pH meter, it can prove a godsend to improving efficiencies throughout your brewing process. Starting with a pH of 5.2 to 5.4 in the tun is critical; many folks using water with a pH of 8 will want to use lactic or phosphoric acid, to lower the pH of the mash and sparge water, along with some form of calcium (usually calcium chloride or gypsum). Calcium lactate, which can be made from combining chalk with lactic acid, is a great way to add calcium without sulfate and chloride, and it's much more soluble than calcium carbonate alone.

Realize, too, that pH rises as wort gravity drops in the tun and temperature increases. Periodic checks of pH and gravity as runoff progresses will allow the brewer to stop runoff at the proper time, at either 6 pH or 1.008 SG (2°P)—if

acidifying your sparge, take both parameters into consideration and stop at whichever comes first. Beyond that point tannins can be extracted from the grist.

### Other Factors

The mash schedule can also affect wort density and viscosity in the mash and, by extension, flow rate during the sparge; many swear by a protein rest to lessen the effects of glucans in the mash. Just realize this rest can also affect mouthfeel and foam stability, and depending upon grist composition, it may not be necessary. Finally, time is a major factor. A slow, steady flow rate maximizes efficiency and helps prevent bed collapse. Fortunately, depending upon your mash tun design, sparging grain for a 10-gallon batch doesn't necessarily have to take much longer than it does for a 5-gallon batch.

### Amyloglucosidase

This is the enzyme used to make brut IPA, but it can be used for just about any beer style. It isn't expensive, and it will net you a few points Plato on your gravity over what the enzymes found naturally in your barley malt can achieve, particularly if it's added in the fermenter towards the end of attenuation. It breaks down any remaining dextrins into glucose, which yeast then happily converts to alcohol. That means you can make a 6% ABV Pilsner, for example, with a starting gravity of 12°P instead of 14.5°P, which means less malt is necessary to brew the same-strength beer.

At the homebrew scale, it's only a matter of 20 to 30 drops of the stuff. You'll need less hops as well if you want to go with a drier, more delicate beer. If not, use your amyloglucosidase in the mash rather than in the fermenter, and add some milled dextrin or light crystal malt to the mash tun during your sparge. This will result in a bit more sweetness and heft, as you are not giving the enzyme enough time to break down those dextrins before it is denatured in the boil.

### Wort Losses

It's generally accepted that you stop transfer of clear wort from kettle to fermenter before those chunks of trub, hops, and break material have a chance to get pulled into your transfer line. But depending upon how big your kettle is, that can leave a lot of wort behind. Leftover wort absorbed by kettle solids and hops can be up to 10 percent of the total boil volume—perfectly good, hopped, full-strength wort.



Some large breweries go to the trouble of using a centrifuge to extract this wort and minimize losses, but at home, a kettle screen, time, and gravity will work perfectly well. After running wort into the fermenter, simply place a mesh screen over the dip tube, tip the whole kettle up onto the edge of your burner, place a steel stockpot beneath the spigot, open the valve, and collect the drippings. The kettle screen filters bonus wort from the mass of solids, which dribbles clear as a bell into the stockpot while you finish up your brew day.

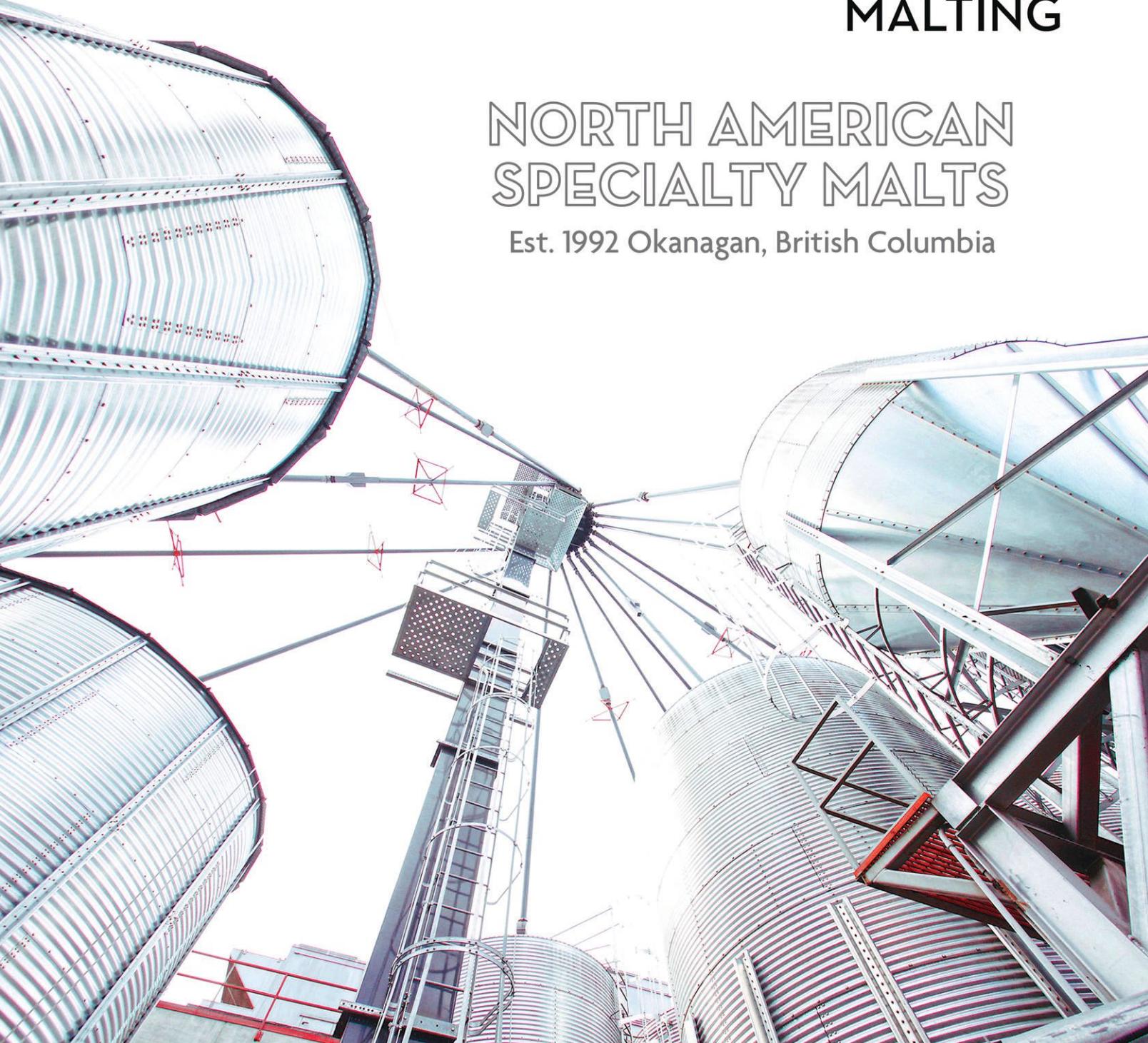
When the stream of wort slows to a drip, verify wort gravity with a refractometer, jar it off in mason jars, heat each jar to boiling (I use my kitchen microwave), and then seal and mark them. When cool, they can either go right into the fermenter, or you can store them in the fridge for later use. If the beer is sufficiently strong, you can go a step further: pour a measured amount of boiling water over the mass of hops and trub in the kettle to rinse hopped wort from the remaining cake of solids, and then measure, boil

and jar off this partial-strength wort as above for later use in yeast propagation. It's not labor intensive, and it saves a lot of perfectly good wort that would otherwise go into the compost bin.

And finally, don't forget the wort left over in your transfer lines and heat exchanger that can be recovered and processed similarly.

### Solids

Many homebrewers find a use for spent grains, either as animal feed or for baking—I compost mine with leaves from the yard to make a nitrogen-rich mulch for the vegetable garden. But you can do the same with your spent yeast and even the leftover kettle solids. Once that mass of hops and trub has been rinsed or sparged to your satisfaction, mix it into the compost. If you have dogs, it's likely they will enjoy the spent grain as a snack. Just make sure they can't get to the spent hop material (or mash hops); they might like the sweet taste, but hops are toxic to them.



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## Yeast

While I don't have a centrifuge to recover beer losses from a yeast/trub cake after fermentation, as large breweries often do, I do like to reuse the yeast for subsequent batches. It's true that pitching ale wort onto the entire yeast cake from a previous fermentation can lead to over-pitching, but this is rarely true with lagers. Cold crashing not only facilitates clearing but also helps consolidate yeast at the bottom of the fermenter.

