Vol. 37 ✳ No. 3 | May/June 2014

FOR THE HOMEBREWER & BEER LOVER

zymurgy®

The Journal of the American Homebrewers Association®

BREAD'S SECRET INGREDIENT: *Berliner Weisse*

BA BREWERS ASSOCIATION
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by Jill Redding

Beer is Food

One of the seminars I attended at the Big Beers, Belgians, and Barleywines Festival in Vail, Colo. earlier this year was "Cooking with Beer," presented by the fabulous Women Enjoying Beer founder Ginger Johnson. As an avid cook who is always looking for new ideas and recipes, I scribbled lots of notes and takeaway tips while I was enjoying the delectable three-course offering prepared by Ginger.

Here are seven ways to incorporate beer in cooking, in ways that you might not have thought of before.

1. Rehydrate beans in beer. Ginger presented slow-cooked roasted pork and beans as a first course. Collage, a strong ale collaboration between Deschutes Brewery and Hair of the Dog Brewing Company, was used to rehydrate dried red beans, pinto beans, and Great Northern beans to deepen the flavor. Ginger suggests rehydrating the beans over low heat in a crock pot, and saving the bean water for reuse. (Ginger is a Master Recycler in Oregon, so she can always be counted on for sustainability tips as well!)

2. Use hoppy beers to add an extra flavor dimension to homemade salad dressing. The bitterness of the beer can complement the bitterness of salad greens. (Be sure to check out the Chainbreaker White IPA Dressing recipe on the Deschutes website, and Orange IPA Salad Dressing recipe on the Alaskan Brewing website).

3. Use hefeweizens as an ingredient to spice up muffins.

4. Use beer in hummus (you can also use beer to rehydrate dried garbanzo beans for hummus). Ginger used Sixth Glass quadruple from Boulevard Brewing to rehydrate a hummus mix purchased from a local food co-op, and she threw in some chopped red bell peppers and cilantro for good measure.

5. Dip bread in beer to make French toast. Substitute at least part of the milk in the recipe with a beer such as milk stout.

6. Make a malted milkshake using stouts or porters. (I'm sure you already do this…right?)

7. Soak ladyfingers in beer to add a fun element to desserts. Ginger served a scoop of vanilla ice cream topped with ladyfingers soaked in Allagash Fluxus (a porter brewed with coffee and chocolate malts with added blood orange pulp and zest). The dessert was topped with Dagoba Lemon Ginger chocolate shavings and fresh lemon zest for an added twist.

For more on incorporating beer into cooking, turn to page 42 for a delectable rustic bread (and pizza crust) recipe made with Berliner weisse. Also, for more on cooking with beer, be sure to check out the Beer and Food section on CraftBeer.com.

Speaking of ingredients, the articles for our annual Ingredients issue run the gamut from mashing for sour beers, to making the most of your hops (by *For the Love of Hops* author Stan Hieronymus), to the latest installment of the Brewing Water Series (London) by Martin Brungard. In addition, look for the latest report from the AHA's Research and Education Fund, as well as a wort oxygenation experiment in For Geeks Only. Happy brewing!

Jill Redding is editor-in-chief of *Zymurgy*.

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(zī'mər jē) n: the art and science of fermentation, as in brewing.

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COLUMNS

DEPARTMENTS

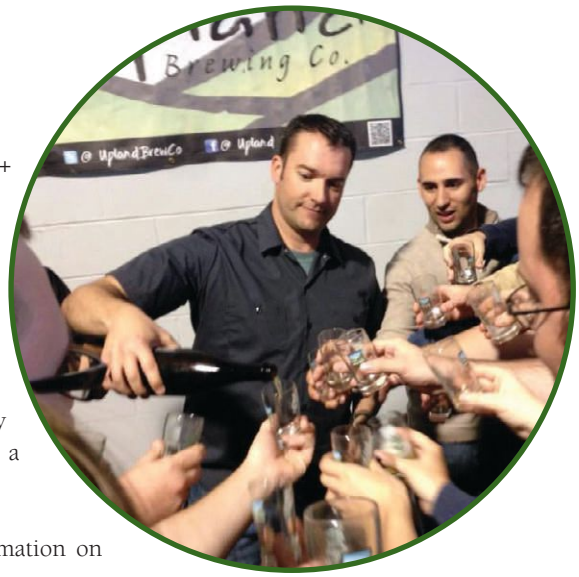



FEATURES

QUICK RECIPE GUIDE

>> GET THERE!

SOUR + WILD + FUNK FEST



Upland Brewing Company's third annual Sour + Wild + Funk Fest takes place on Saturday, May 17 at the historic Indianapolis City Market. This new venue is more centralized with better parking options, free valet bicycle parking, an extended outdoor area, and accessibility to walkup traffic.

More than 20 breweries will be pouring samples of sour, wild, and funky beer at the festival, which is preceded by a VIP Sour lecture and private tasting, and is followed by a Secret Barrel Society members-only party.

Go to www.uplandsourfest.eventbrite.com for more information on the festival.

May 2-3
St. Louis Microfest
St. Louis, MO
stlmicrofest.org

May 9-10
SAVOR℠: An American Craft Beer & Food Experience
Washington, DC
www.savorcraftbeer.com

May 10
Wild West Brew Fest
Katy, TX
www.katybrewfest.com

May 17
West Coast Brew Fest
Sacramento, CA
www.westcoastbrewfest.com

May 17
Maui Brewers Festival
Maui, HI
www.mauiarts.org

May 24-June 1
Paris Beer Week
Paris, France
http://laparisbeerweek.com/

May 30-June 7
Frederick Beer Week
Frederick, MD
www.frederickbeer.com

May 30-June 8
Philly Beer Week
Philadelphia, PA
Phillybeerweek.org

May 31
Firestone Walker Invitational Beer Fest
Paso Robles, CA
www.firestonebeerfest.com

June 7
Boulder Sour Fest
Boulder, CO
www.averybrewing.com

June 11-15
Mondial de la Biere
Montreal, Quebec.
http://festivalmondialbiere.qc.ca/

June 26-29
North American Organic Brewers Festival
Portland, OR
www.naobf.org

For more craft beer events, go to www.CraftBeer.com.

>> YOU'VE GOTTA DRINK THIS

ODELL IPA

If there is a finer IPA made, please let me know. I think drinkers and brewers can get hung up on IBU numbers and bitterness being so closely associated with how hoppy an IPA is. This beer is hoppy in the best way: floral, citrus, a bit dank even, without tearing your tongue off with bitterness. The best IPA I've ever had, although I will continue my quest of trying them all to be sure!

Reviewed by Eric Knight, Littleton, Colo.

If you've had a beer you just have to tell the world about, send your description, in 150 words or fewer, to zymurgy@brewersassociation.org.

Photos © Upland Brewing Co., Odell Brewing Co. and GarageMonk.com

>> BEER QUOTE

"That's why I like Sam so much. He's as crazy a brewer as I am—he puts lobster and carrots in beer."

—Avery Brewing Co.'s Adam Avery on his good friend Sam Calagione of Dogfish Head

>> BREW NEWS

AMERICAN CRAFT BEER WEEK

AMERICAN CRAFT BEER WEEK
CraftBeer.com
May 12-18, 2014

What are your local breweries, brewpubs, and beer retailers doing to celebrate American Craft Beer Week?

For the ninth consecutive year, the Brewers Association presents American Craft Beer Week® (ACBW), a celebration of U.S. craft brewers across the country. Last year, ACBW was celebrated by breweries, brewpubs, and retailers in all 50 states. More than 56,000 beer lovers have joined the Facebook community for American Craft Beer Week, and 2014 will undoubtedly be the largest celebration yet.

From May 12-18, ACBW will provide an opportunity for small and independent brewers, craft beer enthusiasts, and the community of better beer retailers to celebrate the ever-advancing beer culture in the U.S. Events will include exclusive brewery tours, special beer releases, beer and food pairing dinners, collaboration beers, retail promotions, and much more. To find events near you, go to CraftBeer.com/acbw.

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The labels come in sets of 24 to 70 and include a body and neck label and a dry-erase pen. Sets range from $24 to $48. To learn more, go to http://garagemonk.com.

THE LIST

A BY-THE-NUMBERS LOOK AT THE U.S. CRAFT BEER SEGMENT AT THE END OF 2013

7.8%
MARKET SHARE FOR CRAFT BEER

18%
VOLUME GROWTH FOR CRAFT BREWERIES

109
NEW BREWPUBS

304
NEW MICROBREWERIES (packaging breweries under 15,000 barrels)

1,774
U.S. BREWERIES IN PLANNING STAGE

2,772
U.S. OPERATING BREWERIES (including non-craft)

985,000
BARRELS PRODUCED BY SIERRA NEVADA BREWING CO. (second largest U.S. craft brewer)

2,295,000
BARRELS PRODUCED BY BOSTON BEER CO. (largest U.S. craft brewer)

>> CRAFT BREWER PROFILE: WAYNE WAMBLES

BY GORDON STRONG

Catching up with Wayne Wambles of Cigar City Brewing in Tampa, Fla. isn't easy. Even though he had just finished brewing a collaboration beer in the UK, was starting Tampa Bay Beer Week events, and was celebrating the fifth anniversary of the brewery, I was fortunate to get a few hours of his time to sit down and discuss his beers and brewing.

Working my way through several samplers, I was impressed by their flagship beer, the 7.5-percent Jai Alai IPA—fruity and balanced with a clean bitterness and lots of Columbus and Simcoe late hops. The Tocobaga red ale (at 7.2 percent, more of a red IPA) was also balanced and clean with a big Citra hop character.

I tasted many other interesting beers offered only at the brewpub, some that had fruit or spice infusions, used Belgian yeast, or were aged on wood. The Maduro brown ale with vanilla was wonderful, as was the Citrus Wizard, which was Tocobaga aged on Spanish cedar and orange wood, and dry hopped with Motueka—fruity, spicy, peppery, and very interesting.

My attention next turned to Humidor IPA, which is Jai Alai aged on Spanish cedar. It's amazing what this wood can do to a beer. The nose was intense and bright, with strong white grapefruit and white pepper notes that weren't in the base beer. I remember judging a homebrew based on this beer that went on to win a gold medal in the 2010 NHC.

Wayne explained that they've started doing their infusions in something they call the Spinbot 5000, a repurposed Grundy tank that allows them to shoot two streams of beer into a closed vessel with the key ingredient in the center. The streams of beer are shot tangentially in opposite directions, forming a vortex. It's kind of like the Sierra Nevada Hop Torpedo meets an atom smasher. Wayne said they only infuse on the cold side of brewing (using alcohol extraction) and are careful about the ingredients they select.

Wayne got his start as a homebrewer in Alabama, which led to his first job in a local brewpub. At the time, brewpubs had to operate in historic buildings in counties that brewed before Prohibition. He

Spinbot 5000

Photos © Cigar City Brewing Co. and Gordon Strong

moved on to jobs in Tallahassee, Atlanta, and Winston-Salem before getting the opportunity to start out at a new brewery in Tampa in 2009—Cigar City.

Owner Joey Redner explained that Florida brewers tended to make lighter beers for the hot weather, but that he had a vision of making great craft beer regardless of the weather. Wayne and Joey tell a story of planning for the brewpub in 2008 where Wayne was pitching safe or normal ideas, before Joey finally told him "Why don't you do something different?" Joey said Wayne can hold back up to 10 percent of production for "random ideas" that pop into his head—a great vote of confidence from a business owner.

I was intrigued at the concept of random ideas when Wayne said that magic phrase, "Hold on, let me get you something from the back." (Great brewers always have "the back" somewhere—their stash of special stuff.) He brought out 750s of 5 Beers for 5 Years (a margarita gose using Himalayan pink salt, lime, and orange peel), Don Gavino's Big Guava (a blended 10-percent super saison with guava aged in chardonnay barrels), Black Ash (an American black lager aged on black ash wood and using Mt. Rainier hops), Illuminating the

Humidor IPA

RECIPE COURTESY OF CIGAR CITY BREWING
WWW.CIGARCITYBREWING.COM

INGREDIENTS

for 5 U.S. gallons (19 L)

14.0 lb	(6.4 kg) two-row malt
10.0 oz	(284 g) crystal 60° L malt
12.0 oz	(340 g) Munich malt
1.0 oz	(28 g) Victory malt
0.5 oz	(14 g) Motueka hops, 7.5% a.a. (FWH)
0.5 oz	(14 g) Columbus hops, 13.1% a.a. (FWH)
0.33 oz	(9 g) Columbus hops, 13.1% a.a. (60 min)
0.7 oz	(20 g) Cascade hops, 7.2% a.a. (15 min)
0.4 oz	(11 g) Centennial hops, 12.5% a.a. (15 min)
0.33 oz	(9 g) Columbus hops, 13.1% a.a. (15 min)
0.75 oz	(21 g) Cascade hops, 7.2% a.a. (5 min)
0.5 oz	(14 g) Amarillo hops, 10.% a.a. (5 min)
0.75 oz	(21 g) Motueka hops, 7.4% a.a. (5 min)
2.0 oz	(57 g) Simcoe hops, 12% a.a. (dry hop)

1 Spanish cedar spiral (6-8") (dry hop)
Wyeast 1968 London ale yeast

Original Gravity: 1.071, 75% efficiency
Final Gravity: 1.014
ABV: 7.5%
IBU: 73
SRM: 8

DIRECTIONS

Use RO water treated with 2.4 g $CaCl_2$ and 4.8 g $CaSO_4$ per 5 gallons (19 L). Mash at 152° F (67° C) for 60 minutes. Collect 7 gallons (26.5 L). Boil 60 minutes. Final volume will be 6 gallons (23 L). Transfer 5.5 gallons (21 L) to fermenter. Ferment at 66° F (19° C). Transfer 5.25 gallons (20 L) to secondary. Cool to 55 °F (13° C). Add dry hops and Spanish cedar. Wait 3 days. Cool to 35° F (2° C). Total dry hop time: 6-7 days, total cedar contact time: 7-14 days, to taste. Transfer 5 gallons (19 L) to packaging.

PARTIAL EXTRACT VERSION

Substitute 12 lb (5.44 kg) of the two-row pale malt with 9.2 lb (4.17 kg) pale malt extract syrup. Mash 2 lb (0.9 kg) pale two-row with the crystal, Munich and Victory malt at 155° F (68° C) for 60 minutes. Drain, rinse, and dissolve extract completely. Proceed with boil as above.

Path (a pinot noir-aged 9.5-percent beer with berries and hibiscus), and the coveted Hunahpu's Imperial Stout (aged on cacao nibs, ancho and pasilla chiles, with cinnamon and Madagascar vanilla beans). I could tell these were special by the way the bartenders and wait staff were hovering around.

I was impressed with the flavor combinations and artistry. Big Guava and Illuminating the Path had wine-like characteristics (one white, one red). They were definitely beers, but drank like wine. Hunahpu's ingredients blended together like a great Mexican mole sauce. Wayne said he takes inspiration from food, wine, aromatic and flavor combinations, and does blending tests in the lab to determine if combinations work and what ratios to use. I didn't get a peek, but he mentioned using stir plates and graduated cylinders, and working initially in smaller batches.

The barrel aging of their beers was perhaps the best aspect. Using unusual woods and featuring the wood along with other ingredients was well handled. The wood was at a complementary level, not in your face. The aromatic, flavor, and tannin qualities of the wood enhanced the other ingredients, rather than dominated them. Wayne says it's very important to taste the beers frequently as they age so that you get the desired level and don't overdo it.

With GABF medals in each of the last five years (including two for Humidor IPA), I'd say he's got it about right. Wayne was kind enough to share the recipe and method for Humidor IPA, which I've scaled down to homebrew size. Wayne stressed that it's important to use Spanish cedar (*Cedrela odorata*, actually a type of mahogany), not the normal kind from the lumber yard, which has a totally different character and doesn't taste very good in beer. While Wayne has the Spinbot 5000, he said that his beers can be made with static infusions just as easily—they just take longer.

Three-time Ninkasi winner Gordon Strong is president of the Beer Judge Certification Program and author of *Brewing Better Beer*.

By Gary Glass

2014 Big Brew

Hangar 41 Brew Club (Florida)

The Brew Hut (Colorado)

Rat City Homebrew and Sound Home Brew Supply (Seattle)

Photos courtesy of American Homebrewers Association

Where will you be on May 3 when the world homebrewing community gathers at sites across the globe to celebrate National Homebrew Day with the annual AHA Big Brew event? Big Brew is everything we love about the hobby of homebrewing rolled into one: the camaraderie of the homebrewing community, brewing great beer, and of course enjoying some tasty homebrews. Every year on the first Saturday in May, homebrewers gather at sites registered on HomebrewersAssociation.org to brew the same recipes at the same time, and participate in a worldwide toast to our beloved hobby/obsession (at noon Central Time). This year's Big Brew recipes, an American pale ale, an imperial stout, and a schwarzbier, are all 2013 National Homebrew Competition gold medal-winning beers.

Last year's Big Brew had 383 individual events held in 14 countries, resulting in 17,000 gallons of homebrew. With your help, we will top that in 2014.