If the yeast cake is fresh, and if the gravity of the previous batch isn't too high (1.057 or 14°P at most), you can simply rack the previous beer off the yeast and run in the new beer. If there is to be a delay of more than a day or two, or if the previous beer was stronger than 14°P, you'll need to wake the yeast up a bit with your canned, stored wort. Simply temperature-match a couple of quarts of full-strength (ideally 10 to 14°P, or 1.040 to 1.057) hopped wort recovered using one of the methods above, oxygenate it, and pitch it onto the yeast at the beginning of your brew day. By the time you are ready to run into the fermenter, it should be bubbling away, cutting your lag time for the new batch, and eliminating beer losses from the previous one.

Without a lab, it's difficult to ascertain the viability of leftover brewer's yeast, but it should smell fresh and sweet. If you detect any off-aromas, it's time to make a fresh yeast starter.

## Water

Obviously, water is an increasingly precious resource, and brewing uses a lot of it. In the winter, when groundwater temperatures are low, I can usually recover all the coolant water I use to chill my kettle wort, storing it in 5-gallon buckets (for hot water) and 5-gallon plastic water bottles (for warm to cool water). This perfectly good tap water can be reused for washing equipment, dishes, etc. then used again as grey water for plants, the garden, or the lawn. If you have a reverse osmosis filtration system, you can usually recover its wastewater for cleaning, laundry, or other greywater applications. Just realize it has a high mineral content, as well as chlorine and other impurities that may not be suitable for plants, animals, people, etc.

Get creative with ways to improve efficiency in your brewhouse, and not only will you be able to brew more beer for less, you'll be able to conserve valuable resources and reduce your waste output.

Amahl Turczyn is associate editor of *Zymurgy*.



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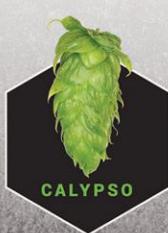


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**Editor's note:** This article is adapted from *Simple Homebrewing: Great Beer, Less Work, More Fun* by Drew Beechum and Denny Conn, available from Brewers Publications this June.



# SIMPLE WATER ADJUSTMENT

By Drew Beechum and Denny Conn

**Leonardo da Vinci declared that water is the driver of nature.** Hungarian biochemist and Nobel Prize winner Albert Szent-Györgyi wrote: "Water, the Hub of Life. Water is its matter and matrix, mother and medium. Water is the most extraordinary substance!" Author of *The Little Prince*, Antoine de Saint-Exupéry, proclaimed: "Water, thou hast no taste, no color, no odor; canst not be defined, art relished while ever mysterious. Not necessary to life, but rather life itself, thou fillest us with a gratification that exceeds the delight of the senses." A Slovakian proverb notes that pure water is the world's first and foremost medicine.

>>



# "Residual alkalinity is the alkalinity that is not neutralized by the calcium and magnesium in your water."

to make great beer in any style, there's no getting around knowing the right water profile to nail a style.

## Brewing Water Basics

Before we get serious about water, it's important to understand five basic things. And no, "water is wet" isn't one of them. The following list comes from our good friend John Palmer. We're using it here because we couldn't say it better.

- Bad-tasting water generally makes bad-tasting beer. If your water smells like a swimming pool, don't brew with it.
- Low-mineral water (less than 50 ppm) is better for extract brewing.
- In general, hardness is good, and alkalinity is bad.
- Hardness and alkalinity affect water, mash, and beer pH.
- Sulfate, chloride, and sodium do not affect pH but instead "season" your beer, like salt does for food.

If you look through a lot of older brewing books, you'll see tables of famous brewing cities and what their water profiles look like. The old way of talking about water treatment was: "Oh, you're making a Scottish beer? You should make your water look like that from the Edinburgh rows in the table." This ignores

### We Don't Adjust Water pH

Brewers do not adjust water to adjust water pH. Water is adjusted to change the hardness and alkalinity concentrations, which in turn affect the pH of the mash. Mash pH is the equilibrium between water chemistry and malt chemistry. The only time brewers acidify water specifically to change the water pH is when they are acidifying sparge water to prevent wort pH from rising during lautering. However, it must be understood that the mechanism for preventing rising pH is the neutralization of the alkalinity in the water, which is gauged by measuring the pH of the water. We measure the water pH to know when we have neutralized all the alkalinity.

the fact that Edinburgh water varies (drastically) from well to well. But it also ignores the fact that breweries worldwide treat their water, removing minerals and adding others all with the same goals in mind. Very few brewers just hew to their native water source.

### pH

When we build a water profile, we have two questions in mind: how it will affect mash pH and how it will affect beer flavor. pH gets manipulated to affect the function of your mash and boil, and mineral salts get manipulated to affect the flavor of your beer. Sure, there's some crossover—pH will have an effect on flavor and the salts can have an effect on pH—but thinking of them as separate adjustments helps you get a handle on what you're doing and why.

pH is a measure of how acidic or basic something is—technically, it's a measure of the hydrogen ion activity in a solution, hence "power of hydrogen" or pH. Keep in mind that the pH of your source water makes little difference. The pH of the mash is what matters and the grain you use will affect that. The more dark grain you add, the lower the mash pH. Enzyme activity in the mash is influenced by pH: beta amylase has a pH optimum in the 5.0–5.5 range while alpha amylase is in the 5.2–5.7 range. Note these ranges overlap, which is why pH 5.4–5.5 is the sweet spot many homebrewers aim for. You'll notice that some products on the market offer the ability to automatically dial in your pH to this magical pH zone, but neither of us have had much luck with them. Sometimes the hard way is the only way.

### Alkalinity

Along with pH, we need to talk about alkalinity. Alkalinity is a measure of how resistant to pH change your water is. Water high in carbonate and bicarbonate will have a high alkalinity and require more acid to bring about a change in pH. Alkalinity is

You might be more familiar with, "Water, water, everywhere, / Nor any drop to drink," by Samuel Taylor Coleridge. Even Henry David Thoreau gets in on the action, proclaiming, "I believe that water is the only drink for a wise man." OK, maybe we can agree that Thoreau went a little too far there, but it's obvious that water is not only the stuff of life, but also the foundation of our favorite hobby. Water makes up about 95 percent of our favorite beverage; maybe only 85 percent if you're a super high-gravity brewer!

For many years, homebrewers were told that if your water tastes good, you can brew with it. That's true to an extent, but without knowledge of your water—what it contains and how to adjust it—you're limited to the few styles for which your water is ideally suited. Many of the world's great breweries started out by only brewing what their local water allowed, but these days, few allow their water to dictate beer style.

You can make really good beer and never worry about adjusting your water if you stick to the styles that your water is suited to. That's what breweries historically did. It's why you get Guinness from Dublin and IPA from Burton-on-Trent. You can even make decent beers in styles your water is not perfect for. But we all know that homebrewers aren't going to be content brewing only a couple of styles. We want it all! And

**SIMPLE HOMEBREWING**  
GREAT BEER. LESS WORK. MORE FUN.

By Drew Beechum & Denny Conn

NOT the same as hardness; it's actually the opposite. Hardness comes from high levels of calcium and magnesium ions in your water. Some hardness in your water is not necessarily a problem and can actually be a good thing for some styles.

Alkalinity can be a big obstacle to you hitting your mash pH and usually needs to be neutralized by an acid addition when brewing lighter-colored beers. Brewers use either lactic or phosphoric acid to neutralize alkalinity and adjust mash pH (notice we said mash, not water). Too much alkalinity can result in a high pH and a muted flavor to the beer. Too little alkalinity can result in low mash pH and tart, almost wine-like flavors, as well as poor conversion. On the other hand, alkalinity is a good thing when you brew dark-colored beers. It balances the acidity from the dark malts and helps keep your mash pH from going below 5.2.

Residual alkalinity (RA) is a concept introduced by Paul Kolbach as a specific tool for brewers. It's the alkalinity that is not neutralized by the calcium and magnesium in your water. It's what's "left over" after the neutralization reactions, hence the "residual" part. It's the true measure of what a brewer needs to know about their water. Darker beers benefit from a higher RA and lighter beers from a lower RA. You can increase RA by adding calcium carbonate (chalk), sodium bicarbonate (baking soda), or calcium hydroxide (pickling



# HOBO BOHO PILSNER

Here's a simple recipe where the whole character changes based on the water. Please note, although this recipe is for a lager, you can substitute a clean, neutral ale yeast and see the same effect.