New AHA Administrative Assistant

The AHA welcomes our newest staffer, Brendan Witt, who serves as our part-time administrative assistant. Brendan has been homebrewing for several years and became an official staff member of the AHA after a four-month internship. Brendan's job is to support the rest of the AHA staff as well as provide administrative assistance to Beer Judge Certification Program exam graders.

National Homebrew Competition Registration

The 2014 National Homebrew Competition first-round judging should be complete by the time this issue starts hitting mailboxes. This year's competition featured several changes, allowing for a large increase in the number of entrants and entries judged. You can find specifics on those changes in the January/February 2014 "From the Glass" column, as well as in the National Homebrew Competition section of HomebrewersAssociation.org.

For this year's competition, we had 3,552 people apply to register for the competition. After two rounds of lottery selection, all but 124 applicants had been given the opportunity to register. Those remaining 124 were given the option to register with one of the three judge centers that had not reached capacity. Ultimately, we ended up with 3,332 applicants for this year's competition, an increase of 52 percent over the 2,187 entrants in the 2013 competition.

Those who judge or steward for this year's competition will be guaranteed their choice of primary judge center for next year's competition. For those unable to judge or steward, but who are willing to do whatever it takes to get into the competition, you can increase the likelihood of getting in by selecting as many alternate judge centers as possible.

Good luck to all of you who have entries in the competition!

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National Homebrewers Conference

The 2014 National Homebrewers Conference in Grand Rapids, Mich. June 12-14 is rapidly approaching. We anticipate that more than 3,000 attendees will take part in the event.

This year's conference will feature 55 different educational seminars, up from 42 last year. Our keynote speakers are Dave Engbers and Mike Stevens of Grand Rapids' nationally renowned Founders Brewing Company. Club Night—in my opinion the best night of beer experienced every year—will feature homebrew clubs from around the country serving up their finest brews from themed booths on Friday night. The conference wraps up with the beer-paired Grand Banquet and National Homebrew Competition awards ceremony.

Grand Rapids has been named Beer City USA multiple times, so attendees traveling to the conference this year are in for an amazing beer experience beyond the official conference events. The conference local committee has arranged a wide array of local beer events to coincide with the conference. It's going to be awesome!

Legislative Update

In late 2013, the California legislature passed AB 1425, a well-intentioned bill that allows home beer and wine makers to donate their beers and wines to non-profit organizations for fundraising events. An unfortunate side effect of the new law is that it makes the longstanding Southern California Homebrewers Festival and similar homebrewer events illegal. Homebrew competitions are still legal and sharing homebrew at club meetings should be covered under allowances for personal use.

The AHA has been working with the California Homebrewers Association, the non-profit organization that hosts the Southern California Homebrewers Fest, on language for a new bill. We are hopeful that new legislation will be passed to ensure that future fests and other homebrewer events like the AHA National Homebrewers Conference can be legally held without excessive hoops to jump through.

We will be sure to notify California AHA members when contacts with state legislators are needed to promote this legislation. The AHA has also lent support to a Kansas effort to pass a bill formally legalizing transport of homebrew for competitions. This is the same bill that died in the legislature last year. To date we have sent out three action alerts to Kansas AHA members and the bill has passed the House and a Senate committee hearing. It now awaits a vote by the Senate.

A bill in the Minnesota legislation aimed at bringing that state's homebrew law more in line with federal law to expressly allow for homebrew events has been attached to an omnibus alcohol bill that is making its way through the legislature.

Other states we are tracking for potential homebrew legislative action include Tennessee and Ohio.

Gary Glass is director of the American Homebrewers Association.


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Carbonation Clarification

Dear *Zymurgy*,
I recently read the "Bottling and Carbonating 101" article in the January/February 2014 *Zymurgy*. I really enjoyed the thoroughness of the article as I have found bottle carbonating to often be a problem for myself. Although I also keg my homebrew, I enjoy bottle carbonation in order to mail my distant family and friends the occasional gift bottle.

There's a part of the article that is confusing to me, and I wanted to ask for clarification. On page 36 under the heading "The Business of Carbonation," the first paragraph mentions, "Once the beer is in the bottling bucket, check the side markings to determine the approximate volume." Hold that thought.

Then in the seventh paragraph of p. 36, the article mentions to "Dissolve the priming sugar into a small volume of boiled water, add it to the boiling vessel, and rack the fermented beer onto it..."

This is where I became confused. Is the article saying to initially place the beer into the bottling bucket (bucket #1) to determine volume, which affects sugar quantity, and then place the dissolved priming sugar/water into another bucket (bucket #2) and then re-rack the beer from bucket #1 onto the sugar in the second bucket? I don't think I'm interpreting this correctly because it seems like too much racking since we are trying to minimize oxygen exposure.

I'm bottling a Lagunitas IPA clone in a few weeks, and really want to get it right. I will be following all the other helpful hints in this very informative article. Please keep up the fantastic work and thank you in advance!

Cheers,

Justin Raaf
Sacramento, Calif.

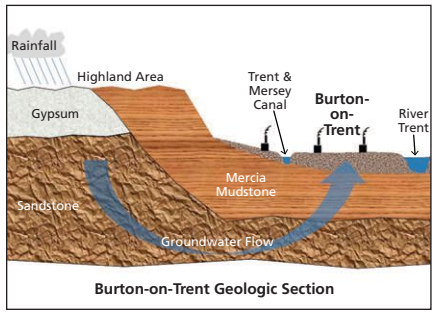
Article author Mark Pasquinelli responds: Glad you liked the article. After re-reading the passage in question, I can understand your confusion. Using a microwave, I boil my water for priming in a Pyrex measuring cup. I then dissolve the sugar in the boiled water. You then can either add the sugar solution to the bottling bucket and rack the finished beer onto it, or add the sugar solution to the finished beer which is already in the bottling bucket. Be sure to stir well with a sanitized spoon (don't use wood). If the beer is already in the bottling bucket, you can ascertain how much finished beer you have using the markings on the bucket and adjust the amount of sugar accordingly using the software. Hope that clarifies things.

As a BTW, there's quick way to fill a bottle or two from a carbonated keg. A bottling cane fits perfectly into the nozzle of a picnic tap. Try to have the kegged, carbonated beer and bottles cold (I put the bottles in the fridge or freezer beforehand). Keeping everything cold keeps the CO_2 in solution. Adjust the CO_2 to a few (2-3) PSI and press your thumb on the picnic tap. The cane will fill with beer, but won't empty until the button touches the bottom of the bottle. You may have to play with the CO_2 pressure a bit to fine-tune the beer flow to your system and it helps to have another person ready to cap the bottle as soon as you fill it. You will lose a little carbonation in the process. What I do is to crank up my carbonation on the keg just a smidge the day before to compensate for the loss.

Brewing Water Series

Dear *Zymurgy*,
I would like to commend *Zymurgy* for a great brewing magazine. I joined the AHA last year and find *Zymurgy* to be an excellent resource on all things brewing. This issue (January/February 2014) is, however, the best issue I've read. I'm especially

impressed with the "Brewing Water Series: Burton upon Trent" article.



Burton-on-Trent Geologic Section

The geology covered along with the historical settings provided insight that would have required weeks of research. Thank you for publishing experts who are also able to communicate in an enjoyable and readable manner.

Cheers!
Bill James

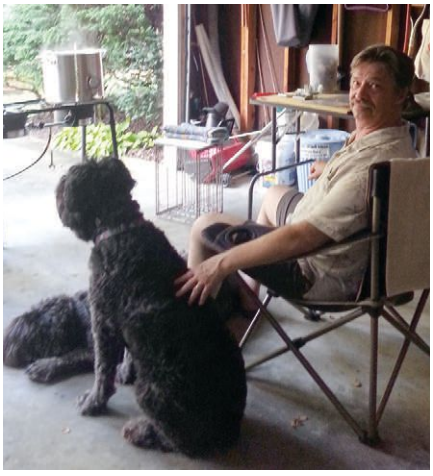
Beer Hijacking

Dear *Zymurgy*,
As a new member of the AHA and an appreciative beer drinker, I just wanted to take a moment to thank you for a great magazine. I especially appreciated Charlie Papazian's article entitled "Beer Hijacking" that appeared in the September/October 2013 issue. It was a well-thought-out piece that provided both a humorous and pointed commentary for the home/craft brewer.


Brewing Supervisor Larry

I would agree that brewing is an emotional process, from the point of purchase of the beer ingredients to the final (hopefully) *wow* of the finished product that may be enjoyed by friends and family. Please keep up the good work.

Peace,
Dennis E. Snider



Brewing Assistants Chimay and Bavik

Brewing Assistants

Dear *Zymurgy*,
I've been loving the continued publishing of brew dogs (and cats) in the magazine, so I wanted to share my own brew dog, Larry. His role is more supervisory than paws on, but we have a lot of fun.

Darrin Ling
Boulder, Colo.

Dear *Zymurgy*,
Here I am with my two brew assistants taking a short break from watching the boil. My Bouvier des Flandres love to hang with me in the garage on brew day, but they have no chance with names like Chimay (at my feet) and Bavik (by my side).

Timothy Carr
Ellicott City, Md.

Send your Dear Zymurgy letters to zymurgy@brewersassociation.org. Letters may be edited for length and/or clarity. Hey homebrewers! If you have a homebrew label that you would like to see in our magazine, send it to zymurgy@brewersassociation.org.

by Professor Surfeit

Nitro and Heavy Metal

Dear Professor,
I was hoping you might be able to diagnose a problem. Back in December I brewed a special bitter. It was a straightforward recipe. Fermentation started quickly and was active within seven hours. The fermentation was kept between 62 and 64° F. I left it on the yeast for 13 days and racked to secondary for about three weeks. Every time I tasted it, I was very pleased with the color and balance.

I've been told I'm hyper-critical of my beers, and that's probably true. Here's where things get tricky. I kegged it and put it on my new-ish nitro [nitrogen gas] setup. It was the second beer on nitro after a successful stout that, although a bit over-carbed, was damn tasty. I decided to carbonate entirely on the beer gas this time (75 percent N_2 and 25 percent CO_2). I let it sit for a few weeks at 50° F. When I poured, it looked perfect, crystal clear, and with a perfectly creamy nitro head.

Then I tasted it. Initially it was fine, but the aftertaste was all metal. It tasted metallic like the way pineapple juice from a can tastes. I've searched all over the net and can't find proof-positive of what the cause may be. I'm still drinking the bitter, but I want to avoid the metallic taste in the future.

Carlos Ojeda
Colorado

Hi Carlos,
Usually we run into each other at the carousel; that's the United Airlines baggage carousel in Denver. We've got to have a beer together one of these go-arounds. To your question, my answer is: Yep! That's how my taste buds react and how I describe what nitro gas does to a beer—metallic. You and I must have the same sensitivity and perception. Solution? You could release all the pressure, let the beer go flat, and recarbonate with only CO_2. I also note that nitrogen flavor seems to work better with stouts that have roast malt

character; the roast malt and barley character helps create a better balance.

Letting it all out,
The Professor, Hb.D.

More on Gluten & Beer

Dear Professor,
I can offer some information regarding Tim Campbell's inquiry ("A Celiac in Denial," Dear Professor, January/February 2014) about gluten in beer. The bottom line is that there is a small amount of gluten (actually protein fragments of a type associated with the auto-immune reaction in celiac disease) in barley beer. A relevant citation is: M. L. Colgrave, et al. "What is in Beer?" *J. Proteome Res.,* 2012, 11, 386-396. Because there is no known level of gluten that is safe for a person with celiac disease, barley beer can't be regarded as safe.

That said, celiac is notoriously difficult to diagnose. Tim's speculation that many people who are warned not to drink beer could do so without aggravating their condition is likely valid. On the other hand, celiac disease can be life-threatening. A person with a bad case of celiac would be crazy to drink beer. A person with a mild case might feel a little more leeway to use himself or herself as a human lab animal to explore the limits.

Roger Barth
West Chester, Pa.
Author of *The Chemistry of Beer: The Science in the Suds*

Dear Roger,
Thanks for more clarification on proteins in beer. It's not an easy scientific answer because nobody knows exactly how to discriminate between what's acceptable and what's not.

Celebrate the beer you can drink,
The Professor, Hb.D.

Feeling the Chill Again

Dear Professor,
It took a little thinking and experimenting, but I figured out my poor-performing plate chiller ("Not Feeling the Chill," Dear Professor, May/June 2012). I have the type of plate chiller that has the wort-in connection and wort-out connection at different elevations, especially the way I have it mounted on my top tier.

When the chiller was under-performing, I was using the upper connection for the hot wort in and the lower for the cooled wort out. This was because I was gravity-draining the brew kettle. After thinking a bit about it, I decided to switch the inlet and outlet. I made the hot wort-in connection the lower of the two and went upflow through the chiller, thinking the wort side of the chiller would be more completely flooded, thus maximizing surface area for heat transfer. This immediately made a significant difference in lowering my wort-out temperature.

After a few trial runs with hot water, I noticed that the wort flow seemed to be slowing to a trickle. The dreaded airlock was coming into play. I did not have enough head pressure to clear all of the air out between all of the plates. Now the only solution was installing an inlet pump to ensure all the air gets pushed out of the chiller and that's what I did. So going upflow through the chiller on the wort side

with the help of a pump and counterflow with the cooling water proved that I did not have a lemon on my hands. I'm certainly feeling the chill now.

Thomas Bosak

Hey Thomas,
Glad you were able to figure it out. I'll bet a little of your homebrew helped a lot in solving your chilling tale. Thanks for sharing your insight. By the way, another reader, Ian Tenner from Scotland, shared his thoughts: "Trapped air inside the exchanger on hot or cold side would reduce the area available for heat transfer. Most designs should account for this by having the inlets low and the outlets at the highest point, but not always. Maybe check with Tom if there could be trapped air, and if so, move the exchanger around a bit to get it cleared?"

Chillaxing,
The Professor, Hb.D.

Being in Control

Dear Professor,
I finally found the time to obtain a great second refrigerator for fermenting at a controlled temperature. I also just received the temperature controller. At what setting should I put my refrigerator when I plug all this together?

Thanks for the help,
Bill

Dear Bill,
Set your fridge down to the lowest temperature you'll ever expect to want it. Set the thermostat to anything above that.

Wishing life was this easy,
The Professor, Hb.D.

Hey homebrewers! If you have a brewing-related question for Professor Surfeit, e-mail professor@brewersassociation.org.

By Amahl Turczyn Scheppach

Heather Ale

Though ales and meads brewed with heath or heather were commonly associated with the Picts and areas now known as Scotland, Stephen Buhner writes in *Sacred Herbal and Healing Beers* that in fact they were brewed for thousands of years, "throughout Europe, the Scandinavian countries, and all of the United Kingdom."[1] Primarily used in alcoholic beverages for their preservative effects in times predating the use of hops, boiled heather flowers were also said to lend a dry bitterness to counter the sweetness of malt or honey fermentations, a heady floral aroma when added late in the boil or after fermentation, as well as certain other "remarkable properties" that may have enhanced intoxication.

The fact that the plant was so plentiful and available across the UK and other parts of Europe certainly helped, as did the fact that honey made from heather was much prized as a food source and for fermentation. But perhaps most intriguing was the powdery white substance that tended to collect on the heather plant. Buhner writes that the harvesters of heather in Scotland referred to this powder as "fogg," and says it was a moss with its own apparently inebriating effects. English brewing chemist Keith Thomas found that "the white powder possessed narcotic and mildly hallucinogenic properties," but also a wild yeast that may have been a serendipitous yet necessary ingredient in brewing the ancient beverage. Pictish brewers and brewsters would have had a large part of their work done for them: barley malt or heather honey for fermentables; heather for bitterness, aromatics, and preservation; fogg for stimulating fermentation and that little extra *je ne sais quoi*; and of course, water.

Photos © Thinkstock

Bruce Williams, who brews his own commercial version of heather ale called Fraoch, and who deserves credit for reviving what may have otherwise been a lost historical style, makes sure the large quantity of Scottish heather blossoms used in his product are thoroughly washed before use (presumably to ensure batch consistency). Williams began as a homebrewer, and generously shared his recipe for Fraoch, which was published in *Zymurgy* Vol. 17, No. 4, Special 1994. It uses prodigious quantities of fresh heather tips, which is great if you live where heather grows; but traditional heather tends to prefer acidic soil, which means folks west of the Mississippi might have trouble growing or finding it.

While Buhner doesn't mention it, there's a good chance the presence of "fogg" is region-specific. Two species of heather, including bell or Scotch heather (Erica cinera) and ling or broom heather (Erica vulgaris) are preferred for brewing, though others may also work. Cornish heather (Erica vagans) and cross-leaved heather (Erica tetralix) grow throughout the UK, Europe, and parts of the United States, and may also be suitable for use in brewing.

Ling heather has adapted to the United States climate, but grows best in New England. Fortunately, other related plants like mountain heather (Cassiope mertensiana), cream mountain heather (Phyllodoce glandulifera), starry cassiope (Cassiope sterreriana), and brewer mountain heather (Phyllodoce breweri), all members of the heath or Ericaceae family, can be found in the Western United States. They have not been proven performers in the brew kettle, however, though one can assume "brewer mountain heather" must have seen some historical use as a brewing ingredient. Buhner suggests picking the top two or three inches of the fresh flower stalks when they bloom (July to October in the States) and using them within 36 hours to preserve their delicate aromatics.

Many homebrew shops carry or can order dried heather tips. Those who go this route may not be able to tell how long the dried heather has been sitting on a shelf, but at least one can be reasonably sure the correct species was harvested. For these folks, I've included a version of heather ale with honey to bolster late aromatics, since there probably won't be a huge floral contribution from the dried heather. (What is heather honey, after all? Concentrated heather flower nectar!) If you can find heather honey—Mellis, Straun, and Tiptree apiaries in Scotland all produce jarred versions available online—this would certainly be a great use for it. The honey should be added after flameout and just before wort cooling, so that as much of the volatile aromatics can be preserved in the beer as possible.

Williams' recipe calls for a late infusion of heather tips, in which the hot wort is run over the fresh flowers, as one would do with a hop-back. This may not achieve much with dried heather tips, but would certainly extract aromatic volatiles with fresh heather. There is also a post-fermentation addition in the Fraoch recipe that is sort of a hybrid dry-hopping: half

Fraoch Heather Ale

[EDITOR'S NOTE: THIS RECIPE, BY BRUCE WILLIAMS, ORIGINALLY APPEARED IN THE 1994 SPECIAL ISSUE OF *ZYMURGY*.]

INGREDIENTS

for 5 U.S. gallons (19 L)

6.66 lb	(3 kg) Scottish pale ale malt
10.5 oz	(298 g) 40° L crystal malt
12 cups	lightly pressed fresh flowering heather tips
Irish moss	(10 min)
1.8 oz	(51 g) 6% a.a. hops (90 min) optional
Lager-type yeast	

Original Gravity: 1.048
Final Gravity: 1.011
ABV: 4.9%
pH: 4.1
SRM: 9 (23 EBC)
IBU: 21

DIRECTIONS

Mash at 153° F (67° C) for 90 minutes. Sparge as usual. Add about 8 cups (2/3 of total) of lightly pressed heather tips and boil vigorously for 90 minutes.

Run hot wort through a sieve filled with 2 cups (1/6 of total) of heather tips into the fermenting vessel. Allow to cool and ferment at 61° F (16° C) for seven to 10 days. A lager-type yeast is suggested. The original yeast for Fraoch Ale was a Scotch ale yeast, but after years of cold slow fermentation it has evolved into a strain with a bottom-fermenting bias. When the gravity reaches 1.015, usually the fifth day, remove ½ gallon of ale, add 2 cups (1/6 of total) of heather flowers and warm to 158° F (70° C), steep for 15 minutes, then return to the fermenter.

Condition the ale as usual. For those needing a hop fix, add 1.8 oz (51g) of 6% alpha acid hops for the 90-minute boil to provide bitterness that will not unbalance the flavors. Late addition aroma hops would compete with the delicate heather.

a gallon of fermented ale is removed, heated to 158° F (70° C), steeped with two cups (about two ounces) heather tips, strained, and then returned to the fermenter. The heating process is apparently in place to discourage wort-souring yeast and bacteria on the heather. Brewers who have tried "dry-heathering" their heather ale without this intermediary semi-pasteurization stage have found that it tends to render the whole batch rather tart. So again, if you have access to fresh heather tips, it's certainly worth trying this to maximize aromatics. If you are working with dried tips, a late addition of heather honey or some other floral, aromatic (and hopefully raw, local) honey is probably a better idea.

As for the other ingredients, the recipe is fairly simple, as the focus really is on heather. Heather ale should be a delicate drink though, so the supporting cast should be light enough to let the star ingredient shine through. A grain bill of pale ale and crystal malt provides a nice backdrop with enough heft and sweetness to both complement floral aromatics and

counter the gentle bitterness of the early heather addition (or hops, if used). The modest honey addition increases alcohol and dries the finish, as well as provides additional floral aroma. The caramel malt allows some residual dextrin and sweetness to prevent the beer from becoming too dry, and adds a bit of light amber color as well. The base two row malt should ideally be Scottish in origin—Golden Promise is a great choice—but Maris Otter can be used as an alternative. Domestic two row pale malt can also be used, but a small addition (2 ounces) of biscuit malt will round out the flavor depth. Mash these grains for medium body: a one-hour rest at 153° F (67° C) should be sufficient.

Hops are strictly optional here, but many brewers have understandably come to rely on their antibacterial properties and may feel more comfortable with a modest kettle addition. Heather has some of the same keeping properties, but if you don't want to place too much faith in an unknown ingredient, one ounce of an unobtrusive UK variety like Golding at 60 minutes from the end of the boil won't interfere with the heather expression too much.

Another optional ingredient is bog myrtle, also known as Myrica gale or sweet gale, a resinous flowering plant commonly used in gruit. It is also reported to add certain intoxicating effects in alcoholic beverages, and while the original Fraoch recipe from Williams that appeared in *Zymurgy* did not list it as an ingredient, it does crop up in later versions as a late boil addition. Personally, I prefer to save sweet gale for gruit, and let heather ale celebrate heather, but if you do decide to add it, go easy. Two to six grams (not ounces!) is sufficient for five gallons of beer, boiled with the wort for about 30 minutes. There are plenty of historical accounts of this ancient herb having powerful effects and then leaving the imbiber with a powerful headache, so err on the light side. It also is available from homebrew shops.

Water should be fairly soft, as you would use for any Scottish light ale; no hop sharpness is desired here, so if you want to add calcium to distilled or reverse-osmosis water, go with a moderate addition of calcium chloride. Two grams per five gallons will give you roughly 30 ppm calcium and 50 ppm chloride. This will bring out maltiness and provide a full-flavored grain complement to the late honey addition.

Scottish ale yeast is obviously a great choice for heather ale, but from Williams' notes, lager yeast would certainly be fine as well. A gentle, cool, or even cold fermentation will minimize yeast-derived esters and phenols and emphasize clean smoothness. So with a Scottish or Edinburgh ale strain, this means a fairly large pitching rate for ales, a low pitching temperature (64° F or 18° C), and a fermentation temperature closer to 62° F (17° C). I like the subtle smoke note that the Scottish ale strains can develop, so I favor those yeasts over the admittedly "cleaner" lager yeasts, but if I were to use the latter, a Munich strain or the Ayinger house yeast would be my choice for this beer.

Hand Pict Heather Ale

(SLIGHTLY UPDATED FROM AMAHL TURCZYN SCHEPPACH'S RECIPE IN *ZYMURGY* VOL. 22, NO. 2, MARCH/APRIL 1999, P. 24.)

INGREDIENTS

for 5 U.S. gallons (19 L)

6.5 lb	(2.95 kg) Scottish pale malt or 6.4 lb (2.9 kg) domestic pale malt plus 2.0 oz (57 g) biscuit malt
8.0 oz	(227 g) 20° L crystal malt
1.0 oz	(28 g) Golding pellets, 5% a.a., 60 min (optional)
3 cups	(about 3 oz/85 g) dried heather tips, 60 min
4 g	sweet gale, 30 min (optional)
1.0 lb	(0.45 kg) heather honey, knockout
1 cup	(about 1 oz/28 g) dried heather tips, knockout
Edinburgh or Scottish ale yeast, 4L starter or 200 mL fresh slurry (400 B cells)	

Original Gravity: 1.047
Finishing Gravity: 1.008
Brewhouse Efficiency: 75%
IBUs: 0-28
SRM: 5
ABV: 5.1%
Boil Time: 60 minutes

DIRECTIONS

Maris Otter pale malt may be used instead of Scottish pale malt. Mash grains at 153° F (67° C) for one hour. Sweet gale will provide a certain bitterness along with the 60 minute heather tips, so it's best to use either sweet gale or hops, not both. Sparge, run into kettle, and add first charge of heather tips and hops, if using. After 30 minutes, add sweet gale, if using. After 60 minutes, shut off the heat. Just before chilling, add honey and last charge of heather tips and stir well. A hop screen is effective here to prevent heather tips from obstructing the runoff. Chill to 64° F (18° C) and pitch 4L ale yeast starter. After fermentation starts, ferment for one to two weeks at 62° F (17° C). Heather aromatics will take some time to appear, but should begin to come across strongly after the second week of maturation. This recipe is designed for use with dried heather tips, but fresh flowers can and should be used if available (or follow the Fraoch ale recipe).

EXTRACT VERSION

Substitute 6.5 lb (2.95 kg) pale malt extract syrup for pale malt. Steep crystal malt in 158° F (70° C) water for 30 minutes, strain, dissolve extract completely and proceed with boil. Expect a slightly higher finishing gravity (1.010) with the extract recipe.

Amahl Turczyn Scheppach is the associate editor for *Zymurgy*.

Resources

1. Buhner, Stephen. *Sacred Herbal and Healing Beers*, Brewers Publications, 1998, pp. 25-35.
2. "The Scoop on Scots," *Zymurgy* Vol. 22, No. 2, March/April 1999, p. 24.
3. "Leann Fraoch Scottish Heather Ale," *Zymurgy* Vol. 17, No. 4, Special 1994.


sour
mash

PRODUCING WORT FOR MIXED FERMENTATIONS

BY MICHAEL TONSMEIRE

Many delicious sour and funky beers can be produced simply by diverting wort designed for a clean fermentation and pitching additional microbes (*Lactobacillus*, *Pediococcus*, and/or *Brettanomyces*). While saison is a classic choice, sour beers can be based on any style that is not exceedingly hoppy, dark, or strong. An earthy Kölsch fermented with *Brettanomyces*? How about a tart English brown with *Lactobacillus*?

While these options are appealing, this article will focus on the ways brewers can tailor their mash to produce wort ideally suited for mixed fermentation. In many cases, wild yeast and bacteria react differently to wort than brewer's yeast. *Brettanomyces* has the ability to create potent flavors from compounds that would otherwise go unnoticed. *Pediococcus* can ferment "unfermentables." A noticeable difference in mash pH may account for only one percent of the total acidity after *Lactobacillus* is finished.

CARBOHYDRATE PROFILE

The primary purpose of the mash is to allow the base malt's enzymes to break down the long chains of glucose molecules (i.e., starches) contributed by both the malt and other grains into fermentable sugars and unfermentable dextrins. Brewer's yeast is able to ferment chains of three or fewer glucose molecules (i.e., glucose, maltose, and maltotriose). Other fermentable sugars are present in the wort as well, but these glucose chains account for 95 percent or more of the fermentables in an all-malt beer. Chains of glucose molecules longer than three are called dextrins. In clean beers, dextrins can provide substance to the mouthfeel and some residual sweetness.

When it comes to sour beers, however, dextrins are no longer considered unfermentable. One of the enzymes (alpha-glucosidase) produced by most strains of *Brettanomyces* and some *Lactobacillus* is effective on dextrins up to nine glucose molecules long (aka oligosaccharides). Some species of *Pediococcus* are capable of breaking down starches with no help from enzymes in the mash. You can create a wort containing carbohydrates that are reserved for the microbes that flourish following the brewer's yeast. This can be accomplished either with a hot saccharification rest (158-160° F [70-71° C]), a complex step mash, or by adding maltodextrin or starch directly to the wort.

In my experience, the greater the amount of available carbohydrates after the brewer's yeast fermentation is complete, the more acidity that can be produced by the lactic acid bacteria (*Lactobacillus* and *Pediococcus*). However, *Brettanomyces*' production of flavorful esters and phenols does not require vast stores of carbohydrates. Therefore, if you are not adding lactic acid bacteria, there is no reason to go out of your way to create a dextrinous wort.

Adding flaked or torrefied grains to an infusion mash does not have a large impact on the carbohydrate profile of the wort. So it does not matter if you add corn/rice (which some brewers mistakenly believe leads to a drier beer), or oats/rye (which are said to contribute unfermentables). This is because the enzymes act on the starches from the unmalted grain in the same way as the starches from the malt itself.

If you want starch in the wort, but adding refined starch seems like cheating, you have a few options. The classic turbid

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mash calls for extracting a portion of the starchy wort at several points, and heating it to deactivate the amylase enzymes before adding it back to the mash to reach mashout. For a simpler version, pull a few cups of starchy wort immediately after doughing in, heat it close to a boil to denature the enzymes, and add it to the boil. Some brewers add huskless grains (e.g., wheat, oats) directly to the boil to extract some of their starches into the wort. I generally do not find any of these methods necessary, but they are worth considering if you are producing both a clean and a sour beer from a single mash.

BETA-GLUCANS AND PROTEINS

One of the effects of fermenting with these omnivorous microbes is the thin mouthfeel of most sour beers. In addition to dextrins, a source of body for many clean beers is the glycerol produced by brewer's yeast. Since few strains of *Brettanomyces* produce glycerol, the more of a beer it ferments, the thinner the beer will be. While a crisp body may not be a problem if your goal is a light and refreshing Berliner weisse, it can cause a rich, high alcohol sour beer to be lacking.

One solution is to add flaked or torrefied grain that is high in protein and beta glucans to the mash. More study is needed to definitively say that beta glucans (a form of soluble fiber) are responsible for the silky body contributed by oats, and especially rye. The proteins deserve some of the credit, and as an added benefit they improve head retention. Whatever the reason, adding 10 to 20 percent unmalted oats, rye, barley, or wheat to the mash provides a fuller mouthfeel that is retained even after the long souring process.

ACIDS AND ESTERS

Brettanomyces possesses the ability to both create and destroy esters. These are the fruity aromatic molecules composed of an acid attached to an alcohol. The human nose has evolved to detect many esters at low concentrations, so even a small change in wort composition can result in a large alteration in the finished beer.

For beers fermented with *Brettanomyces*, but no lactic acid bacteria, I add a small amount of acidulated malt. This provides

DARK WINTER SAISON IV

THE FOURTH IN A SERIES OF BEERS (SIX SO FAR) BREWED WITH MY FRIEND ALEX HOWE TO CELEBRATE DRIED FRUIT AND COLD WEATHER. A DARK SAISON, WITH FLAVORS INSPIRED BY RUSSIAN RIVER'S CONSECRATION. AGED ON ZANTE CURRANTS AND A WINE-SOAKED OAK STAVE, IT BECOMES RICH AND VINOUS.

INGREDIENTS

for 5 U.S. gallons (19 L)

12.0 lb (5.44 kg) Vienna malt
4.0 oz (113 g) Special B malt
4.0 oz (113 g) American chocolate malt
4.0 oz (113 g) Carafa Special II malt
4.0 oz (113 g) roasted barley (cold extraction – see directions)
0.5 oz (14 g) Warrior pellets 11% a.a. (75 min) 22 IBUs
25.0 oz (907 g) dried Zante currants
White Labs WLP670 American Farmhouse Blend

Brewhouse Efficiency: 73%
Target Original Gravity: 1.067 (before currants)
Approximate Final Gravity: 1.005
Approximate Color: 29 SRM
IBUs: 22
Boil: 90 minutes
ABV: 8.2%

DIRECTIONS

Steep the milled roasted barley in 1 quart (0.95 L) cold water overnight. Filter through a sieve lined with a coffee filter. Mash at 159° F (71° C) for 60 minutes. Add the roasted barley extract to the wort at the start of the boil.

Chill to 68° F (20° C), transfer to a fermenter and pitch White Labs 670 yeast. If this blend is not available, pitch a Belgian saison strain (White Labs 565 or Wyeast 3724) along with Brettanomyces bruxellensis (Wyeast 5112 or White Labs 650). Hold fermentation close to 75° F (24° C).

After the initial wave of fermentation is complete, transfer to secondary with 1 oz (28 g) red wine-soaked oak cubes and 25 oz (907 g) dried Zante currants. Store beer between 60° F and 80° F (16° C and 27° C) until the gravity is stable from one month to the next (a minimum of six months). Bottle or keg and carbonate to 2.4 volumes of CO_2.

EXTRACT VERSION

Omit Vienna malt and substitute with 8.75 lb (3.97 kg) pale malt extract. Steep Special B, chocolate, and Carafa malts in 160° F (71° C) water for 30 minutes. Drain, rinse, dissolve extract completely and proceed with the recipe, making sure to include the cold-steeped roast barley.

CHOOSE YOUR OWN FUNK-VENTURE

THIS RECIPE HIGHLIGHTS THE CHOICES FACED WHEN BREWING A SOUR BEER.

INGREDIENTS

for 5 U.S. gallons (19 L)

8.0 oz (227 g) acidulated malt (for beers w/o bacteria) - optional
7.75 lb (3.52 kg) Pilsner malt (8.25 lb [3.74 kg] if not using acid malt)

1.5 lb (680 g) flaked wheat (to enhance head retention)

OR

1.5 lb (680 g) flaked buckwheat (to enhance fruity esters)

OR

1.5 lb (680 g) flaked rye (to enhance body)

0.5 oz (14 g) Hallertau pellets 5% a.a. (60 min.) 10 IBU

Target Original Gravity: 1.050
Approximate Final Gravity: 1.000-1.006
Approximate Color: 3 SRM
IBUs: 10
Boil: 90 minutes
ABV: 5.8-6.6%

DIRECTIONS

Optional: Mash grains at 113° F (45° C) for 20 minutes (to increase funkiness).