The decoction schedule specified is traditional, but hardly necessary. For a simpler brew day, perform a single infusion mash at 150°F (65.6°C) before proceeding to mash out or straight to the lauter.

If you do opt for the decoction, though, you can learn more in Jan Brücklmeier's article "Decoction Mashing: History and Modern Approaches" in this issue of *Zymurgy*.

## Batch volume: 5.5 US gal. (21 L)

Original gravity: 1.051 (12.6°P)

Final gravity: 1.010 (2.6°P)

Color: 3 SRM

Bitterness: 40 IBU

Alcohol: 5.2% by volume

## MALT

11 lb. (5 kg) Bohemian Pilsner malt

## HOPS

2.25 oz. (64 g) Saaz, 4.5% AA  
@ 60 min

1 oz. (28 g) Saaz, 4.5% AA  
@ 0 min

## YEAST

Wyeast 2124 Bohemian Lager

## WATER

Use water with minimum of 50 ppm calcium and minimal levels of other minerals.

## BREWING NOTES

Strike with 4 gal. (15.1 L) of 134°F (57°C) water and rest at 122°F (50°C) for 20 minutes.

**Decoction #1:** Pull 1/3 of the mash with minimal liquid. Raise to 152°F (67°C) for 20 minutes in a separate vessel and then bring to a boil, while stirring. Add back to the main pot to raise the mash to approximately 150°F (66°C).

**Decoction #2:** Pull 1/3 of the mash volume with liquid. Bring to a boil. Add back to the main pot to raise temperature for mash-out.

Ferment for 2 weeks at 48–50°F (9–10°C). Raise to 64°F (18°C) for 24 hours and then crash to 35°F (2°C) for 2 more weeks.

## VARIATION: Johann's Pils

Adjust water with gypsum (about 1 tsp. for a neutral water source) and use Wyeast 2206 Bavarian Lager.

lime). The easiest way to increase the alkalinity of your water is to use baking soda or pickling lime because calcium carbonate is hard to dissolve. You can reduce RA by hardening the water with additions of calcium or magnesium, or by adding acid.

## Simple Water Treatment

Here are a few simple guidelines for treating your brewing water. You can go a lot deeper, but here's the basic stuff to get you thinking in the right direction.

- Get your water measured via a third party or a home kit. Everything else starts from here.
- Get rid of chlorine and/or chloramine—these will ruin your beer.
- Residual alkalinity is the key to adjusting your water. Use lactic or phosphoric acid to counter alkalinity.
- Water pH doesn't matter, mash pH does; the grains will do a lot of your pH adjustment for you.
- Use sulfates (gypsum and/or Epsom salts) to promote a dry finish in your beer and increase the perception of bitterness.
- Use chloride (calcium chloride or salt) to increase the perception of sweetness and malt.
- When you use a water calculator, add mineral salts first to achieve the flavor profile you're looking for. Then use acid to reduce pH or pickling lime/baking soda to increase pH if needed.
- The best water treatment is the least water treatment. Do what you need to do and nothing more. More is not better. If you're within 10 ppm of the target, you're plenty close enough.

## Function and Flavor

OK, does your head hurt yet? Yeah, we understand. But we think it's important to have at least a bit of an idea how and why things happen with your water. Here's the takeaway from all of this (i.e., the simple part):

- Start adjusting your water by adding mineral salts to build the flavor profile you want.
- Mineral salt additions will affect the RA of your water, so after you get your flavor profile built, use acid or bicarbonate to adjust the mash pH to the value you want it to be.
- In general (VERY general!), shoot for a pH on the slightly high side (5.4–5.8) for dark beers and on the lower side (5.2–5.4) for lighter, crisper beers. Amber-colored beers should fall somewhere between those outside values.

We recommend you get some water treatment software. Some popular brewing software, like BeerSmith™, will have it built in. There are online water calculators like Brewer's Friend that you can use; there are also many standalone calculators like Bru'n Water (which Denny uses), Brewer's Friend ([brewersfriend.com](http://brewersfriend.com)), or

Palmer's Brewing Water Adjustment App that you can download. If you're really nerdy, go forth and make your own spreadsheet (that's how Bru'n Water started), but we really do recommend going and finding a calculator that works for you because the math gets weird.

These are all basically spreadsheets that allow you to play "what if" games. You input the profile of the water you're using, select a target profile for the beer you're making, and start manipulating the various salt additions until you get close to the profile you want.

## It's Never Too Late

Sometimes a beer doesn't turn out exactly like what you had in mind. Maybe it's too bitter, too "thin," or too "flabby." Your choices are to suffer through it or dump it, neither of which we want to do! However, you can actually add some water treatments directly to a keg or glass of beer. It still might not be what you had in mind, but chances are it will be a lot closer!

There's no formula to determine how much to add to a glass or keg because there's no way to quantify flavor. It's a

trial and error thing, hopefully with the emphasis on the trial! Denny just adds a bit to a glass and tastes until he decides the beer has been improved. You can carefully measure the amount you put in a glass (hint: it's not very much) and scale that up to the size of the whole batch you want to treat. Or you can add a bit, taste, and add more if needed. It's unlikely the beer will turn out to be the perfect pint you had in mind, but you'll undoubtedly end up with a beer that you can enjoy both for itself and for the simple reason that you saved it from ending up as drain cleaner.

We don't know about you, but after all this water talk, we need a drink!

**Drew Beechum and Denny Conn** are co-authors of Experimental Homebrewing, Homebrew All-Stars, and Simple Homebrewing (Brewers Publications, Spring 2019). Together, they cohost the Experimental Brewing podcast. Drew lives in Pasadena, Calif., with his lovely wife and loyal army of dogs and cats and has a dedicated brewery in his home. Denny lives in Noti, Ore., with his wife, five cats, and two dogs. 



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# SECOND ANNUAL KLCC Brew Fest HOMEBREW COMPETITION

By Amahl Turczyn

Organized by homebrew club Cascade Brewers Society (CBS) as a benefit for public radio station KLCC 89.7 FM, the annual KLCC Homebrew Competition was held January 31 and February 1 at Ninkasi Brewing in Eugene, Ore. The competition took place one week prior to the main KLCC Brew Fest, the station's largest off-air fundraiser, which featured live music, food, yoga, and 200 brews from 80 breweries. After all, it is Oregon! The Brew Fest took place at Lane Events Center in Eugene and included the homebrew competition awards ceremony on February 9.

Competition organizer Michael Gwynn, president of CBS, offered some background on how his club's close involvement with Eugene's finest amateur and pro brewers over the years led to their bringing the KLCC Homebrew Competition to successful fruition.

"CBS was founded in 1982 in the basement of [local brew shop] Home Fermenter in Eugene," Gwynn stated. "As one of the oldest and largest homebrew clubs in Oregon, we've been heavily involved →



Russell Berger, Best of Show winner,  
Annual KLCC Brew Fest Homebrew Competition

The contest also received entries from California, Illinois, Minnesota, Texas, Ohio, and Pennsylvania.

Gwynn noted that since its inception, the KLCC Brew Fest has focused on one thing: supporting local National Public Radio (NPR) affiliate KLCC 98.7 FM.

"As official hosts of the competition this year, CBS continued the tradition of forwarding all proceeds generated by the competition to KLCC to help keep the airwaves filled with NPR stories, news, and a variety of music programming," said Gwynn.

In terms of size and scope, the event has snowballed over the years. "The homebrew competition started under the stewardship of Jamie Floyd, Ninkasi Brewing's founding brewer, and Jason Carrier," Gwynn continued. "The goal was to engage the people attending the partnered beer festival (KLCC Brew Fest) and the community of brewers in Eugene. Since the original competition, held in Floyd's basement, it's been moved to various locations to accommodate annual expansion. At one point the competition was judged during the festival on Fridays and the awards were tabulated and handed out the next day! Since the logistics of running the competition during the festival were difficult to say the least, it was decided to move up judging to the weekend prior. As a result, we are able to grant free entry to the festival as a thank you to those who participate as judges and stewards."

Ninkasi Brewing has continued its involvement in the event by volunteering its space as a storage and judging venue. "They've hosted the last few competitions," Gwynn agreed. "With their scale of produc-

in the local beer scene. From helping the Heart of the Valley club of Corvallis, Ore., (Radagast recipient 2017) start the first Oregon State Homebrew Competition in 1984, to supporting the Glen Hay Falconer Foundation with the Sasquatch Homebrew Competition, to now running the KLCC Homebrew Competition, CBS has had the pleasure of influencing and being influenced by local brewing legends."