148° F (64° C) for 60 minutes (for beers w/o bacteria)

OR

158° F (70° C) for 60 minutes (for beers with bacteria)

Chill to 68° F (20° C), transfer to a fermenter and pitch:

English Ale Yeast (fruitier finished beer)

OR

Belgian Ale Yeast (funkier finished beer)

AND

Souring blend of your choice (e.g., Wyeast Lambic Blend or Roeselare Blend, White Labs Belgian Sour Mix #1 or Flemish Ale Blend)

OR

Brettanomyces strain(s) of your choice (e.g., Wyeast ***B. claussenii***, ***B. bruxellensis***, or ***B. lambicus***; White Labs ***B. claussenii***, ***B. bruxellensis***, or ***B. lambicus***)

OR

Bottle dregs (sediment) from your favorite unpasteurized sour or funky beer (optional)

Ferment at 65-70° F (18-21° C) for three weeks.

Leave in primary (funkier flavor profile).

OR

Rack to secondary (cleaner flavor profile).

Add 1.0 oz (28 g) oak (cubes, chips, spirals, etc.) - optional

Store beer at 60-80° F (16-27° C) until the gravity is stable from one month to the next (approximately 4-12 months). Bottle with enough priming sugar to achieve 2.7 volumes of CO_2, or keg and force carbonate.

lactic acid, one of the building blocks of fruity ethyl lactate (ethyl refers to ethanol, of which there will be plenty). A slightly lower wort pH also helps to make these beers taste crisper, and increases the speed of *Brettanomyces'* fermentation. With 10 percent or more acid malt (I have gone as high as 20 percent), you can either wait to add it to the mash until after starch conversion is complete for the rest of the grain bill, or mix it in at the start to disrupt conversion. Lowering the pH outside the normal mash range will increase the percentage of long-chain carbohydrates in the wort.

One of the amazing things about ester production is that some fatty acids with unpleasant flavors can be transformed into an enticing ester. For example, capric acid (capr- derives from goat) found in buckwheat can be transformed into coconut- and pineapple-scented ethyl caprate during fermentation.[1] Butyric acid from an aerobic sour mash, perceived as somewhere between Parmesan cheese and rancid butter, becomes guava-tastic ethylbutyrate.[2] There is no guarantee that the *Brettanomyces* will convert all of a fatty acid into esters, so if you intentionally add or create these off-putting fatty acids, you may not like the result. However, it should give you hope if you taste an unpleasant flavor partway through a mixed fermentation.

PHENOLS

While esters account for many of the more enticing aromatics found in sour beers, phenols bring the funk. I think of these sour beer complexities in the same way exotic flavors and aromas are layered in cooking. A dash of fish sauce or dried shrimp adds depth and soul to Pad Thai, but most people would not enjoy either of these pungent ingredients straight. Phenols, specifically 4-ethylguaiacol (4-EG) and 4-ethylphenol (4-EP), are responsible for the farmyard, barnyard, mousy, smoky, horse blanket aroma that people often describe in beers fermented with *Brettanomyces*. Other phenols are responsible for the clove (4-vinylguaiacol [4-VG]) in German wheat beers, the peppery/spicy aromatics in Belgian ales, and the smoke in rauchbier.

> "WHILE ESTERS ACCOUNT FOR MANY OF THE MORE ENTICING AROMATICS FOUND IN SOUR BEERS, PHENOLS BRING THE FUNK."

If the funkier aromatics of sour beers are appealing to you, maximize the phenolic precursors extracted from the mash. To enhance the clove aromatic in a hefeweizen, for example, a ferulic acid rest can be performed to start the mash. Holding the mash near 113° F (45° C) frees ferulic acid from the grain, which yeast strains that are referred to as phenol off-flavor positive (originally POF+) convert into 4-VG.[3] *Brettanomyces* will take 4-VG and further transform it into funky 4-EG. So if you want a more aggressive funkiness in your sour beer, add a low-temperature rest; if not, minimize phenolic precursors by starting your mash with the saccharification rest.

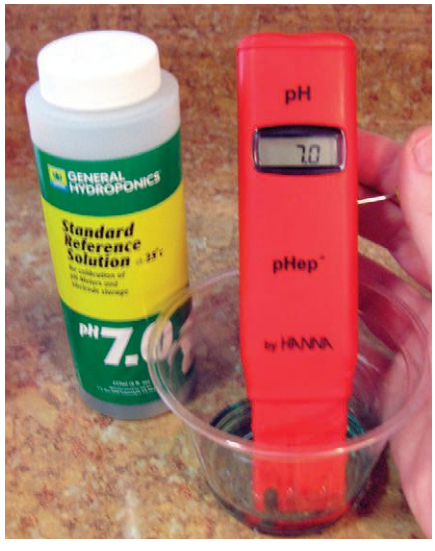
Another place to pay attention if your goal is a mellower funk is the sparge. Sparging with too much water, water that is hotter than 170° F (77° C), or water that has a high pH will extract more phenols and polyphenols.

The missing phenol production of brewer's yeast is also one reason why 100 percent *Brettanomyces*-fermented beers tend to be less funky than many people expect. Despite exclusive access to all of the carbohydrates in the wort, *Brettanomyces* does not do as effective a job converting ferulic acid to 4-VG as POF+ brewer's yeast strains. So if you want a funkier beer, select a spicy brewer's yeast strain—the *Brettanomyces* will handle it from there.

CONTROLLING PH

An oft-repeated reassurance to beginning brewers is that no matter how terrible a homebrew tastes, pathogenic bacteria will not be present. However, when it comes to spontaneous fermentation (i.e., one in which no microbes are pitched), this is not necessarily the case. Do not assume that the high hopping rate of a traditional lambic recipe will protect you; while hop compounds inhibit *Lactobacillus* they do not prevent the growth of many other microbes. As a result, for the first few weeks of a spontaneous fermentation, there is a chance that pathogenic enteric bacteria like *Escherichia coli* can inhabit the beer. As soon as the pH drops and alcohol is produced, most of the danger is over. However, a small percentage of people have an allergic reaction to biogenic amines that remain even after the bacteria are dead!

If growing a big vat of *E. coli* seems undesirable, lower the pH of the wort below 4.5 pre-inoculation to prevent enteric bacteria from reproducing. This can be accomplished before the boil by adding about 10 percent acid malt to the grain bill, slightly souring the mash/wort with *Lactobacillus*, or dosing the wort with food-grade lactic acid. Ideally you would use a pH meter, but high quality pH strips can be used. As an added benefit, the lower pH inhibits proteolytic enzymes produced by *Lactobacillus* from reducing head retention.



Corn, rice, and wheat lower the pH buffering capacity of the wort. So while they do not technically lower the pH of the wort themselves, they make it easier for the fermentation to lower it. However, as the pH scale is logarithmic, the buffering capacity of the wort does not have a large

effect on the final pH and perceived acidity of a sour beer. The difference between the acidity of a beer at pH 3.4 and one at 3.5 is 100 times greater than the difference between worts at 5.4 and 5.5.

WATER CHEMISTRY

Treat your liquor as you would for any other moderately-hopped beer with a similar grain bill. As always, chlorine-free water is essential, especially with the high production of phenols (which combine to form medicinal-tasting chlorophenols).

While I have frequently read that magnesium enhances acidity, it is not an ion that I have found necessary to boost. You could experiment by dosing your finished beer with various salts to determine what difference they make to your palate. It is not worth copying the water of a specific region unless you understand how the breweries there treat their water.

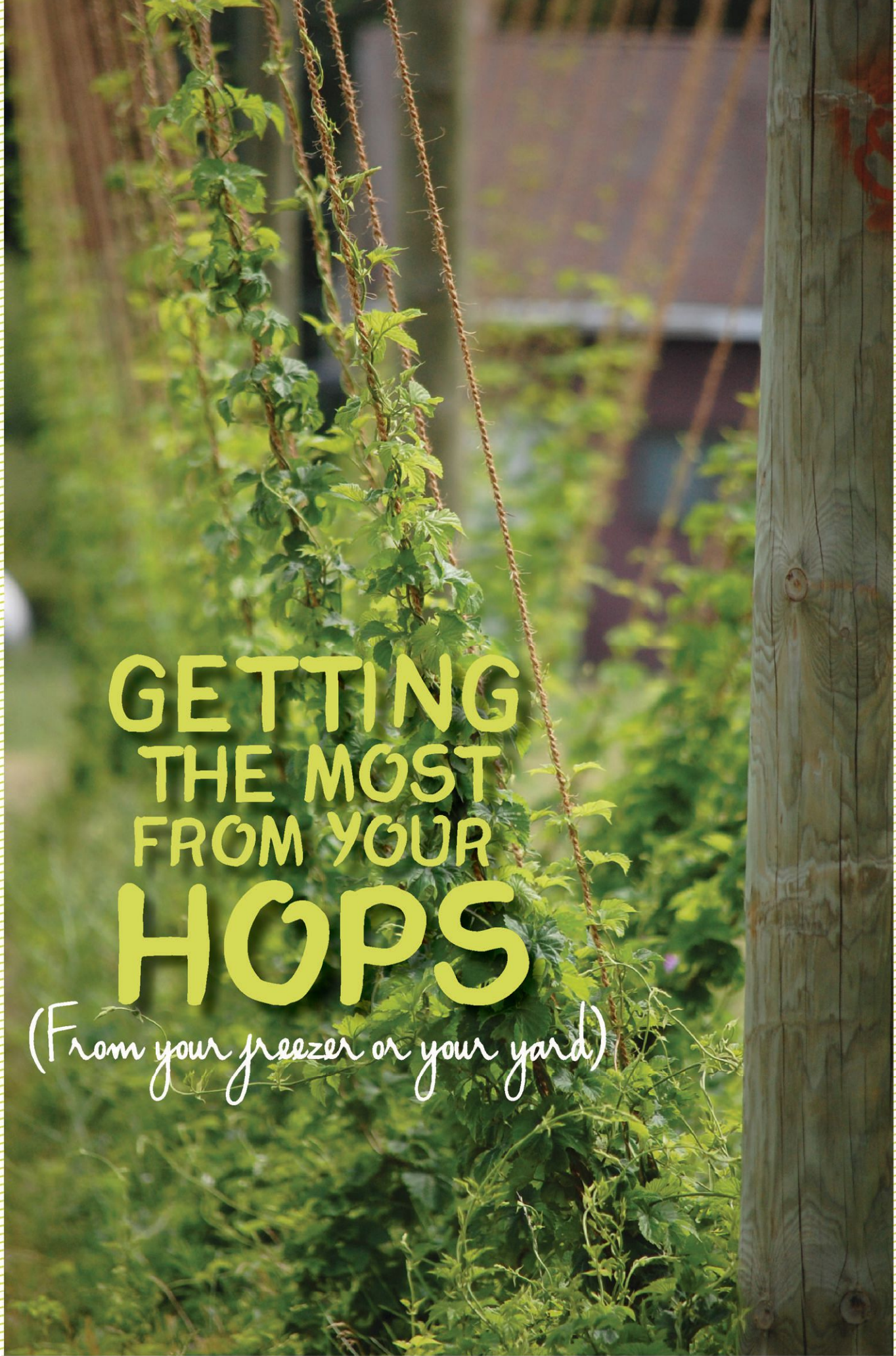
CONCLUSION

Plenty of wonderful sour beers are produced from unremarkable worts, but a bit more knowledge will allow you to adjust your process based on your desired result. Brewing sour beers is identical to any other beer style in many ways, but the adjustments made for clean beers may have a completely unintended side effect on beers fermented with a variety pack of microbes.

Michael Tonsmeire is the author of the upcoming book *American Sour Beers: Innovative Techniques for Mixed Fermentations* from Brewers Publications. He blogs at themadfermentationist.com.

REFERENCES

1. Phiarais, Blaise P Nic., et al. "Processing of a Top Fermented Beer Brewed from 100% Buckwheat Malt with Sensory and Analytical Characterisation." J. Inst. Brew. 116(3), 265–274, 2010.
2. Sparrow, Jeff. *Wild Brews: Beer Beyond the Influence of Brewer's Yeast.* Brewers Publications, 2005.
3. Coghe, Stefan, et al. "Ferulic Acid Release and 4-Vinylguaiacol Formation during Brewing and Fermentation," *J. Agric. Food Chem.*, 52 (3), 602–608, 2004.



GETTING THE MOST FROM YOUR HOPS

(From your freezer or your yard)

Photos © Jess Clifton and Stacy Lein

By Stan Hieronymus

Here's the condensed version of a story you've likely heard before. After the price of hops spiked in 2007 and 2008, scores, perhaps hundreds, of farmers and would-be farmers across the country invested in growing what they viewed as a lucrative commodity. Two years later, most of them were ex-hop farmers.

Randy Flores was one of those. He started a farm in western Colorado in 2008 but gave it up two years later. Now he buys hops and sells them to small breweries. People were "romanced" into growing hops, Flores told the Associated Press in January, and "it's a hell of a lot of work for just a little bit of money."

That's not necessarily a problem for homebrewers.

Growing hops has never been quite as easy as it might look, and it hasn't suddenly gotten easier. Nonetheless, home growers may benefit from the same knowledge being made available to a second wave of new hop farmers—those motivated by demand for local hops rather than the unsustainable prices of the short-lived hop shortage.

Home growers can also better set their expectations based on regional comparisons than trying to duplicate hops from the American Northwest. About 75 farms in the Northwest produce 31 percent of the hops in the world. Hop yards elsewhere simply don't operate on the same scale or even necessarily speak the same language. "We're still talking about pounds per plant wet weight," said Jeanine Davis at North Carolina State University. Hop growers around the rest of the world talk about pounds (dried) or "alpha" per acre (or hectare).

The North Carolina Hops Project is one of several similar programs supported by state universities and extension services. Davis estimates 100 farmers in North Carolina are growing hops. "We're going to start losing some," she said. "It's going to be a labor of love." Interest is equally high in the Northeast, New York, the upper Midwest, and Colorado.

The emphasis craft brewers have put on hop aroma and flavor, as opposed to the arms race for higher alpha, also benefits homebrewers. "This love craft brewers have for hops refocuses attention on the plant," Alex Barth of the Barth-Haas Group, the world's largest supplier, explained not long ago. Commercial brewers today can choose from more than 100 hop varieties. In contrast, during the first year after Colorado's Wynkoop Brewing opened in 1988, brewmaster Russell Schehrer used only five different kinds of hops.

Homebrewers have access to those same varieties. For instance, it is a point of pride for hop supplier Hopunion that it packages its entire portfolio of domestic and imported hops for homebrewers as well as commercial brewers. Obviously, some are in shorter supply than others. Vendors, both those selling small custom packs from Hopunion and hops they package themselves, are providing not only more choices, but fresher hops in packages designed to keep them that way. Just as an expanding bank of information about cultivating hops serves home

growers, every homebrewer benefits from understanding packaging and hop storage.

HOP GROWING

There is no clearinghouse for information about homegrown hops from across the country or commercially grown hops from outside the Pacific Northwest. However, Zac German, lab manager at Alpha Analytics, sees enough hops from beyond the Yakima Valley to comment with more authority than just about anybody else.

Alpha Analytics is both the quality control and test laboratory for Hopunion, but also provides a variety of services for both brewers and farmers. German often knows little about the story behind the hops he analyzes. Customers could be operators of new hop yards, home growers, or even people simply wanting to identify hops they found growing in their yards. Alpha Analytics discourages people from seeking to identify varieties based on the profiles it can provide; they really need a full genetic analysis, which it cannot do.

During the 2013 hop harvest and months after, the lab analyzed nearly 1,000 hop samples from sources outside of Hopunion. These included hops from all over the United States and British Columbia. Not many of those were from homebrewers, and German is careful not to make generalizations. However, he sees a few patterns related to hops grown commercially and not.

- Many non-commercial samples contain two- or even three-fold of the 10-percent moisture expected in commercial hops. Cones above that level lose quality due to microbial degradation, and also present a risk of fire when stored in bales. Hops with less moisture may fall apart and lose quality due to oxidation. "Take (underdried hops) out of the freezer and they turn to mush," German said. "They smell like old, wet leaves."

- The quality of hops from Colorado has been outstanding.

- Even when Cascade hops, which are popular with new farmers across the country, match those in the Northwest in alpha and beta acids, they are more likely to be lower in essential oils. "Mostly the aromatics aren't there," German said.

- In fact, oil content generally varies more than alpha content, although it isn't clear if that is related to the regions the hops come from or the experience of particular growers. On the whole, it appears that oil values are lower in new hop yards, but that yards that were new a few years ago are already harvesting higher quality hops.

When home growers use their own hops, they understand they cannot be certain about the percentage of alpha acids, so they generally add them late for flavor and aroma. They should also realize that the total of all essential oils may be considerably lower than, and the composition much different from, commercially grown hops. That, of course, may change the aroma. Although Alpha Analytics offers a complete analysis, measuring all the essential oils, it costs $130. Home growers are more likely to settle for a basic profile (alpha, beta, and storability for $35). "Makes more sense when you only have a few pounds," German said.

James Altwies of Gorst Valley Hops in Wisconsin points out that bad decisions

about when to harvest and poor drying practices are the primary reasons for lower oil levels, but that growers need to better understand the full life cycle of the plant to produce hops they want to brew with. This is true even for growers who have invested in a trellis system and harvested one or more crops.

"I get into a conversation and they realize this is a whole lot more complicated than they want," he said. Founded half a dozen years ago, Gorst Valley first of all advises Wisconsin hop farmers and provides processing, but Altwies speaks frequently with home growers as well as new farmers.

First there are absolutes. Hop plants are annual above ground and perennial below. They need six to eight weeks of dormant time with the temperature below 40° F (4° C), then 120 days without frost during the growing season. They are photoperiodic, so day length is a critical factor for both vegetative growth and flowering. While they grow between latitudes 30° and 52°, they thrive between 45° and 50°.

Then there are variables. The timing of when the plant reaches the top of the trellis is very important, but there is no formula to determine the target—latitude, seasonal conditions (temperatures), and variety all must be factored in, and successful farmers rely on their experience. In the Yakima Valley, the first week of July is generally best, but Altwies said the summer solstice is a better target in the upper Midwest.

Growers then count backwards to decide when to begin training bines to wire, but again the decision is based on variety and experience. Generally training late April to mid-May produces the best results.

Another mistake novice farmers make is to become seduced by the robust first flush of growth, when the plant literally explodes out of dormancy. The shoots look robust, but they won't produce as many laterals, which is what the cones grow on. Experienced farmers rip them out. They may burst to the surface as early as February in North Carolina, Davis said. "We're all teaching each other," she said,

talking about experiments in which farmers cut half of the first shoots. They've determined that cutting them back until the first of May results in the best plants.

Altwies finds the bines that farmers in the Midwest want will generally emerge in early to late April. By then the plant will have used most of the nutrients stored during dormancy, and needs a combination of nitrogen, potassium, phosphorous, and calcium. They may be in the soil itself, but most farmers add at least nitrogen. Altwies suggests doing that in two or three additions, all during the vegetative stage (before flowering), then perhaps more potassium. It's vital to manage the growth, because if it is too fast not as many laterals will develop, and it's important to make sure the plant has sufficient water from the beginning of training until harvest. The roots should always be wet, but not enough to develop "wet foot syndrome," a problem that inhibits root development, particularly in heavy soils.

SIMPLE, BUT TEDIOUS

Determining the right time to pick the hops and drying them properly is more straightforward than shepherding a plant through a growing season, but is also much easier to do wrong. "People get a hodgepodge of anecdotal (advice) from various sources," Altwies said. When talking about choosing the right harvest date, he often hears that the hops should be papery to the touch or that growers must wait for the bracts to open up. "That's all garbage," he said. Home growers can determine when to pick just like commercial farmers do, by measuring dry matter.

To calculate dry matter, gather a sample of hops. Weigh an empty container, then the hops in the container. Dry the hops until there is no moisture. This is most easily done overnight in a food dehydrator, although a microwave oven will work. Using the microwave requires constant monitoring.

Dry matter equals 100 times the dry cone weight minus the empty container divided by the original cone weight minus the empty container. The target percentage for most varieties is between 20 and 25 percent, and it will increase about 1 percent every four to six days, depending on the variety.

Hops should be dried to between 8 and 12 percent (which is the same as 88 to 92 percent dry matter). To measure that without a moisture meter calculated for hops, start by weighing a sample and then drying it completely. The moisture of the sample will equal the weight of the sample minus the weight of the dried sample multiplied by 100 and divided by the weight of the sample.

Hop farmers dry hops in large kilns, using heat and fans, because they must process such large quantities in a very short amount of time. There's little less pleasant than standing in a kiln in September with hops drying at 120 to 140° F (49-60° C) and fans blasting. It is easy to understand why that might not be the best way to retain essential oils.

Gorst has developed a single batch dryer that uses no heat, designed for small farms rather than to process hops on the scale used in the Northwest. Even that is more robust than some of the kilns—which as the name would imply

JAMES ALTWIES OF GORST VALLEY HOPS IN WISCONSIN SUGGESTS HOME GROWERS SHOULD DRY THEIR HOPS ON SCREENS AWAY FROM DAMAGING SUNLIGHT.

use heat—Altwies has seen homebrewers construct. "If you don't have to do something, don't," he said.

He suggests that home growers should try something far less intricate: dry the hops on screens in a garage (away from damaging sunlight). It is a reminder that one reason hops from Spalt in Germany were considered the best in the world in the 19th century is that they were spread in the lofts of multi-level barns and air-dried. "Most homebrewers are astonished it's that simple," he said. "It's not *hard* to dry hops well. It's *tedious*."

Those hops should be stored as carefully as any others, carefully bagged and kept cold (or even frozen). A German study found that whole hops, packed in bales and wrapped, stored for three months at 68° F (20° C) lost 12 percent of their alpha acids. Those stored at 37° F (3° C) lost just 3 percent. Essential oils and alpha do not degrade at the same rate, but that certainly points to the value of cold storage.

KEEPING THE FRESH IN FRESH

In *Beyond the Pale*, Sierra Nevada Brewing founder Ken Grossman writes, "When I first started homebrewing [1970s], finding quality hops was nearly impossible because the homebrew trade consumed an insignificant amount of hops and, apparently, in the eyes of hop growers and merchants, wasn't worth pursuing. Most supply shops either stocked samples of poorly cared for British hops or small compressed blocks of aged or rejected Cluster."

Compare that to a new program that homebrew supplier Northern Brewer calls "Hoptimus Rex." The company offers more than 100 varieties of hops, acquiring them from 10 different suppliers. "We're homebrewers ourselves, so we're always looking for the latest and greatest," Northern Brewer president David Kidd said. Three employees pack hops every day, usually about 200 pounds, taking them from 44-pound boxes (a standard industry size) pulled right from a freezer. They arrive in nitrogen-flushed oxygen and light barrier bags and leave in nitrogen-flushed oxygen and light barrier bags, but in sizes homebrewers are more likely to use.

"We take this very seriously. We experimented with a vacuum sealer," said founder Chris Farley. "We moved to nitrogen purge with a double seal."

Michigan newcomer Hop Head Farms sells soft and hard (vacuum) packs, but co-founder Jeff Steinman calls soft packs the default because that's what a majority of commercial customers prefer. "I've heard many complaints about how their hops need to be chiseled apart to be added," he said. "Nice, easy flowing is much better." One concern with the packages is ballooning. Low volatile aroma components may increase during inert storage, resulting in a solvent smell, particularly at higher temperatures. It is an unlikely problem for hops shipped in a timely manner in smaller quantities, as homebrew supplies are.

To be certain the hops are not damaged, Hopunion suggests lifting up on the top of the bag (prior to opening) to see both sides slightly suck in. Spoiled pellets will

HOP HEAD FARMS SOFT PACKS ALLOW FOR A FREE FLOWING MATERIAL. PELLETS ARE PACKAGED IN 47 MM OXYGEN AND LIGHT BARRIER MYLAR BAGS THAT ARE FLUSHED WITH NITROGEN BEFORE SEALING.

usually appear brighter, like fresh green vegetables, and may smell solvent or herblike.

Pellets store wonderfully when handled well. Unopened pellets retain most of the alpha for five years when frozen to 26º F (-3 º C), two to three years when refrigerated at 40º F (4 º C). Aroma changes will occur more quickly, but at 26º F aroma remains relatively stable. They must be protected carefully from oxidation because pressing in the pellet die crushes the lupulin gland and as a result bitter and aroma substances will oxidize three to five times faster than whole hops. Thus opened foils should be used quickly. An opened packet of Cascade pellets will be good for two weeks when stored at 50° F (10° C) and five weeks at 26° F. Resealing the bag at home does not provide the same protection as the original package, although using a foodsaver vacuum sealer and new Mylar packaging certainly adds a measure.

Hopunion began packaging hops in custom one-ounce and one-pound "small packs" in 2011. From the beginning, these packs were sealed in light-resistant, nitrogen-flushed bags, with the residual oxygen level frequently measuring less than 0.5 percent. Brewcraft USA and LD Carlson distribute the packages and they've grown to almost 10 percent of Hopunion's sales, on top of the hops Hopunion ships to repackaging homebrew vendors.

No wonder Hopunion company president Don Bryant draws an interesting analogy. "The craft brewer is to macro as the homebrewer is to craft," he said. And everybody shares the same hops.

Stan Hieronymus is the author of *For the Love of Hops: The Practical Guide to Aroma, Bitterness and the Culture of Hops.*

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MAKING GREAT BEER BREAD

• BY JIMMY KROON AND LORI BROWN •

Bread is a centuries-old tradition, just like beer. Using simple techniques, you can make your own bread with the flavor and texture you'd expect from the neighborhood bakery. The addition of beer brings a new dimension of flavor, but many beer bread recipes we've seen are quick breads with unremarkable texture and flavor derived from a slathering of butter.

Making great beer bread simply requires a little time and attention. With some basic bread making tips and some knowledge of what beer brings to the party, you'll have yet another artisan product to wow your friends with. Plus, compared to three weeks to brew a batch of beer, a day (or two) set aside to make bread provides almost instant gratification.

TIPS FOR GREAT BREAD

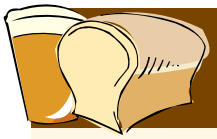
Let's start with some basic bread making techniques. Luckily, as a homebrewer you probably already have some of the gadgets you'll need, such as a scale and thermometer. Pull them out and be prepared for deliciousness!

WEIGH YOUR FLOUR

The ratio of flour to liquid is crucial. Flour compresses in storage, so it is difficult to measure accurately by volume. If you have a grain scale, give yourself a head start by measuring flour by weight.

GIVE IT A REST

Extended fermentation is your secret weapon. Aging a portion of dough, called preferment, improves the bread's structure and flavor. While aging, starch granules fully hydrate, giving the crumb a cool, creamy texture. Starches are also converted by enzymes (similar to what happens in a mash) that feed



CRUSTY BERLINER BREAD

OUR FAVORITE BEER BREAD IS A CRUSTY, RUSTIC BREAD MADE WITH BERLINER WEISSE, PROVIDING A FLAVOR AND AROMA SIMILAR TO SOURDOUGH, BUT WITHOUT A SOURDOUGH STARTER. OUR FRIENDS SHANE AND JESSICA KELLEY HAVE BEEN PERFECTING THEIR BERLINER WEISSE FOR YEARS AND SHARED THEIR RECIPE FOR PUCKER UP BABY ON PAGE 46. BESIDES MAKING GREAT BREAD, THE BEER IS REFRESHING ON A HOT SUMMER DAY!

INGREDIENTS

18.5 oz	or 3.75 cups (524 g) unbleached bread flour
1.5 tsp	(7.5 g) salt
0.5 tsp	(2.5 g) instant yeast
1 Tbs	(15 mL) olive oil
12 oz	(355 mL) Berliner weisse

DIRECTIONS

1. Blend the flour, salt, and yeast. Add oil and beer, and mix until the flour is hydrated. The dough will be wet and sticky.
2. Knead for 5 minutes. Don't knead on a floured surface or it will absorb too much extra flour. Instead, knead in the bowl by turning the dough with your hands. You'll notice the dough become smoother as you work it. If you have a stand mixer, you can knead it in that using the dough hook.
3. Place in a greased bowl large enough to allow the dough to double in size. Cover and set aside for 12-15 hours at room temperature. Overnight is great! For convenience, you can extend the process by refrigerating overnight, bringing it to room temperature in the morning, and baking in the evening.
4. Very gently turn out the dough onto a floured work surface. The dough contains bubbles that will expand into nice irregular holes as the bread bakes, so handle gently and degas it as little as possible as you shape it.
5. Dust the dough with flour. Make a ball by folding the sides toward the center, forming a seam. Pick it up and flip the seam to the bottom. Stretch the dough's surface toward the seam and pinch together, creating a taught skin. You'll get better at shaping dough with practice—be gentle, but don't fret about it too much (maybe have a homebrew while you are baking).
6. Place the dough on parchment or a sheet pan. Cover with a smooth cloth and allow to rise for 60 minutes. A warm spot around 80° F (27° C) is ideal, but room temperature will do. Don't be afraid to let it go longer if it is slow to rise.
7. Preheat oven to 475° F (246° F) allowing extra time to heat the pizza stone. Preheat a water pan in the oven too.
8. Boil 1 cup of water. Slash the top of the loaf with a razor blade. Put loaf in the oven and carefully pour the water into the pan, being careful to avoid contact with steam. Close the door quickly and reduce the oven temperature to 400° F (204° C).
9. Bake for 35-40 minutes. Remove when the center of the bread has reached 200° F (93° C).
10. Allow to cool for 1 hour.

MAKE IT YOUR OWN

As long as the total flour weight remains the same, you can modify the grain blend. Try substituting up to 25 percent whole wheat or rye flour. You can even grind some of your brewing grains into flour with a corona mill (or a blender for very small amounts).

Almost any beer will work in this bread and various styles add different qualities, so feel free to experiment.

HERBED IPA PIZZA DOUGH

THE CRUSTY BERLINER BREAD BASE RECIPE ALSO MAKES GREAT PIZZA DOUGH, SUBSTITUTING IPA FOR BERLINER WEISSE. CHEESE IS ADDED TO BALANCE THE BITTERNESS FROM IPA, YIELDING A CRISPY, FLAVORFUL CRUST.

Follow steps 1-3 in the Crusty Berliner Bread directions, using:

18.5 oz	or 3.75 cups (524 g) bread flour
12 oz	(355 mL) IPA
2 Tbs	(30 mL) olive oil
2 Tbs	(30 g) grated parmesan cheese
1.5 tsp	(7.5 g) salt
0.5 tsp	(2.5 g) dried Italian herbs
0.5 tsp	(2.5 g) instant yeast

After the overnight rise, stretch and pat the dough into a thin circle on parchment paper or a sheet pan. Top with sauce, cheese, and your favorite toppings. Bake at 450° F (232° C) for 11-13 minutes, until the crust is browned and cheese is bubbly. This is enough for one large thin-crust pizza or two smaller pizzas.

CRAN-BEERY WIT BREAD

WITBIER IMPARTS HINTS OF CORIANDER AND SPICE TO THIS BREAD RICH WITH CRANBERRIES AND ORANGE. SERVE LIGHTLY TOASTED WITH BREAKFAST AND GET READY TO REWRITE WHAT YOU BELIEVE BEER BREAD CAN BE. FEEL FREE TO SUBSTITUTE OTHER DRIED FRUIT OR NUTS FOR SOME OF THE CRANBERRIES.

1.5 tsp	(7.5 g) finely chopped orange zest
1.5 tsp	(7 mL) vodka
13.5 oz	or 3.5 cups (383 g) bread flour
3 Tbs	(45 g) sugar
0.75 tsp	(3.7 g) salt
3.5 tsp	(17 g) instant yeast
2	large eggs, beaten
2 Tbs	(30 mL) melted butter
5 oz	room temperature witbier (148 mL) plus 4 oz (118 mL) as needed
2 cups	(240 g) dried cranberries
1 egg	whipped for egg wash

1. Steep orange zest in vodka for at least 30 minutes to make orange extract.

2. Stir together flour, sugar, salt, and yeast. Add eggs, butter, 5 oz (148 mL) witbier, and orange extract (with zest). Mix until it forms a ball, adding extra witbier as needed to make it stick together. The dough should be soft and tacky, but not sticky.

3. Knead (by hand or using a stand mixer) for 5 minutes until dough is soft and smooth. Knead the cranberries into the dough by hand. Flatten the dough, cover with cranberries, fold and press. Repeat until all of the cranberries are incorporated and evenly distributed.

4. Place dough in a greased bowl. Cover and set aside for 2 hours to rise.

5. Grease a loaf pan. Remove dough from bowl and divide in half. Place half on the bottom of the pan. Divide the other half into three pieces and roll each piece out until it is a few inches longer than the pan. Braid the pieces together and place in the pan over the other half. Brush with half the egg wash.

6. Allow to rise uncovered at room temperature for 90 minutes.

7.Preheat oven to 325° F (163° C). Brush with remaining egg wash. Bake for 50-60 minutes until the center reaches 185° F (85° C).

8. Remove from pan and cool for 1 hour.

PUCKER UP BABY BERLINER WEISSE

RECIPE BY SHANE AND JESSICA KELLEY, THE CPJ BREWHOUSE
1st Place Sour Ale, 2013 NHC 1st Round, Ohio

INGREDIENTS

for 5 U.S. gallons (19 L)

3.0 lb (1.4 kg) wheat malt
3.0 lb (1.4 kg) Pilsner malt
8.0 oz (226 g) rice hulls
0.5 oz (14 g) Hallertauer hops (60 min)
For souring: 1.0 lb (454 g) uncrushed two-row
Yeast: Any clean ale yeast

Original Gravity: 1.030
Final Gravity: 1.010
ABV: 3%
SRM: 3
IBU: 6

DIRECTIONS

Mash at 150° F (66° C) for 60 minutes. Collect 5.5 gallons (20.82 L) wort. Heat to 200° F (93° C) to kill off all unwanted bacteria. Cool to 120° F (49° C). Transfer to a keg/cooler and pitch 1 lb uncrushed grain. Cover wort surface with plastic wrap or foil to protect it from oxygen. Close and wrap keg/cooler in a heated blanket or use other heating device to keep temp between 100-120° F (38-49° C). Allow to sour for 14-24 hours depending upon level of sourness desired.