Gwynn attributes the competition's popularity, at least in part, to where it falls on the annual AHA/BJCP sanctioned competition calendar. "The KLCC competition had 258 total entries this year, mainly from Oregon, representing an increase from our historical average of 239. This may have been because it's the first sanctioned event of the year, which means it begins the competition season for locals who are interested in competing for Oregon State Homebrewer of the Year. Many entrants may also be looking for feedback on beers that they want to submit to round one of the National Homebrew Competition."

“  
**When I cracked open the first bottle ... I was forever hooked.**

tion, we have a comfortable, well-lit space to judge, as well as easy access to refrigerated storage for all entries. As an added bonus, Ninkasi staff volunteered to run calibration for the judges prior to the start of the first flights, as well as participate in the judging!"

Gwynn mentioned that in keeping with the tight-knit brewing community that is Eugene, sponsorship of the competition came from other local businesses and



**KLCC Homebrew Competition**  
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**Homebrew Competition Sponsors:**  
KLCC 89.7 [klcc.org](http://klcc.org) | [mpf.org](http://mpf.org)

breweries as well, including a Pro-Am opportunity for the BOS brewer.

"This year the competition was sponsored by four wonderful community partners. Home Fermenter offered general sponsorship of both the festival and the competition. For best of show, we are lucky to count Falling Sky Brewery, Ninkasi Brewing, and Oakshire Brewing as sponsors. The best-of-show brewer will be given the opportunity to brew the winning recipe at Falling Sky and have it entered into the Pro-Am competition at this year's GABF. Runners-up will receive generous prize packages from Ninkasi (second place BOS) and Oakshire (third place BOS). CBS is grateful that we have such amazing independent breweries with staff who all want to support their homebrewing roots."

Portland Brewers Collective member Russell Berger was the recipient of that coveted BOS prize this year, and he describes how he got into brewing great beer only three short years ago.

"It all began when my friend Shilpi Halemane began inviting me to bottle shares after noticing that I preferred beers made with expressive yeast. My enthusiasm led him to recommend that my wife get me some brewing gear for Christmas."

*Continued on page 76 >*



# Probably the Best Beer in the...House

## International Pale Lager (2A)

Russell Berger, Best of Show, Annual KLCC Brew Fest Homebrew Competition

**Batch volume:** 5.5 US gallons [20.82 L]

**Color:** 3 SRM

**Original gravity:** 1.044 (11°P)

**Alcohol:** 4.6% by volume

**Final gravity:** 1.005 (1.3°P)

**Efficiency:** 72%

**Bitterness:** 20 IBU

### MALTS

8.5 lb. [3.86 kg] BestMalz Heidelberg Pilsner malt

8 oz. [227 g] BestMalz Munich malt

8 oz. [227 g] Weyermann Carafoam malt

### HOPS

3 oz. [85 g] Mt. Hood, 5.2% a.a. FWH [15 IBU]

0.75 oz. [21 g] Mt. Hood, 5.2% a.a. @ 0 min, steep 5 min [5 IBU]

### OTHER INGREDIENTS

lactic acid, as needed to adjust mash & sparge liquor

2.5 g calcium chloride in mash & sparge liquor

0.5 tsp. [1.5 g] yeast nutrient @ 15 min

1 tablet Whirlfloc @ 15 min

gelatin for fining

### YEAST

340–460 billion cells Imperial Pilgrimage or other German lager yeast

### WATER

Portland, Ore., water or RO water. Adjust mash pH to 5.2–5.3 with lactic acid if needed.

### BREWING NOTES

Mash in at 131°F (55°C) and hold for 15 minutes. Raise to 148°F (64°C) and rest for 30 minutes. Raise to 162°F (72°C) and rest for 30 minutes. Raise to mash-out temp of 168°F (76°C) and hold for 5 minutes. Fly sparge with 170°F (77°C) water.

Add 15 IBUs Mt. Hood to kettle before lautering. Boil 90 minutes, adding Whirlfloc and yeast nutrient 10–15 minutes prior to flameout. Add 5 IBUs Mt. Hood at flameout. Steep 5 minutes. Chill as fast as possible to 46°F (8°C). Pitch 1.5–2 million cells/mL/Plato of Imperial Pilgrimage German lager yeast. In 5 gallons, this is about 340–460 billion cells.

Oxygenate 2 minutes. Allow beer to rise to 48°F (9°C) and hold for 3 days. Raise to 52°F (11°C) and hold for 1 day. Raise to 57°F (14°C) and hold for 1 day. Raise to 62°F (17°C) and hold until fully attenuated. This should be at least 5 days. Rack to a keg and chill to 32°F (0°C). Fine with gelatin. Lager until clear. Force carbonate.

### EXTRACT VERSION

Replace Pilsner, Carafoam, and Munich malts with 6.75 lb. (3.06 kg) Pilsner malt extract syrup. Dissolve extract in hot reverse osmosis or Portland municipal water to desired boil volume, add first wort hops, and proceed with boil as above. Resulting beer will be slightly darker than the all-grain version, about 4 SRM.



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They didn't wait long to get Berger's inaugural batch going. "On December 26th, 2017, Shilpi helped me brew an extract weissbier. When I cracked open the first bottle and heard that hiss of success, I was forever hooked."

Like so many new homebrewers who come to appreciate a range of styles before they begin brewing, Berger felt a sudden thirst to brew as many different beers as he could. "I still love to brew weissbier, saison, and Trappist-style beers, but Pandora's box is open. I have been brew-

ing German-style lagers obsessively for the past year or so. I have also begun dabbling with Brett and bacteria."

The next stage of Berger's indoctrination into the world of homebrewing came with membership in a local brew club. "When I had been brewing for a few months, an employee of my local homebrew store invited me to a Portland Brewers Collective meeting," he recalls. "This connected me with a lot of great brewers, who became firsthand resources to supplement the copies of *How To Brew* and *Designing Great*

Beers

I'd cut my teeth with. I felt accepted immediately, and the honest feedback of my fellow PBC members certainly accelerated my growth."

Soon after, his fellow club members made sure he heard the siren call of competition. "They encouraged me to enter some of my beers in a local event, the Oregon Brew Crew Fall Classic. A saison recipe I stole from friend and fellow PBC member Jordan Folks earned me some pretty things to hang in my brewery, and I have been competing ever since."

Berger brews 5-gallon batches at home on top-notch equipment: what he terms "a modest, gas-fired HERMS system."

"I modified my Anvil kettles and use a Blichmann RipTide pump," he says. "I chill my wort with a counterflow chiller. I ferment in my basement, which stays cool enough for most ales. I control my lager fermentations with a Chronical from Ss Brewtech, and their FTSS<sup>2</sup>. I keep the submersible pump in a bucket of water in a mini fridge."

As for his BOS recipe, while it won as an International Pale Lager, it began life as a riff on a classic German lager spiced with local hops.

"The recipe for Probably the Best Beer in the...House was just an experiment to see what would happen if I used only first-wort and flameout additions of Mt. Hood in a Munich helles. It was obvious that the low-FG beer did not resemble a helles, but it was a great lager, so I entered it in the KLCC competition accordingly."

When entering any competition, it pays to think like a judge.

Berger can name on one hand the prime lessons he's learned making German lagers—tenants from two mighty lager brewers in their own right: Greg Noonan and Zymurgy editor-in-chief Dave Carpenter.

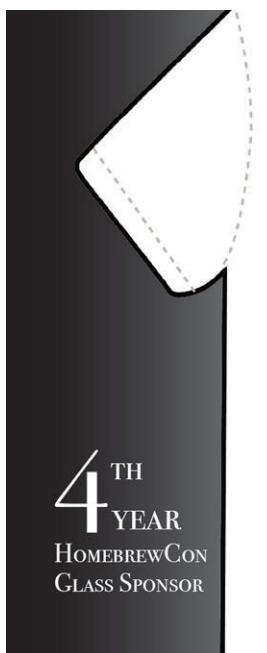
1. Pitch a lot of yeast. 1.5 to 2 million cells/mL/<sup>o</sup>Ptato.
2. Use German malt for lagers and step mashing for fermentability. Lagers should be well attenuated, even doppelbock.
3. Get your mash pH into the 5.2 to 5.3 range. Use a calculator like Bru'n Water and adjust on the fly if you have to.
4. Add plenty of oxygen immediately after pitching.
5. Use Mike "Tasty" McDole's modified version of the fermentation schedule recommended by Narziss.