After souring period, run wort off into boil kettle, removing the grains with a strainer. Bring to a boil, add hops, and boil for 60 minutes. Chill to 68° F (20° C). Transfer to fermenter and pitch a clean ale yeast of your choice, oxygenating as you normally would.

EXTRACT VERSION: Substitute 3.75 lb (1.7 kg) wheat DME (such as Briess) for wheat and Pilsner malts. Dilute to desired volume, heat to sterilize, sour and ferment as instructed above.

the yeast and draw flavor from the grain. Preferments are particularly important for rustic breads not enriched with sugar, fat, or eggs. Our Crusty Berliner Bread recipe simplifies this process by putting the entire dough through overnight fermentation.

PIMP YOUR OVEN

A magical, chewy bread crust is the result of baking in a hearth oven. Humid air thickens and delays the setting of the crust long enough for the dense, hot walls to vaporize moisture in the dough, creating steam that springs the loaf into shape. A pizza stone will do a great job of transferring heat to the dough. If you're in the market for a pizza stone, consider a square one that will fit two loaves. If you don't have a stone, a sheet pan will do.

For humidity, professional ovens blast the dough with steam injectors. You can recreate this by placing a heavy pan in your oven while it preheats. When the dough goes into the oven, pour a cup of boiling water into the hot pan to provide a burst of steam. A cast iron pan works very well for this. ***Use extreme caution with this method, as steam burns! Make sure you are wearing oven mitts and keep your face away from the oven as much as possible.***

MIND THE TEMPERATURE

Undercooked bread is doughy and unsatisfying, so it's important to measure the internal temperature. Insert a probe thermometer into the center (hide the hole in the bottom). The desired target is 185° F (85° C) for enriched breads and 200° F (93° C) for rustic breads.

KNOW YOUR INGREDIENTS

Gluten gives bread its satisfying chewiness. While all-purpose flour contains 10 percent protein, bread flour is around 12 percent. Many baking and specialty shops carry high-gluten bread flour with up to 14 percent protein.

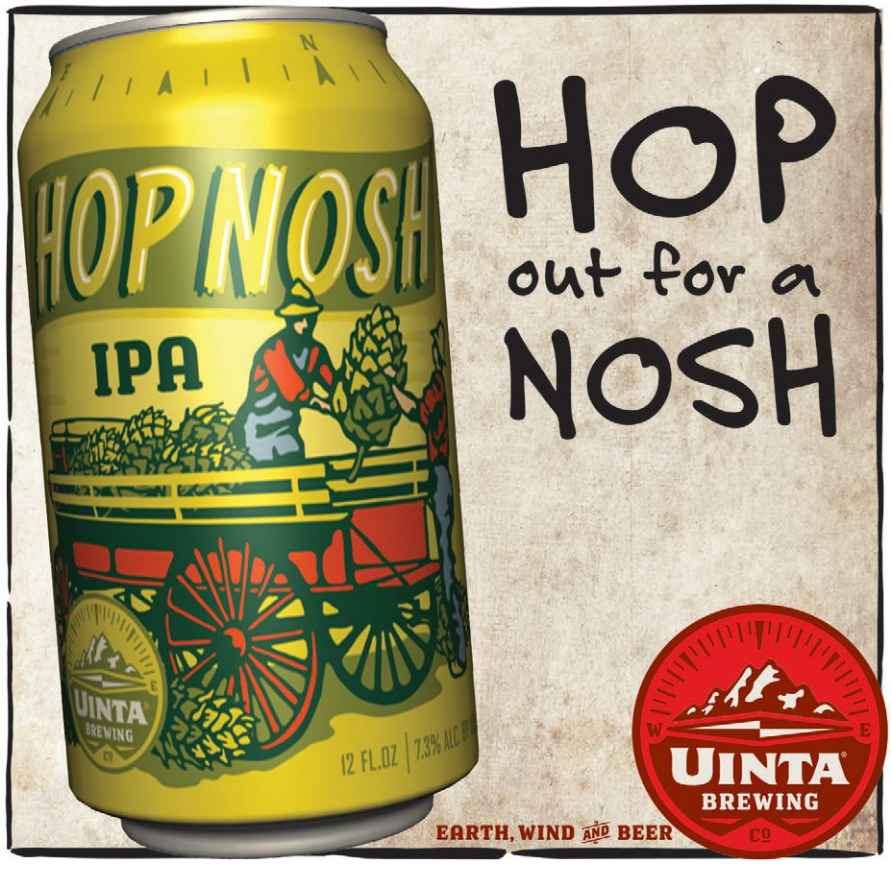
Instant yeast has smaller granules than active dry yeast and hydrates easily. You can mix instant yeast with other dry ingredients and use room temperature or even cold liquids. No proofing (testing to see if the yeast is alive) is needed.

Don't expect bread made with beer to "taste like beer," but rather to add complexity to the flavor of grain. Most malty beers provide subtle flavor since malt flavors are already present in bread. Spicy and fruity flavors can shine, some better than others. Sour beers such as lambics add interesting flavor notes. Hop flavor and aroma don't always survive the heat, and using beer with a high hop bitterness (over 25 IBU) can add an unpleasant harshness.

FROM BEER TO BREAD AND BACK AGAIN

After you've made the Crusty Berliner Bread recipe on page 44, how about bread in beer? Kvass is a traditional fermented Russian drink made with rye bread, sometimes with fruit, honey, or herbs added for flavor, and fermented by Lactobacillus and yeast to create a sour, refreshing beverage that is very low in alcohol—usually less than 1.5 percent alcohol by volume.

If possible, flour should be measured by weight, not volume.



THE TSAR'S KVASS

RECIPE BY JIMMY KROON AND LORI BROWN

Kvass is a traditional, low ABV Russian beer made with rye bread.

INGREDIENTS

for 5.5 U.S. gallons (21 L)

Recipe for 0.5 gallon (1.89 L) soured wort:

8.0 oz	(226 g) light dried malt extract (DME)
3.0 oz	(85 g) uncrushed base malt

Mix DME with water to make ½ gallon. Bring to boil and cool to 120° F (49° C). Add grain, place in a container where it's protected from oxygen and maintain at 90-110° F (23-43° C) for 2-4 days. The wort will be more sour the warmer and longer it ferments. It will smell sour and grainy when ready. You may also notice DMS (cooked corn), which will boil off.

Recipe for 6 lb (2.72 kg) rye bread:

2.0 lb	(0.9 kg) bread flour
2.0 lb	(0.9 kg) rye flour
48 oz	(1.4 L) beer such as Berliner Weisse
2 tsp	(10 g) yeast

Rise and bake in four loaves according to directions for Crusty Berliner Bread on page 44. Rye has no gluten, so the bread will be very flat. Bake on cookie sheets to fit multiple loaves in the oven.

Recipe for kvass:

6.0 lb	(2.7 kg) rye bread
3.0 lb	(1.3 kg) pale malt
1.0 lb	(454 g) rye malt
4.0 oz	(112 g) rice hulls
0.5 gallon	(1.89 L) soured wort
0.5 oz	(14 g) Hallertauer hops (60 min)
2.0 g	grains of paradise (10 min)
1.0 tsp	(5 g) Irish moss (10 min)
1.0 oz	(28 g) Hallertauer hops (flameout)

Yeast: Fermentis T-58

Original Gravity: 1.040
Final Gravity: 1.09
ABV: 4%
SRM: 4
IBU: 7

DIRECTIONS

Cut bread into small cubes. Mix bread with grains and mash at 152° F (67° C) for 90 minutes. Sparge and add soured wort to kettle. Boil for 60 minutes adding hops and spices at stated intervals. Cool and ferment at 65° F (18° C).

Kvass was made in household kitchens using stale bread that would have otherwise gone to waste. Like many traditions, recipes were rarely written down so it is difficult to find authentic ones. Also, kvass styles varied from region to region and household to household, and were certainly influenced by seasonal ingredients.

Our club, Delmarva United Homebrewers, based in southern Delaware, served a kvass at Club Night at the 2013 National Homebrewers Conference. That kvass was made with malted barley, rye beer bread, caraway seeds, and fermented with Lactobacillus and ale yeast. It was tart and refreshing with the aroma of fresh bread crusts. One hundred percent of the Russian attendees that we talked to loved it (and it reminded him of home).

With encouragement from the motherland, we tried our own version. In *Tasting Beer*, Randy Mosher describes kvass as part of a family of white beers that also includes Belgian witbier and German Berliner weisse. Given the relationship, our kvass combines peppery/lemony notes from spicing and yeast, tartness from Lactobacillus, and 50 percent of fermentable sugars from mashing rye bread. Our version is "imperial" at 4 percent. Perhaps this was the kvass of nobility.

AHA members Jimmy Kroon and Lori Brown are biologists and homebrewers who live in Felton, Del. and have been homebrewing together for 10 years. Kroon is president of the Delmarva United Homebrewers.

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BREWING WATER SERIES:

LONDON

BY MARTIN BRUNGARD

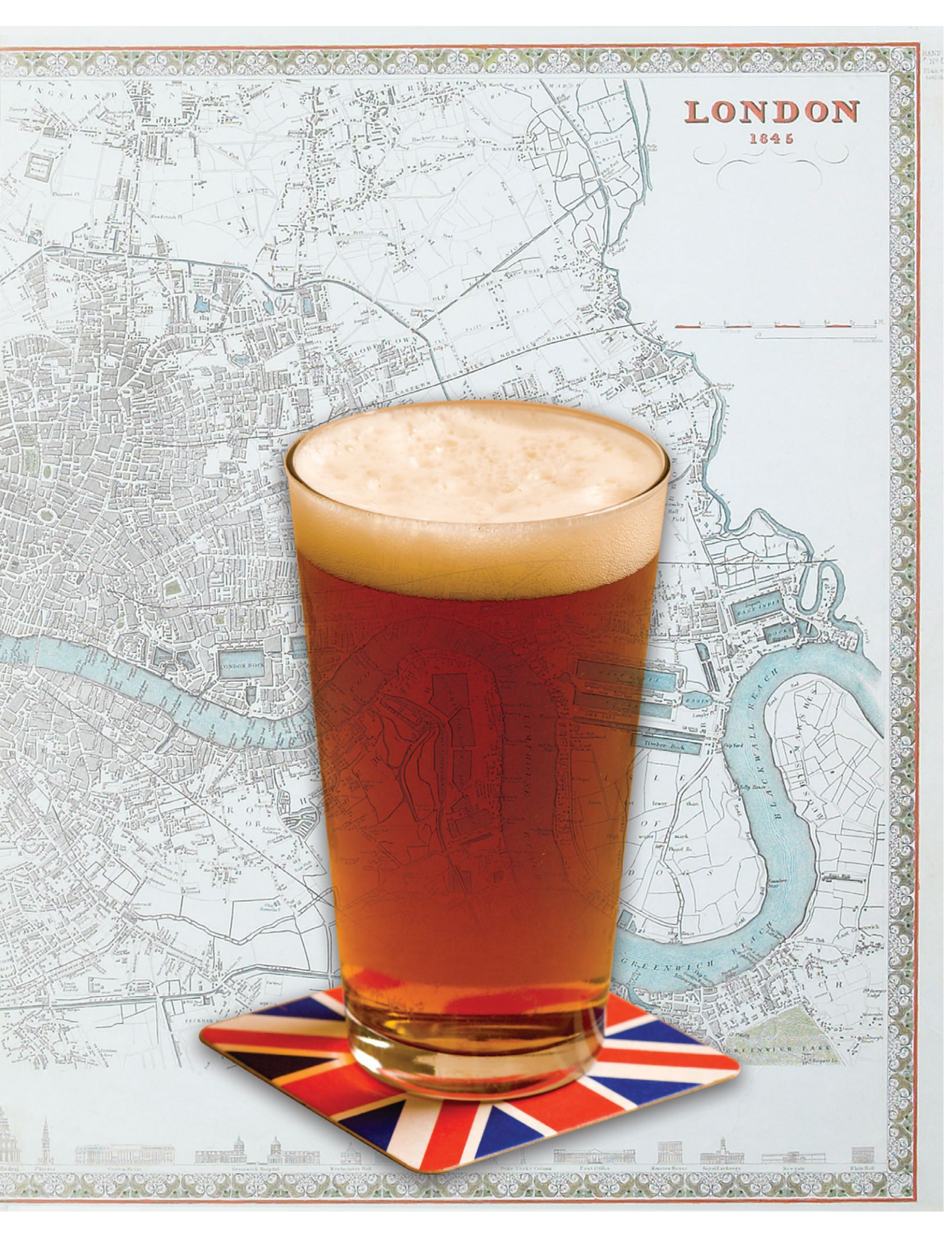
LONDON, THE CITY ON THE THAMES, HAS BEEN THE SCENE OF MUCH BREWING HISTORY AND THE BIRTHPLACE OF SEVERAL BEER STYLES.

A variety of water sources influenced how beer styles evolved and prospered in this early cradle of brewing. While breweries such as Young's, Fuller's, and Whitbread have brewed in the city in modern times, other notable former breweries such as Hodgson, Meux, and Barclay Perkins helped form the essence of London brewing.

Modern London is now a megalopolis that stretches across some 700 square miles (1,800 square kilometers) in southeastern England and is home to more than 10 million people. However, it started as a small Roman village on the banks of the River Thames nearly 2,000 years ago. Traces of that humble beginning are still present in the mile-square core of the old city, where London brewers have long been found.

Water supply is a critical factor to any city and London has transitioned through a variety of sources. Through the early history, the Thames served as that source. The city's location near the North Sea means that sea tides are driven up the river. This tidal flow also helped make the river water unsanitary within the city by occasionally backing sewage up the river. By the 1300s, a pipeline from a local spring supplied water to portions of the city. By the 1600s, the New Canal was in place, supplying an area of the city with water from the River Lee. However, the Lee is a small river with limited flow. In the 1700s, earthen reservoirs were built along the Thames to store river water. Those reservoirs are located above the tidal section of the Thames to avoid salt water intrusion. Today, reservoirs continue to store Thames water for London residents. However, these river sources were not the only water supply for London. By the mid-1700s, deep wells and pumps supplied portions of London and its industries.

EDITOR'S NOTE: *This ongoing series explores the water quality from famous brewing centers, its effects on beer styles, and the relevance to modern day homebrewing.*


LONDON
1845

London is known as the birthplace of the porter style. Through the 1700s, the porter that developed in London was revered as the first global beer. Porter production in London peaked at 1.8 million barrels per year in 1823. Not only was the beer exported, but so was the style. Famous among the adopters were Guinness and Beamish in Ireland, brewers in the Baltic regions, and even America. London was also the birthplace of the India pale ale style partly through the shrewd business practices of the Hodgson Brewery, although Burton-on-Trent ultimately characterized that style. Allied with the origin of IPA, the bitter style (also known as pale ale) was widely brewed in London. Pale ale production in London peaked in the mid-1800s.

That assortment of beer was brewed with water from a variety of sources, all with differing character. In all cases, those waters were well mineralized.

FIGURE 1: SOUTHEAST ENGLAND GEOGRAPHY AND GEOLOGY

GEOLOGY

London is situated in a unique geological setting. The London Basin is composed of layers of clay and chalk forming a broad and shallow valley. London is situated just above sea level and upriver from the North Sea and English Channel. **Figure 1** shows London's location in southeastern England along River Thames. The figure also shows the major soil and rock formations that make up the region's geology. London is at the bottom of a very wide (up to 50 miles [80 km]) and shallow (between 400 and 600 feet high [120 to 180 m]) valley. A cross-section view of the valley (looking east) showing the layering of clay and chalk in the Basin is presented in **Figure 2**. For presentation purposes, the vertical scale of the cross-section is exaggerated in comparison to the horizontal scale. The London clay layer is around 100 feet (30m) thick and it overlays about 600 feet (200m) of chalk. The chalk layer overlays another deep clay layer.

Chalk is a form of calcium carbonate and is relatively permeable, which means that water can flow through it. The material is similar to the chalk used on classroom chalkboards. The clay that sandwiches portions of the chalk layer is relatively impermeable and little water flows through the clay. As depicted in Figure 2, rain falling on the regions where chalk is exposed at ground surface filters into the chalk layer as groundwater. Those elevated chalk hills help move groundwater toward the Thames Valley and London. The chalk layer is the groundwater aquifer beneath London.

Relatively pure rainwater picks up calcium and carbonate as it flows through chalk. Because the chalk layer was

deposited at a time when sea level was much higher than it is today, it contains significant sodium and chloride content. Since London is located just above sea level, it is apparent that the chalk aquifer is actually situated below sea level around London. If there were no wells drawing water from that aquifer, the natural flow of rainwater into the aquifer would keep most seawater out. However when groundwater is drawn from the aquifer, seawater can make its way in. Through the 1800s and 1900s, thousands of wells were constructed in London and their water withdrawals significantly lowered the water table beneath the city. Up until the early 1970s, significant pumping from the aquifer resulted in significant saltwater intrusion within portions of the chalk aquifer.