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*Amahl Turczyn is associate editor of Zymurgy.*

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# Relax, Don't Worry, Have a Homebrew!



That mantra rings as true today as it did in 1978 when Charlie Papazian cofounded the American Homebrewers Association with Charlie Matzen. Homebrewing can be as simple or as complex as you want to make it, but the first step is always to relax and not worry.

To aid your relaxation and help you get the most out of Zymurgy, here are some standard assumptions and methods for our recipes. Of course, when a recipe says to do something different, follow the recipe. But you can always fall back on these general tips to brew great beer.



## ON THE WEB

For more detailed info, head over to [HomebrewersAssociation.org](https://HomebrewersAssociation.org) and dive into our How to Brew resources.

## BREWING WITH ZYMGURGY

### MAKING WORT

Most recipes in Zymurgy offer an all-grain version and a malt extract or partial-mash alternative. Pick the procedure you prefer and prepare some wort!



### Malt Extract Recipes

Making wort from malt extract is easy.

- Crush specialty grains.
- Place milled grains in a mesh bag and tie it off.
- Steep bag of grains in 150–160°F (66–71°C) water 30 min. in your brew pot.
- Remove bag of grains from the pot.
- Fully dissolve extract in the hot, grain-infused water.
- Top up with water to your desired boil volume. (Leave some room for foam!)

### All-Grain and Partial-Mash Recipes

Unless otherwise specified, all-grain brewers can conduct a single-temperature infusion mash with these parameters:

- Water/grain ratio: 1.25 qt./lb. (2.6 L/kg)
- Mash efficiency: 70%
- Mash temperature: 150–153°F (66.7–67.2°C)
- Mash duration: 60 minutes

Partial-mash recipes make the same assumptions but use a smaller amount of grain and augment the wort with malt extract.

### BOILING

No matter how you get here, everyone loves adding hops.



- Boil time is 60 minutes.
- Boils are assumed to be the full batch volume, but you can also boil a concentrated wort and top up with water in the fermenter.
- Hop additions are given in minutes before the end of the boil.

# Brew Lingo

Every field has specialized language, and homebrewing is no different. Here are some of the key terms, abbreviations, and acronyms you'll find throughout Zymurgy.

**AA** – alpha acid

**ABV** – alcohol by volume

**AHA** – American Homebrewers Association

**BBL** – US beer barrel [31 US gal or 117.3 L]

**BIAB** – brew in a bag

**BJCP** – Beer Judge Certification Program

**Chico** – American ale yeast, AKA Wyeast 1056, WLP001, SafAle US-05, and others

**CTZ** – Columbus, Tomahawk, and Zeus: interchangeable high-alpha-acid hops

**DME** – dry malt extract

**DMS** – dimethyl sulfide, an off flavor similar to canned corn or cooked vegetables

**DO** – dissolved oxygen

**EBC** – European Brewing Convention (beer color)

**FG** – final gravity

**FWH** – first wort hops, added to the boil kettle as it fills with sweet wort after mashing

**HERMS** – heat exchange recirculating mash system

**HLT** – hot liquor tank

**IBU** – international bitterness unit

**LHBS** – local homebrew shop

**°L** – degrees Lovibond (malt color)

**LME** – liquid malt extract

**MLT** – mash-lauter tun

**NHC** – National Homebrew Competition

**OG** – original gravity

**°P** – degrees Plato (density of wort or beer)

**RIMS** – recirculating infusion mash system

**RO** – reverse osmosis, a water purification process that removes most dissolved ions

**SG** – specific gravity (wort/beer density)

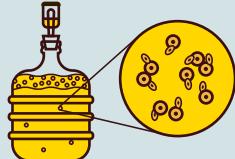
**SMaSH** – single malt and single hop

**SMM** – S-methyl methionine, precursor to dimethyl sulfide (DMS)

**SRM** – Standard Reference Method (beer color)

## FERMENTING & CONDITIONING

Pitch yeast into chilled, aerated or oxygenated wort.



- Use twice as much yeast for lagers as you do for ales.
- Ales ferment at 60–70°F (15–20°C). Lagers ferment at 45–55°F (7–13°C).
- Condition ales at room temperature or colder for a week or two.
- Condition lagers at close to freezing for several weeks.

## BOTTLING & KEGGING

If you bottle,

- Use 1 oz. of dextrose (corn sugar) per gallon of beer (7.5 g/L) for a good, all-purpose level of CO<sub>2</sub>.
- Use less sugar for less fizz.



- Take care with higher carbonation levels—many single-use beer bottles aren't designed for high pressure.

If you force carbonate in a keg,

- Use the chart to dial in the pressure on the regulator.

- Add 0.5 psi (35 mbar) for every 1,000 feet (300 meters) you live above sea level.
- To convert psi pressures to mbar, multiply by 69.
- To convert volumes of CO<sub>2</sub> to g/L, multiply by 2.

**REGULATOR PRESSURES (PSI) FOR VARIOUS CARBONATION LEVELS AND SERVING TEMPERATURES**

TEMP. (F)	VOL. CO <sub>2</sub>										
	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1
33	5.0	6.0	6.9	7.9	8.8	9.8	10.7	11.7	12.6	13.6	14.5
34	5.2	6.2	7.2	8.1	9.1	10.1	11.1	12.0	13.0	14.0	15.0
35	5.6	6.6	7.6	8.6	9.7	10.7	11.7	12.7	13.7	14.8	15.8
36	6.1	7.1	8.2	9.2	10.2	11.3	12.3	13.4	14.4	15.5	16.5
37	6.6	7.6	8.7	9.8	10.8	11.9	12.9	14.0	15.1	16.1	17.2
38	7.0	8.1	9.2	10.3	11.3	12.4	13.5	14.5	15.6	16.7	17.8
39	7.6	8.7	9.8	10.8	11.9	13.0	14.1	15.2	16.3	17.4	18.5
40	8.0	9.1	10.2	11.3	12.4	13.5	14.6	15.7	16.8	17.9	19.0
41	8.3	9.4	10.6	11.7	12.8	13.9	15.1	16.2	17.3	18.4	19.5
42	8.8	9.9	11.0	12.2	13.3	14.4	15.6	16.7	17.8	19.0	20.1

■ = PSI

Source: Brewers Association Draught Beer Quality for Retailers



# Sanctioned Competition Program

## AUGUST 2018

Concurso Home Brew Slow Brew Brasil 2018,  
160 entries

Pedro Lito, Rio de Janeiro, Brazil

VII Concurso Interno CCCUY, 132 entries  
Federico Fernández, Montevideo, Uruguay

Oregon State Fair Homebrew Competition, 246  
entries

Jason Barker

Washington State Fair, 137 entries  
Dean Malte, Auburn, WA

3rd Annual Fire Fighter's Chili Cook-Off &  
Homebrew Competition, 87 entries  
Mike Riddle, Napa, CA

Gawler AH&F Society Home Brew Competition,  
72 entries

Kieren Vercoe, Adelaide, Australia

4th Annual Champlain Valley Fair Homebrew  
Competition, 40 entries  
Andrew Grogan, Jericho, VT

New Barons Brewing Coop Homebrew  
Competition, 15 entries  
Nate Fakler, Milwaukee, WI

## SEPTEMBER 2018

Itaewon Homebrewers Competition No. 2,  
7 entries  
Hwarang Jung

Western Australia State Amateur Brewers  
Competition, 436 entries  
Jerome Kennedy, Perth, Australia

Dogg Dayzz Homebrew Competition,  
108 entries  
Glenn Cole, Colona, IL

Fugetaboutit, 255 entries  
Matt Warren & Ryan Golden, Chattanooga, TN

4st Hebei Homebrew Competition, 40 entries  
Xin Chao, Hebei, China

Byggvir's Big Beer Cup, 155 entries  
Tyler Mangin & Jon Lewis, Fargo, ND

The Manhattan Homebrew Cup, 150 entries

Mark Zamaitis, New York, NY

Lager, Lager Everywhere, But Not an Ale to  
Drink, 17 entries

Matthew Hibbs, Auburn, WA

6th Annual Picnique Belge, 60 entries

David Dewolf, Arnold, MO

Santa Cruz County Fair Homebrew  
Competition, 21 entries

Steve Tanner, Ben Lomond, CA

DRAFT Brewfest 2018, 173 entries

Nathaniel Pahl, Clayton, OH

EHG Summer Brews, 29 entries

Craig Lee, Edmonton, AB

Carboys SMASH! Pro-Am, 8 entries

Rick Ward & Tony Rovano, Austin, TX

WBC US Pale Ale, 12 entries

Stu Ure, Auckland, New Zealand

Viasat Homebrew and Appetizer Competition,  
22 entries

Joel Magnuson, Vista, CA

Oklahoma State Fair Home Brew Competition  
2018, 144 entries

Ken Morris, Edmond, OK

Old Forge BIG Beer and Odd Ale Competition,  
29 entries

Lee Mahoney, Odenton, MD

IV Copa CervaSerra de Cervejas, 52 entries  
Jocemar Gross & Elson Sousa Jr., Caxias do Sul, Brazil

Bruce Street Brewfest, 30 entries

Frank T. Mitchell, Pike Road, AL

Tulsa State Fair Homebrew Competition,  
104 entries

David Thompson, Tulsa, OK

III Concurso Interno da ACervA Goiana, 3  
2 entries

Ricardo Alarcão Soares, Goiânia, Brazil

V Concurso Estadual Cervejeiro Caseiro

ACERVA-ES 2018, 60 entries

Miguel Jaretta, Vitória, Brazil

8 Concurso Interno ACervA Paulista, 58 entries

Inage George Mazaferro, São Paulo, Brazil

MCM Homebrewer of the Year Q3, 5 entries

Justin Hall, Belleville, MI

The 6th Annual Members of Barleyment (MoB)  
and Beau's Oktoberfest Homebrew Competition,  
632 entries

Colin VanderMeulen, Belleville, ON

Big Fresno Fair Homebrew Competition,  
54 entries

Toby Gelenaw, Madera, CA

Welsh National Homebrew Competition,  
301 entries

Ian Cheeseright

NOLA on Tap 2018 Homebrewer's Competition,  
40 entries

Mitch Grittman, New Orleans, LA

Concurso Eu Cervejeiro, 72 entries

Rafael Costa Almeida, Juiz de Fora, Brazil

Australian National Amateur Wine & Beer  
Show, 101 entries

Barry Cranston

4º Concurso CCBR de Cervejas Caseiras,  
25 entries

Rainer Brokamp, Rio de Janeiro, Brazil

Roberts Cove Germanfest Home Brew Comp  
2018, 67 entries

Charlie Milan, Baton Rouge, LA

Oaktoberfest Homebrew Competition,  
76 entries

Ron Brown

VicBrew - Victorian Amateur Brewing  
Championship, 575 entries

Matt Standfield, Melbourne, Australia

Hillsdale County Fair Beer Show, 22 entries

Matt Mansfield, Homer, MI

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## ON THE WEB

For an up-to-date calendar of AHA and BJCP events, visit the Events section of [HomebrewersAssociation.org](http://HomebrewersAssociation.org)

Central South African Intervarsity Beer Brewing Competition 2018, 54 entries  
University of Cape Town, Cape Town, South Africa

OC Mashups Team Competition, 9 entries  
Scott Andrews & Aaron Viera, Newport Beach, CA

2018 Sonoma County Harvest Fair Homebrew Competition, 90 entries  
Scott Knirck, Windsor, CA

Crystal Lederhosen, 141 entries  
Nicholas Ciuffreda, East Norriton, PA

Athens Homebrew Classic, 102 entries  
Vinnie Krishan, Suwanee, GA

Copa Cerveceros Artesanales de Colombia, 145 entries  
Leidy Rincon, Bogotá, Colombia

Concurso de Cervejas Artesanais Caseiras e Profissionais do Festival Internacional de Cerveja e Cultura (FICC), 240 entries  
Douglas Merlo, Blumenau, Brazil

III Mini-concurso da ACervA Gaúcha, 10 entries  
Renato Troian da Silva, Porto Alegre, Brazil

Salt City Brew Club Annual Competition 2018, 154 entries  
David Briest, Jordan, NY

Smithville Wingfest & Home Brew Beer Competition, 11 entries  
Michael Johnson, San Antonio, TX



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**B**lizzard of Hops is a winter seasonal from Tröegs Brewing Co. that celebrates the closing of the year's hop cycle. It is a tribute to hop growers worldwide for providing brewers with another successful harvest season.

Lovingly crafted with Pilsner malt, white wheat malt, and unmalted wheat, the hazy gold brew is bittered with Centennial, Chinook, and El Dorado hops to the tune of 80 IBUs. Chinook and Galaxy dry hops infuse the aromatics with citrus and pine notes, with hints of pineapple. →

# Judges' Score BLIZZARD OF HOPS WINTER IPA

Tröegs Brewing Company, Hershey, Pa. | BJCP Category 21A American IPA



DAVE HOUSEMAN



SANDY COCKERHAM

→ This seasonal offering is on tap from November through January, and Tröegs recommends pairing it with dry-aged beef ribeye and roasted beets.

Santa Fe Brewing takes a delicate, traditional English brown ale style and puts its own uniquely American spin on it without losing any of the balanced nutty, toffee, and lightly fruity hop signature that has made it a year-round classic.

The brewery mashes at high temperatures to fill out the body, employs a hard water profile to complement the dark grains, and packages the beer in cans to preserve its delicate flavors and aromas. Two-row pale malt, 30–37°L caramel malt, Carastan, and chocolate malts are spiced with floral Willamette hops, resulting in a 35 IBU ale of 5.2% ABV. Santa Fe suggests beef stew, cured meats, barbecue, and cheeses to accompany the toasty, nutty flavors.



## AROMA

Fruity (primarily berries and pineapple) and floral with a hint of citrus hop aromas. Fruity fermentation esters. Light pale ale-like or Pils-like malt aroma. No overt alcohol aroma. No diacetyl. There is a little off-aroma of old cheese, perhaps from hops or DMS. **9/12**

## APPEARANCE

Quite hazy, similar to a New England IPA. Golden yellow color. Dense, rocky, white, long-lasting head. **2/3**

## FLAVOR

Pale ale or Pils malt flavor without caramel, crystal, and other specialty malts. Medium high hop bitterness lingers in mouthfeel and balances the malt sweetness. Fruity (pineapples and berries) hop flavors. Fruity fermentation esters. No diacetyl. Some light sulfur. No overt alcohol flavor. Well attenuated. **15/20**

## MOUTHFEEL

Medium body. Lingering bitterness and some astringency. Medium alcohol warming. **4/5**

## OVERALL IMPRESSION

A drinkable IPA with a unique fruity hop profile, predominantly pineapple. The finish is a little rough in the mouthfeel, but this is largely appreciated by hop heads. There is a clean, crisp fermentation. Like many IPAs, this one paired nicely with spicy chicken and dirty rice. **7/10**

**TOTAL SCORE 37/50**

## AROMA

Moderate to strong hop aroma mixes citrus, tropical fruit, pine, and leather-like spice. Bready malt with a hint of grain. Low, red fruit-like esters. A tiny bit of sulfur vents after a short time. Inviting hop aroma. Leather-like spice note fades after a while, only to re-intensify as the beer warms. Fermentation character is otherwise clean. **9/12**

## APPEARANCE

The moderate, finely beaded white head has a mousse-like texture. Head retention is above average. Straw color with moderate haze. No particulates. **3/3**

## FLAVOR

Medium high hop flavors—citrus, pineapple, resin, and some spice—lead the charge and invite another sip. Firm, medium-high bitterness has a rough edge at the finish. Malt character is medium low cracker with a hint of grain and takes a backseat to hops. Medium low red-fruit esters. Initial juicy sweetness dries in favor of hops at the end. **17/20**

## MOUTHFEEL

Medium-high carbonation balances medium-full body on the palate. Low hop astringency sends it towards an off-dry finish. Moderate alcohol warmth. **4/5**

## OVERALL IMPRESSION

Quite an enjoyable IPA. The hops evoke a mix of old-school and modern hops. Body is dry, but not West Coast IPA dry. At 6.4%, this cleanly fermented IPA is easy to drink, and hop heads could savor a pint or three. **8/10**

**TOTAL SCORE 41/50**



# Judges' Score SANTA FE NUT BROWN ALE

Santa Fe Brewing Company, Santa Fe, N.M. | BJCP Category 13B British Brown Ale



SCOTT BICKHAM



GORDON STRONG

## AROMA

Medium malt aroma with pronounced hazelnut, cocoa and light toffee. Fermentation character is clean with very low pear esters. No hops. Low alcohol is appropriate for a British Brown Ale. **12/12**

## APPEARANCE

Medium brown in color with ruby highlights. Medium amount of foam with decent retention and very tight and uniform beading. Excellent clarity. **3/3**