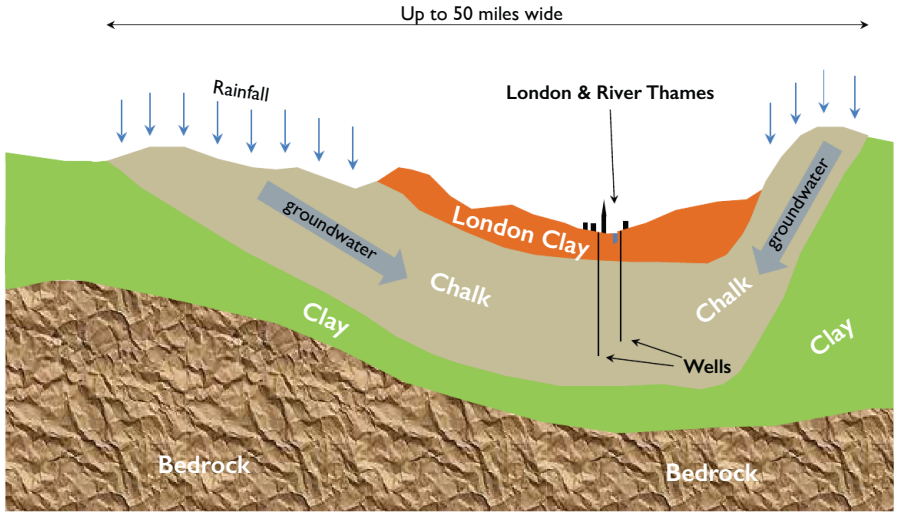
River Lee and the New River (actually a man-made canal) serve as freshwater sources for a portion of the north side of London. For the rest of the city, the Thames and its reservoirs are a major water source. Since those waters flow through and across the clay and chalk found in the region, they pick up ions from those soil layers and become mineralized.

London's location within 30 miles (50 kilometers) of the North Sea means that the Thames is subject to tidal fluctuation. The tidal effects actually reach about 50 miles (80 kilometers) up the Thames, so it should be apparent that the tidal portion of the Thames can be salty. Because of the potential for the water to be unsanitary, London was an early leader in water treatment. It was the first to filter water and the first to use lime to soften and clarify water.

WATER QUALITY

Historic water quality for various water sources is summarized in **Table 1**. This historic water quality data was derived from the book *The Examination of Waters and Water Supplies*. The data presented in that book was first published in 1904 and this suggests that it may be representative of conditions during a significant period of London's brewing history. Note that the ion concentrations are presented as milligrams per liter (mg/L), which is equivalent to parts per million or ppm.

FIGURE 2: GEOLOGIC CROSS-SECTION OF THAMES VALLEY



Note:Vertical scale is exaggerated

TABLE I . TYPICAL WATER QUALITY OF LONDON WATER SOURCES

Location	River Thames (tidal)	River Thames (upper)	River Lee (upper)	Chalk Wells (west)	Chalk Wells (east)
Ion	**Concentration (mg/L)**				
Calcium	275	95	110	15	20
Magnesium	450	5	5	5	5
Sodium	1,535	35	25	180	175
Sulfate	1,490	30	70	65	70
Chloride	3,030	40	30	120	125
Bicarbonate	200	240	275	260	265

Brewers familiar with typical brewing water ion concentrations should recognize that the tidal Thames water shown in **Table 1** is *very* mineralized. While it is not as salty as seawater, it is not potable or suited for brewing. Fortunately, fresh water is lighter than seawater and it tends to flow on top of the seawater layer in the river. Water near the river surface does tend to be fresher (less salty), although there is some mixing of the fresh and salt waters.

Upstream of the tidal section, river water quality in both the Thames and Lee is similar. Both waters are fairly hard and alkaline, however their flavor ion content (magnesium, sodium, sulfate, and chloride) is fairly low. A number of breweries located on the northeast side of London received their water from River Lee. In addition, River Thames water was widely used to supply London and its breweries once storage reservoirs were constructed in the 1700s. The water quality in those reservoirs would be similar to the upstream Thames quality. Even today, modern London receives most of its water supply from the Thames reservoirs with chalk wells providing backup supply.

The water quality from the chalk wells in London presents a substantial difference from the river water quality. The wells produce water that is surprisingly soft (low calcium and magnesium content), but with significant sodium and chloride content. The water still has significant alkalinity (high bicarbonate content).

Table 1 shows that water quality does vary depending on the source. Over the ages, the London water supply could be grouped into four sources: tidal Thames, upper Thames, upper Lee, and chalk aquifer.

The book *Amber, Gold, and Black* says that early porter quality was reportedly best when Thames water was used for its brewing. Prior to the construction of reservoirs for Thames water in the 1700s, water was often extracted from the tidal section of the Thames within London. As mentioned, some mixing with the tidal river water was likely. Looking at the upper Thames and Lee water quality and compositing it with the very salty quality

in the tidal Thames, it is apparent that the sodium, chloride, and sulfate content of water drawn from the river would be higher than that of the upstream water. Estimating that water profile would be difficult. However, a blend of the tidal and upper Thames quality may be representative. Table 2 presents the water quality that is produced when five percent tidal Thames water is mixed with upper Thames water. That resulting water quality should be "pure" enough to brew ales and may be representative of what early London brewers used.

When London changed its water supply to the upper Thames and Lee, the quality of brewing water also changed. Those waters have much lower flavor ion content (magnesium, sodium, sulfate, and chloride) but higher calcium and bicarbonate. High calcium and bicarbonate content is referred to as high temporary hardness, which can be driven off by boiling the water.

The chalk aquifer became an attractive water source for many London industries and water users that needed a more reliable water supply. Rivers and reservoirs were not reliable sources when dry weather occurred. Since many London breweries had a well at their location by the late 1800s, it is reasonable that the chalk aquifer water quality is representative of what many London brewers of that era brewed with.

Reviewing the water quality from the chalk aquifer and the mixed Thames water in **Table 2**, it is apparent that those waters have substantial sodium, chloride, and bicarbonate content.

HOW THEY BREW

One thing that is fairly consistent for the various London sources was their high bicarbonate content (aka: alkalinity). While alkalinity is welcome when brewing dark styles such as porter, it can be detrimental to pale styles. In the days of early London brewing, brown malt was prevalent. That malt provides more acidity than pale malt, which helps neutralize the water's alkalinity. However, when pale ale brewing became popular, altering the water chemistry became more important.

THAMES PORTER

A London porter benefits from the proper water: alkaline with a dose of sodium and chloride. Thames water was revered as producing better porters and that character is evidenced in the water profile. The somewhat elevated alkalinity of the London porter profile helps keep the mash pH slightly higher than in typical pale beer brewing, enhancing the flavor quality of the dark malts.

A London porter would likely be characterized as a brown porter using BJCP style guidelines. The malt bill for a brown porter is largely 2-row pale malt with modest percentages of roast and crystal malts. According to Brewing Classic Styles*, the secret to a great brown porter recipe is the inclusion of brown malt. English hops are preferred to meld with the malt bill. Northern Brewer is included for its woody character and Golding is included for its floral notes.*

Ingredients

for 5.5 gallons (21 L)

7.5 lb	(3.4 kg) 2-row pale malt
0.75 lb	(340 g) brown malt
0.5 lb	(227 g) chocolate malt
0.5 lb	(227 g) crystal 55° L
2.0 oz	(57 g) crystal 150° L
0.75 oz	(21 g) Northern Brewer pellets (9.5% a.a.) 60 min
0.5 oz	(14 g) East Kent Golding pellets (4.8% a.a.) 10 min

London Ale yeast

Original Gravity: 1.049
Final Gravity: 1.012
SRM: 26
IBU: 27
Assumed Efficiency: 80%

Directions

Mash all malts in London porter water (adjust as necessary to produce a mash pH of 5.5 to 5.6) at a temperature between 150-154° F (65-68° C) for 60 minutes. A mashout step to 168° F (76° C) is helpful, but optional. Sparge the mash with low-alkalinity water that is acidified to a pH between 5.4 and 5.7. Boil the wort for 60 minutes. Use a program such as Bru'n Water to guide the mineral additions needed to produce the London porter brewing liquor.

Extract: Substitute 6.0 lb (2.72 kg) of liquid pale malt extract for the pale malt in the recipe. Steep the other malts in 150° F (65° C) brewing liquor. Rinse the malts with brewing liquor and remove from kettle. Boil all liquids as indicated above.

Variations: Many English hop varieties can be substituted. London Ale yeast is preferred for its minerally character and fruity ester profile. However, other English or U.S. ale yeasts may be substituted.

As typical for many brewers, pre-boiling water that contains high temporary hardness provides the benefit of reducing the calcium and bicarbonate (alkalinity) content. The process is known as decarbonation since the boiling drives off carbon dioxide dissolved in the water. When the calcium content is high enough, the bicarbonate content in these waters can be reduced to somewhere around 60 to 80 mg/L by boiling. The range is due to the intensity and duration of the boil. Longer, harder boiling will tend to reduce the bicarbonate to 60 mg/L while less active boiling may produce the higher concentration. That reaction also causes the calcium to precipitate out of the water as chalk. After boiling and allowing the water to clear, the clear water is decanted off the chalk sediment. With the calcium and bicarbonate content from a testing report along with an ending bicarbonate content between 60 and 80 mg/L, the ending amount of calcium can be predicted using the following equation:

$$Ca_{end} = Ca_{start} - [(HCO_{3\ start} - HCO_{3\ end})/3.05]$$

For the upper Thames and Lee water sources, the calcium content is sufficient to produce that reaction. However, for the London chalk water, the calcium content is relatively low and the reaction will not occur. Therefore pre-boiling cannot effectively reduce its alkalinity.

With the water quality provided from the chalk aquifer and tidal Thames, an external acid source is needed to reduce alkalinity and bring the mash pH down into a desired range. In the case of porter brewing, dark malts provide this acidity. Prior to the early 1800s, porters were brewed primarily with brown malt. In 1817, black patent malt was invented (and patented!), enabling the use of pale malt with a small percentage of black patent malt to create a similar beer color. Brewers preferred pale malt since it provided higher potential gravity (more sugars) than brown malt.

Readers of *Zymurgy*'s Brewing Water Series may recognize that the high alkalinity presented by the chalk and tidal Thames waters may not produce good pale beers. However the acidity provided by the dark malts of typical porter grists would be sufficient to produce an appropriate mash pH. In the case of dark beer brewing, experience has shown that many dark beers taste better when they are mashed at a pH of around 5.5 to 5.6. This is in contrast to the lower desired mashing pH range of 5.2 to 5.4 preferred for pale beer brewing. (Note: all pH values refer to their measurement at room temperature, not mash temperature). It turns out that the elevated alkalinity of these chalk and tidal Thames waters is likely to produce a slightly elevated mash pH. Based on the water quality parameters for those waters, a suggested water profile for London porter is presented in **Table 3**. It includes the elevated sodium, chloride and bicarbonate that characterize the original waters. The London porter profile may also be useful for dark milds, brown ales, and stouts.

Many brewers will recognize that the sodium and chloride content of the London porter profile is much higher than typically utilized in most brewing. Both sodium and chloride will impart perceptions of sweetness and fullness to beer

when present at moderate levels. Taste trials conducted by John Palmer during the writing of *Water: A Comprehensive Guide for Brewers* indicated that dosing typical beers with table salt did produce sweetening effects in the beer with no perception of saltiness when conducted at modest concentrations (< 200 mg/L). Some beer drinkers are known to salt their beer in the serving glass to create this effect, similar to salting a piece of watermelon to enhance sweetness. Too much, however, will produce a salty flavor. In the case of the London porter profile, the sodium and chloride levels are not excessive. Brewers may also notice a slightly elevated magnesium content, which is included with respect to the water's tidal Thames origin. While excessive magnesium can produce bitterness or astringency in beer, the concentration is low enough to only provide minor flavor nuances.

While London is famous for porter, it's also widely known as a producer of pale ales and bitters. The chalk aquifer and tidal Thames water profile would not perform well in pale beer without the acidity of dark malts to neutralize alkalinity. Therefore, other means to reduce mash pH were necessary.

Fortunately, London had other water sources. Water from the upper Thames and Lee rivers could be decarbonated to reduce water alkalinity and calcium content to more modest levels, making them more suited to pale beer brewing. As mentioned previously, the Hodgson's Bow Brewery in London, which happened to be located on River Lee, helped the India pale ale style into development.

An approximate profile of upper Thames and Lee water quality, after pre-boiling, is presented in **Table 4**. Assuming a high degree of decarbonation and an ending bicarbonate content of 60 mg/L, the resulting calcium content would drop from about 100 mg/L to about 40 mg/L. Other ion content would remain unchanged.

The London pale profile with its modest flavor ion content would be suited to a somewhat bitter beer. However, the relatively modest sulfate content would not dry the beer finish to the degree found in a beer produced with Burton water's high sulfate content. The resulting softness in the beer flavor produced with this water should be pleasing. In addition, the modest calcium content of the decarbonated London water may have tended to leave more yeast in suspension since high calcium content aids in yeast flocculation.

The high calcium content of Burton water was revered for producing very clear beers. Once brewers understood how Burton water chemistry benefits dryness and clarity through the addition of calcium sulfate (gypsum), even this London water could be mineralized to produce great pale ales. Undoubtedly, some London brewers did add gypsum to their brewing liquor for pale ale brewing. That possibility is not explored in this article, but the somewhat low RA shown in **Table 4** could be further reduced to a negative value by adding gypsum to the water to boost the calcium and sulfate levels. That addition could help reduce a typical pale malt mash pH into a desirable range of around 5.4.

If brewers did not want to increase the sulfate content of their brewing water via gypsum, an external acid could have been used to reduce the water alkalinity and bring the mash pH into a desirable range. Recognizing that pH was an unknown concept prior to the early 1900s, brewers made adjustments to their processes and materials based on what resulted in better beer. We now know that keeping mash and wort pH around 5.4 produces better hoppy ales.

Sulfuric and hydrochloric acid was not widely available until the late 1800s, but became widely used through the 1900s for treating brewing water. Prior to the availability and use of external acid additions, English brewers may have used an acid rest to develop natural lactic acid in the mash. However, they may have just decarbonated the water by pre-boiling and brewed their pale beers with it. The resulting beer was probably perfectly acceptable; mash pH may have been only slightly high, so tannin extraction at lautering was not an issue.

TABLE 2. ESTIMATED MIXED THAMES WATER PROFILE

Ion	Concentration (mg/L)
Calcium	100
Magnesium	20
Sodium	110
Sulfate	100
Chloride	190
Bicarbonate	240

TABLE 3. SUGGESTED LONDON PORTER PROFILE

Ion	Concentration (mg/L)
Calcium	80
Magnesium	20
Sodium	110
Sulfate	80
Chloride	190
Bicarbonate	210
Residual Alkalinity (RA)	105

TABLE 4. SUGGESTED LONDON PALE PROFILE

Ion	Concentration (mg/L)
Calcium	40
Magnesium	5
Sodium	30
Sulfate	70
Chloride	40
Bicarbonate	60
Residual Alkalinity (RA)	18

These two distinctly different waters were available across London depending upon the water company supplying the area. The water used and the beer brewed at a brewery was often a result of its location. London breweries were typically known as either porter or ale breweries in the early days. Porter was typically brewed near the Thames and other ale breweries tended to locate elsewhere in the city. To illustrate the effect of the salt-infused London water, a London porter recipe is presented with this article.

WHAT IS AUTHENTIC?

London water can be characterized into two distinct types: tidal Thames and chalk aquifer water with elevated sodium and chloride content, and alkalinity that cannot be reduced by boiling; and upper River Thames and Lee water with high temporary hardness that can be reduced by boiling. After recognizing these different water profiles, it is easier to apply the appropriate one to the beer style brewed.

Here are points to take away when brewing London styles.

- The sodium, chloride and bicarbonate content of the London porter profile is key to producing fine porters and stouts. This content should accentuate sweetness and fullness in the beer.
- A slightly high pH (5.5 to 5.6) in the mash and kettle wort helps smooth the roast character of dark styles. Brewers starting with a low alkalinity water source (like RO or distilled) will likely have to add alkalinity with either baking soda or pickling lime in order to avoid an overly low pH.
- The modest ion content in the London pale profile represents what water from the upper Thames and Lee rivers would contain following pre-boiling and decanting of those waters. The sulfate and chloride content are at moderate levels and can be expected to produce a somewhat dry finish in the beer.
- A kettle wort pH of 5.3 to 5.4 is recommended for pale ale brewing to improve hop expression and bittering. The bicarbonate content of the London pale profile may require further reduction with an acid addition to bring the mash and kettle wort pH down to this range.

RESOURCES

Barrow G. and LJ Wills. *Records of London Wells, Memoirs of the Geological Society*, 1913.