## FLAVOR

Medium malt sweetness is prevalent from sip to swallow, with notes of toasted breadcrumbs, chocolate, and toffee. Low hop bitterness yields a semisweet finish, which could be a little drier to bring out the nutty character that makes the aroma so interesting. Medium-low pear with a little roast malt acidity at the finish. **16/20**

## MOUTHFEEL

Medium creaminess and carbonation provide a pleasant, soft sensation on the palate. Very low alcohol warmth accents the residual sugar sweetness. **5/5**

## OVERALL IMPRESSION

This is an excellent example of a nut brown ale, and the aroma in particular is a perfect match to the BJCP Style Guidelines. The flavor profile is also excellent, but the sweetness drowned out some of the nutty malt complexity. A little higher bitterness and a slightly drier finish would benefit. Still, one of the finest craft versions of this style I have been fortunate enough to taste. **8/10**

**TOTAL SCORE 44/50**

## AROMA

Rich, quite strong toasted nut aroma. Light chocolate and coconut notes add complexity. Bready undertones with toasted cracker and marzipan. Complex nutty-toasty quality. Not getting alcohol or hops, just a light malty sweetness. The complexity and strength of the malt is impressive. **10/12**

## APPEARANCE

Tall beige head with a tight frothy texture and great retention. Crystal clear. Very pale brown color. **3/3**

## FLAVOR

Similar toasty, nutty, and bready flavors, with moderate bitterness. Light chocolate sweetness, somewhat masked by bitterness. Moderate earthy, floral hop flavor and supporting esters. Clean fermentation. The malt flavors and hops balance into the aftertaste. **17/20**

## MOUTHFEEL

Medium-full body, on the thick side for the style. Moderate carbonation. Not warming or astringent. **4/5**

## OVERALL IMPRESSION

Great mix of malt flavors. The toasty, nutty tones are complex, and the chocolate is light. More bitter than a Newcastle-type beer, but that fits with the broader range of the style. A bit full in body but not really sweet, so it still is quite drinkable. Fresh and enjoyable. There are a lot of flavors present, but they are very well balanced. **7/10**

**TOTAL SCORE 41/50**



## JUDGING

One way beer judges check their palates is by using commercial "calibration beers"—classic versions of the style they represent. *Zymurgy* has assembled a panel of four judges who have attained the rank of Grand Master in the Beer Judge Certification Program. Each issue, they score two commercial beers (or meads or ciders) using the BJCP scoresheet. We invite you to download your own scoresheets at [bjcp.org](http://bjcp.org), pick up a bottle of each of the beverages and judge along with them in our Commercial Calibration.

## OUR EXPERT PANEL

Includes Dave Houseman, a Grand Master VI level judge and competition director for the BJCP from Chester Springs, Pa.; Sandy Cockerham, a Grand Master V level judge from Indianapolis, Ind. and an associate exam director and Midwest Representative for the BJCP; Scott Bickham, a Grand Master IV judge from Corning, N.Y., who has been exam director or associate exam director for the BJCP since 1995; and Gordon Strong, a Grand Master X judge, principal author of the BJCP Style Guidelines, and president of the BJCP board who lives in Beavercreek, Ohio.



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# What Beer Can Teach Us

By Efraín Villa

Ferment on this: Fermentation science and brewing studies programs are increasingly common at American universities, but most students do not reach legal drinking age until after their third year of undergraduate education. Many states make exceptions for students enrolled in such courses of study—so-called “sip and spit” laws let supervised underage students taste fermented beverages in class—but college campuses still have a complex relationship with alcohol. Some professors, however, are using beer’s rich history to motivate investigations into other subjects for students of all ages.



University of New Mexico (UNM) students visit Red Hat Hops farm near Albuquerque as part of UNM's Geography of Beer course.



"Hear the voice of righteousness and repent now before descending into the bowels of damnation whereon Satan will spring forth from the flames and claim your soul for all eternity," a twenty-something-year-old man in the middle of a campus courtyard yells into a defective mic.

The only words intermittently amplified are "hear the ... bowels ... spring forth," but the young, smiling students nearby do not seem to notice the scatological heeding as they nonchalantly walk past his flailing arms. They squint against the sun to spot friends within the crowded field of pop-up canopies draped in "Welcome Back to UNM" banners. A tanned woman near them gets up, puts her iPad in her backpack, and walks over to a Get Out the Vote volunteer standing next to a rainbow-colored booth. Even with the looming threat of eternal damnation, the whole scene is imbued in youthful optimism.

Few occasions are as exciting in college as the start of a new school term, and today it is not just the promise of connecting with friends that has college students excited. At this university, registrants have the opportunity to further their education through a rigorously academic study of beer and its global role in shaping culture, economics, politics, and natural environments. That is the idea behind Geography of Beer courses offered at the University of New Mexico (UNM) in Albuquerque and Texas Christian University (TCU) in Fort Worth.

### BEER AS A LENS

These classes embrace the intersection of beer and education in creative ways to attract students to the study of more esoteric subjects. "This class is not about beer tasting or beer appreciation, and it is not a how-to chemistry class," says Maria Lane, associate professor and chair of the Geography and Environmental Studies Department at UNM.

Standing at the front of an auditorium decorated with maps and rock specimens, Lane uses her hand to shield her eyes from the black-and-white projected syllabus. After pausing to let straggling students find seats in the unfamiliar space, she clears her throat and continues, "This class is about leveraging the huge interest in beer right now to learn about present and past spatial relationships in our world." As she speaks, she scans the room for signs of approval or understanding. The only discernible sound from her students is the soft whoosh of a pen expertly spinning around the thumb of a Lobo hoodie-clad man.

Sensing a disconnect with her audience, Lane adjusts her tactic. "I know this seems very academic," she sighs. "Let me put it another way: the word *beer* in the course title probably drew your attention to the less popular subject of geography. Beer is very relatable today, especially in cities like Albuquerque, where we've really embraced the craft beer culture, but in the end, beer is just a concept we can use to learn geography and get the added benefit of using our town as an urban classroom."

She finishes going over the syllabus and grading scale. The class remains completely silent. "So, the bottom line is that it would be pretty sad if you went home to your parents with anything less than an A+ in a beer course," she says, finally eliciting a relaxed, collective giggle.

"Alright, how many of you are geography majors?" she asks.

One student out of more than a hundred in the auditorium raises her hand.

"Good!" Lane says. "My goal is to convert the rest of you."

Anyone who has ever transformed a spoonful of veggie puree into a choo-choo train for the benefit of a picky toddler knows that making things palatable for discerning audiences is one of the toughest duties that comes with being in a position of authority.

"Getting students interested in geography as a field of study is not easy, so I am pretty shameless about my beer bait-and-switch approach," jokes Sean Crotty, assistant professor of geography at TCU.

# FROM MALT TO MASTERPIECE



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Top: Red Hat Farms founder Tom Brewer guides UNM students on a tour of his New Mexico hop farm. Bottom: Antonio Fernandez, head brewer at Ponderosa Brewing Co., discusses craft beer with UNM students.



“Isn’t it just plain cooler to learn about this stuff through beer?”

“Like Maria [Lane], I also tell my students on the first day of class that this is not a brewing or tasting class. I tell them that it is a challenging geography class, which means that some students run for the door, but even if the remaining ones, even if they never again take a geography course, hopefully learn a bit about the connectedness of our planet.”

Students who stay in these classes tend to be very forgiving of the good-natured trickery. “I get that beer is part of a marketing strategy for getting people to take these kinds of classes, and so what?” says Mark Steen, a 70-year-old retired editor enrolled in Lane’s class at UNM. “Even for the other students in my class who are a fraction of my age, it’s obvious from the beginning that beer is just a lens to explore geography. I suppose that instead of beer it could be something like coal. Coal can also help explain migration patterns, the allocation of natural resources,

the evolution of technology in human settlements, and lots of other geographical stuff in the same way that beer can, but isn’t it just plain cooler to learn about this stuff through beer? And would anyone ever be really excited to take a class called The Geography of Coal?”

#### TO BEER OR NOT TO BEER?

Whether beer or any alcoholic beverage should be mentioned in an academic setting is a question universities struggle with at a time when harmful drinking continues to be a problem on campuses throughout the US. According to the 2017 National Survey on Drug Use and Health (an annual survey from the U.S. Department of Health and Human Services), nearly 54 percent of full-time college students aged 18 to 22 reported having consumed alcohol in the month prior to the study. More than a third of that population engaged in binge drinking during the same timeframe.

Against this grim backdrop, faculty at American universities tend to be very apprehensive about welcoming beer into the classroom. “We have to be very conscientious about the needs of our students, their parents, and our community,” says Lane. “This class does not promote drinking alcohol and a significant portion of the class says they do not even like beer, and that’s true whether I ask that question at the beginning or at the end of the semester.”

Richard Wood, interim provost at UNM, adds that it just makes sense for institutions of higher learning to meet student needs by engaging their interests and passions. “Our sweet spot is education that overlaps with students’ excitement. One thing college students are excited about is craft beer. UNM hosts a responsibly run taproom and a (geography) course called World of Beer. The idea originally came from our students, and the university responded enthusiastically and responsibly.”

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Crotty says he was fortunate that others had already paved the way for him to use beer as a teaching tool at TCU. "Maybe it would have been harder to launch this kind of class at another college because of the stigma associated with alcohol, but colleagues of mine here at TCU had already done the heavy lifting; one of them teaches a class on the science and history of whiskey," says Crotty. "Plus, I already had some exposure to a Geography of Surfing college-level class, so making the pitch to teach Geography of Beer wasn't too intimidating, and I don't think the university found it particularly edgy as an idea. It's sort of what all of us do in conversation every day; we find ways to connect subjects that might sound disparate so we can make better sense of the world."

Courtney Favaloro, a recent TCU graduate who took the Geography of Beer class as a senior last year, admits that tapping into students' personal interests within a curriculum has its challenges. "You have to get past the title of the class, which I guess can be interesting for students but scary for some people, especially parents," says Favaloro. "I think some students' parents can be a bit apprehensive since they're usually the ones paying for their kids' classes, and if they just look at the title it can look like they're paying for their kids to get drunk, but that's a totally inaccurate way of looking at things. I don't know why the mention of beer would be any different than when grapes and wines are discussed when learning about climates. My parents were actually really interested in this class and they weren't scared by the title."

Roy Villa, a former Marine who took the TCU class in the first half of 2018 agrees that talking about beer in a classroom does not cause students to drink more, but he believes it does affect drinking behavior. "Honestly, I don't think the class would make anyone drink who doesn't already drink," says Villa. "But, when you're a

freshman straight out of high school, you are probably drinking the cheapest beer available, and when you learn how important beer has been in the world, you sort of don't want to drink cheap, bad quality beer anymore. For me, it didn't make me drink more, but I would say the class made me drink better. ... I would rather spend money on one or two quality craft beers instead of buying a bunch of mainstream beers."

### A RIO RUNS THROUGH IT

A month into the semester, about two dozen of Lane's students arrive at Red Hat Hops, a farm in the middle of the Rio Grande Valley a few miles from downtown Albuquerque. Her class incorporates guest speakers and field trips that she arranges with of-age and underage students in mind. These trips include local events as well as walking tours.

As the group makes its way through the baby hop vines tethered to what look like giant clothes hangers, Chinenye Ezenwanyi Ndiulor tells me the course has been much more interesting than she expected.

"I'm not really into beer, and I was looking for an easy class," admits Ndiulor. "It hasn't really been easy, and I still don't really like beer, but I have learned a lot and I have been able to start conversations with customers when I'm working as a server. Like the other day, I was explaining the differences between lagers and ales and how IPAs were invented to get around (the horn of) Africa."

While Tom Brewer, the farm's founder and owner, leads the class on a tour and discussion about hops cultivation, a few of the students use their phones to snap pictures of the plants. He explains the latitudinal limits in which hops grow and mentions that hops and cannabis plants are closely related.

"We're only interested in the female plants here," Brewer says. "Can anyone guess why?"

"Because it's all about the bud," a student blurts out, prompting the rest to chuckle.

"Exactly," says Brewer. "And maybe someday the demand for the buds will be much greater for medicinal purposes, like treating insomnia, than as a beer ingredient."

Eric Bodwell, a liberal arts major, says these field trips are his favorite part of the class. "I love learning the human geography of beer and that it basically came as a byproduct of trading a hunter-gatherer lifestyle for cities, and even now we can see that in craft breweries' architectures," says Bodwell. "It's why it's so common to see breweries in industrial spaces with exposed beams and all that; it's because they're trying to make sure that the place says 'Look at us—we make stuff here.'"

When asked what the most important lesson from the class has been, Bodwell pauses and says that he especially enjoyed exploring associations between new neighborhood breweries and gentrification. "There's a quote one of the speakers used that I repeat all the time now," says Bodwell. "Microbreweries are like catnip for hipsters."

Steen, for his part, says his favorite part of the class is getting the opportunity to exchange ideas with people outside his age group.

"This is the thirteenth class I've taken since turning 65, and I have always thought at some point the younger people would be rolling their eyes at the old guy asking questions," says Steen. "But I have never gotten pushback from professors or students. The kids are so respectful and polite and fall in line with me when walking to another class and we'll have wonderful conversations. How often does someone my age get to mingle with young people? If putting beer in the title of a geography course can bring us all together to learn from each other, isn't that just another great role for beer to play in its long history?"

*Efrain Villa is a photographer, actor, writer, and global wanderer whose endless quest for randomness has taken him to more than 50 countries in five continents. His writing has appeared on NPR's Weekend Edition, in TravelWorld International magazine, in Zymurgy, on CraftBeer.com, and in Spanish-language publications. While not running his consulting firm in Albuquerque, he is busy devouring exotic foods in faraway countries and avoiding adulthood while wearing the least amount of clothes possible. His travel stories dealing with the messiness, humor and beauty of cultural collisions can be found on his website, Aimless Vagabond.*



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# Island Brew

**S**traddling the equator, the Galápagos Islands lie in the Pacific Ocean 970 km (600 miles) west of the Ecuadorian mainland. They consist of six main islands, 12 smaller islands, and more than 40 islets.

My daughter Kira and I explored the Galápagos for 10 days last December. We visited three of the six main islands, where we hung out with giant tortoises and iguanas, hiked over lava boulders in a volcano crater, and crawled through lava tubes. We snorkeled with sea lions and sharks and observed exotic blue-footed boobies, frigatebirds, and bold finches that ate out of my hand.

Wandering the streets of Puerto Ayora on Santa Cruz, one of the main islands, I dodged iguanas and sea lions that were not the least bit interested in the tourists who walked around and over them. But I was on a mission. As a world beer hunter and avid homebrewer, I was obligated to investigate and sample the local brews at Santa Cruz Brewery.

I was warmly greeted at the brewpub by bartender Edison Ocana, who brought samples of their draught selections. These included a 6.5% ABV stout with sour notes; a 5% ABV saison made with toasted rye; a 6.1% ABV traditional pale ale that was quite hoppy from additions of Cascade, Magnum, and Fuggles; a 6.1% ABV Trappist-inspired ale with a distinct Belgian yeast taste; and a 10.1% ABV strong ale.

The head brewer showed up while I was there, having just traveled to the brewpub from the production facility, which is situated in the highlands of Santa Cruz. Marcelo Herrera spoke no English, so Edison translated for him. I learned that Marcelo had trained and apprenticed at a brewery in Spain and has been the main brewer at Santa Cruz ever since.

Unfortunately, I didn't get to visit the brewery, just the brewpub in downtown Puerto Ayora. But Marcelo explained that the brewery's equipment had been fabricated in

Ecuador's capital, Quito, and included four each of 250-liter (2-barrel), 125-liter (1-barrel), and 70-liter (0.6-barrel) fermentation vessels.

All the ingredients that go into Santa Cruz's beers are imported from the United States, United Kingdom, and Spain. Nothing much is grown or produced on the barren volcanic terrain of the Galápagos, so food and dry goods are shipped from the mainland. To protect their sensitive ecosystem, islanders have even banned plastic bags and straws.

Santa Cruz Brewery plans to build brewpubs on San Cristobal and Isabela islands, which are the largest in the chain. When I visited these via a fast, bumpy two-hour boat ride, I got to sample the brewery's blonde ale and Colorada Red Ale Hoppines, both available in bottles.

Borne of volcanic activity and miles from nowhere, the Galápagos islands are an unlikely location for craft beer. Or so I thought until I discovered Santa Cruz Brewery.

**Ralph Bucca is a Lifetime AHA member, a founding member of Brewers United for Real Potables (BURP), and a zymurgist for all things fermentable. As a volunteer with the Farmer2Farmer program, he has had the opportunity to sample tonto, palm wine, chicha, and many other unique beverages in developing countries.**

Photos courtesy of Ralph Bucca





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