Cornell, M. *Amber, Gold, & Black*. The History Press, 2010.

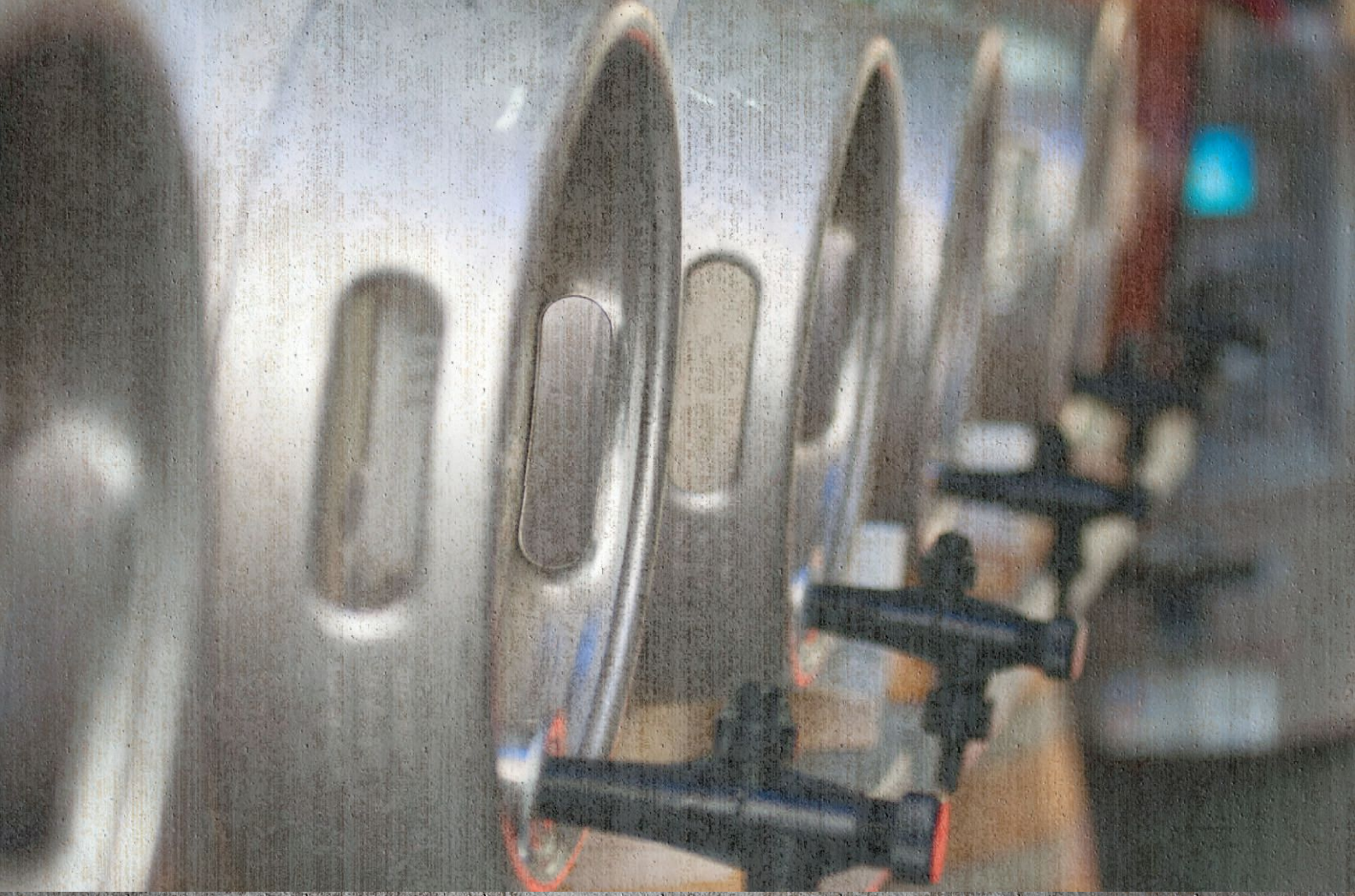
Environmental Simulations International Ltd. *Groundwater Quality Review: The Confined Chalk of the London Basin, Thames Region*, Environment Agency, Thames Region, Nov 2006.

National Water Supply: Notes on Previous Inquiries, Society for the Encouragement of Arts, Manufactures, and Commerce, London, Bell and Sons, 1878.

Suckling, EV. *The Examination of Waters and Water Supplies*, 5th Edition. Blakiston Company, 1944.

Warren, JN. *The Report of the Board of Health on the Supply of Water to the Metropolis*, Trelawny Saunders, 1850.

Martin Brungard is a recognized expert in brewing water chemistry and an engineer specializing in water treatment. He is the author of the Bru'n Water software for brewing water adjustment. He was also a technical editor for Brewers Publications' book *Water: A Comprehensive Guide for Brewers* by John Palmer and Colin Kaminski.



TAKING A BREATHER

Cask-Conditioned Ale Experiment

By John Dura

Editor's Note: This is the second published experiment from the AHA's Research & Education Fund. For more on the REF, including additional completed REF projects, go to www.HomebrewersAssociation.org/community/research-and-education-fund.

I've been a homebrewer for more than 20 years, and among my favorite styles to brew are British-inspired ales. Having traveled extensively in my business career, I have spent a good deal of time in the UK, where I was introduced to real ale by friends and colleagues. For the uninitiated, real ale, in the UK, is unpasteurized, cask-conditioned draft ale served without "extraneous CO_2", as opposed to pasteurized, filtered, pressurized, and chilled kegged ale.

This introduction to real ale opened my eyes to the fact that I had been generally missing the mark when it came to replicating British ales. The closest I came to real ale was early on when I was still bottle conditioning my beer, although I was definitely overcarbonating it as compared to the legitimate article. When I began kegging, I would set my CO_2 regulator to 2-3 PSI and hope for the best. I was drawing closer to the mark, but not quite hitting it.

It was only when I obtained a traditional English cask that I felt I was replicating what I had enjoyed in the UK. Cask-conditioned ale is unpasteurized ale that is allowed to continue secondary fermentation in a cask, either without priming sugar (the ale is put into the cask prior to reaching final gravity) or with priming sugar (which is mixed with the ale before it is put in the cask after final gravity has been reached). After secondary fermentation is complete (usually one or two weeks), the cask is vented through the shive (a bung on the top of the cask) to release excess carbonation. The shive is sealed with a soft, porous spile, usually made of basswood, to allow the excess CO_2 to dissipate without letting the beer gush out of the shive and without letting air enter the cask. After the cask is vented, the soft spile is withdrawn and the cask is sealed with a hard spile, usually made of hard wood or plastic, to prevent air from entering the cask.

The beer in the cask may be served in one of two ways. The first method consists of withdrawing the hard spile and serving the beer through a tap (either gravity dispensed or through a beer engine) while allowing air to enter the cask, in which case the beer is termed "real ale." Alternatively, the cask may be fitted with a cask breather, a device that allows CO_2 at atmospheric pressure to bleed into the cask as the beer is withdrawn, thus preserving the beer from air contact so that it does not spoil as quickly. According to CAMRA (the Campaign for Real Ale), though, beer served with a breather should not be considered real ale.

CAMRA is a campaign originally launched by four concerned British beer drinkers for the protection (and reintroduction) of cask conditioned real ale. This small organization eventually grew into the thousands, and is considered one of the most successful grassroots organizations in the world. It is credited with the return of real ale (which was near extinction at the time) to the UK, where it is now a staple in the

The shive is sealed with a soft, porous spile, usually made of basswood, to allow the excess CO_2 to dissipate without letting the beer gush out of the shive and without letting air enter the cask.

neighborhood pub (although perhaps not quite as popular as kegged ale and lager). Low carbonation (1.5 volumes of CO_2 at 55° F) is characteristic of real ale.

The challenge with real ale (from an American homebrewer's perspective) is twofold. First, it spoils quickly, usually in the space of three or four days; and second, as mentioned previously, CAMRA has repeatedly denigrated the use of a cask breather—many members of the British beer-drinking public insist that the air entering the cask actually *improves* the flavor of the ale. In the past few years, CAMRA has relaxed its stance on breathers and suggests that they may be appropriate in pubs where the turnover is not high enough to dispense an entire cask (usually 9 imperial gallons or larger) before it spoils, although it reiterates that the use of "extraneous CO_2" prevents such a beer from being considered real ale.[1]

I decided to conduct a blind tasting of one ale recipe from two casks. One sample would be drawn from a traditionally air vented cask, the other from a cask fitted with a breather.

Given CAMRA's stance, I wondered if there is any significant taste difference between a traditionally dispensed ale (with air entering the cask) and an ale dispensed with the use of a CO_2 breather. When the AHA started the Research and Education Fund, I suggested that this might be an area where research was warranted.

THE EXPERIMENT

In order to investigate this problem, I decided to conduct a blind tasting of one ale recipe from two casks. One sample would be drawn from a traditionally air vented cask, the other from a cask fitted with a breather.

Protocol

To maintain the integrity of the blind tasting, I had to ensure that everything in the process would be identical until the actual pouring of the beer. So as not to mask any of the properties of the beer, I decided on a middle-of-the-road best bitter. This style of beer should not be overly malty or hoppy, nor should it be dry-hopped, since the hop aroma might obscure any significant aromas in the bitter.

Because I wanted identical ales in the two casks (pins, each of which holds 5.4 U.S. gallons [20 L], or 4.5 imperial gallons), I decided to brew a single 12-gallon (45.42 L) batch and split it post-fermentation. On November 20, 2013, I conducted

a large mash, a 90-minute boil (which incidentally strained the capacity of my 15 gallon kettle—thank goodness for Fermcap S), and fermented the resulting ale at 67° F (19° C) in a 16.5-gallon (62.46 L) closed fermenter. After initial fermentation was complete (about seven days), I mixed in 4 ounces (113 g) of corn sugar into each of the casks as I filled them to capacity. I then allowed secondary fermentation to proceed at a constant 67° F for 10 days before allowing the casks to cool to cellar temperature of 53° F (12° C). I vented the casks on December 11 in preparation for the tasting to be held on December 14.

Unfortunately, a major snowstorm occurred on the 14th, so after much scrambling, we rescheduled the tasting for the following day. About 24 hours prior to the tasting, I drew off 1.5 imperial gallons from each cask to ensure that the air-vented cask had enough time for air to mix with the ale in order to replicate the effects of a partially consumed cask. Then all was ready for the tasting.

Tasters and the Tasting

First I want to give a shout out to Andrew Hejl of the Keystone Hops Club for taking on the task of arranging the tasters. Although the original suggestion for the experiment was to have the beer tasted solely by BJCP judges, I thought that having a mix of judges and non-judges would provide an interesting perspective on what the average homebrewer would experience. This proved to be a fortuitous combination.

The panel consisted of four judges (it would have been a somewhat larger panel if the snowstorm had not intervened): Andrew Hejl, Frank Pileggi, Brian Krebs, and Christopher Clair; and three non-judges: Brent Ziegler, Adam Juncosa, and Karen Malzone. I would like to thank them for braving the elements and helping with the experiment.

So as not to bias their responses, the tasters were not informed of the details of the experiment. The tasting was blind—the tasters only knew that they were tasting two cask-conditioned best bitters. The judges in the group filled out BJCP scoresheets on the two samples, and everyone filled out a survey indicating any differences that could be noted between the two samples and which sample they would prefer to drink.

The Scoring

First the judges' scores. The air-vented cask, sample 1, received an average score of 34.75. Sample 2, the cask with the breather, received an average score of 34.25. The BJCP judges were split on which sample they preferred, three siding with the air-vented cask and one preferring the breather-vented cask, although one judge stated in discussion that the differences between the two samples were subtle.

For the non-judges, two preferred the breather cask and one the air-vented cask. This brought the air-vented cask to the top by a margin of 4 to 3.

For fun, I also had my future son-in-law, Joe Redlitz (who acted as a steward for the tasting) fill out one of the survey forms. His tasting was definitely not blind, but

BEST BITTER

The following recipe is based on Hook Norton's Best Bitter, as originally published by Graham Wheeler in *Brew Your Own British Real Ale*. It has been adjusted to the middle of the BJCP style guidelines for starting gravity. Rice syrup extract was used in place of invert sugar.

INGREDIENTS

for 12 U.S. gallons [45.42 L]

7.2 lb	[3.26 kg] Maris Otter pale malt
7.2 lb	[3.26 kg] mild malt
1.2 lb	[544 g] flaked maize
12.0 oz	[340 g] 60° L crystal malt
4.8 oz	[136 g] torrified wheat
1.1 oz	[31 g] black patent malt
12.0 oz	[340 g] rice syrup [added at the boil]
2.4 oz	[68 g] East Kent Golding whole hops [6.6% a.a.] 60 min
1.2 oz	[34 g] East Kent Golding whole hops [6.6% a.a.] 15 min
0.4 oz	[11 g] East Kent Golding whole hops [6.6% a.a.] 1 min

Wyeast 1469 West Yorkshire Ale yeast

Brewing Efficiency: 83%
Original Gravity: 1.044
Final Gravity: 1.011
IBU: 32.9 [Rager]
SRM: 7.6
ABV: 4.3%

DIRECTIONS

Mash at 152° F [67° C] for one hour. Ferment at 67° F [19° C] [hopefully to develop only moderate esters] with a massive starter of West Yorkshire Ale Yeast [Wyeast 1469]. After primary fermentation, cask condition at 67° F [19° C] with 8 oz [227 g] corn sugar [4 oz. per cask – 5.4 U.S. gallons]. After 10 days, cool to cellar temperature [approximately 53° F or 12° C].

MINI MASH VERSION

Omit mild malt. Reduce Maris Otter pale malt to 2 lb [0.9 kg]. Mash pale malt along with 1 lb [0.45 kg] six-row pale malt, flaked maize, crystal malt, torrified wheat, and black patent malt at 155° F [68° C] for 60 minutes. Drain, rinse grains, and dissolve 9.5 lb [4.31 kg] Maris Otter malt extract syrup completely. Proceed with boil, hop and rice syrup additions as above.

The tasting panel included [from left to right] Karen Malzone, Brent Ziegler, Chris Clair, Frank Pileggi, Andrew Hejl, Adam Juncosa, and Brian Krebs.

he preferred the breather cask because of its slightly higher carbonation.

Some of the remarks (paraphrased) from the scoresheets and surveys:

Sample 1: more estery; Sample 2: more bitterness, more hop aroma

Sample 1: more malt; Sample 2: more estery, a little sweeter

Sample 1: more intensity of flavor, more hops, more estery; Sample 2: subdued hops, more one-dimensional

Sample 1: more estery, watery; Sample 2: more complex, better balanced

Sample 1: more hop-forward aroma; Sample 2: a bit astringent

Sample 2: sweeter, a bit more fruity aroma, better carbonation

Sample 1: slightly more heat and bitterness; Sample 2: balanced

CONCLUSION

Although the air-vented cask was preferred 4 to 3 by the panel, the differences between the two were slight, with the judges favoring the air-vented cask and the non-judges preferring the breather. The difference in the judges' scoring was only 1.4 percent, hardly an overwhelming victory for the air-vented cask.

In conclusion, with the real ale definition aside, I suggest that the average homebrewer would not be sacrificing much, if anything, by using a breather to extend the life of his or her cask-conditioned ale.

REFERENCE

1. O'Neill, Patrick. *Cellarmanship*, 5th edition. Campaign for Real Ale Ltd (2010).

John Dura is retired after 25 years' employment by the Bell Telephone System and its offshoots. He has been homebrewing for 20+ years, and lives with his wife, Mary, his two daughters, Kathleen and Emily, and his dog, Angus. Of all his family, only Angus shows the least bit of interest in John's passion for brewing.

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by Amahl Turczyn Scheppach

Moerlein Cup Homebrew Competition

The first ever Moerlein Cup Homebrew Competition took place January 18 in Cincinnati, Ohio. Organizer Michael Roszkowski referred to this fledgling event as "a collaboration." The driving force behind it, the Northern Kentucky Homebrewers Guild (NKHG), had talked extensively about exactly what they wanted out of the event, and it just so happened that the Christian Moerlein brewery, after launching its Moerlein Lager House on the Ohio River in Cincinnati, had something very similar in mind.

Roszkowski explained, "A couple of years ago when we founded the Northern Kentucky Homebrewers Guild, we discussed what we'd want our first competition to look like. We wanted a great venue, we wanted local support from breweries and homebrewers, we wanted it to be educational for both novice judges and homebrewers, and we wanted it to be awesome. So we had set a pretty high bar for ourselves."

The nearby Moerlein brewery was on board, Roszkowski noted, but needed help with organizing and launching the event. "They had talked about doing a homebrew competition as early as when they launched the Moerlein Lager House. They even went so far as to register a competition with the BJCP. They then realized they didn't have the time or the expertise to put on a quality homebrew competition and postponed the event indefinitely."

That's where the NKHG came in. "I took this as a great opportunity to combine forces and 'take over' the Moerlein Cup competition from the folks at Moerlein," Roszkowski said. And his club was certainly up to the task. Though they are one of the newer clubs in the Cincinnati/Northern Kentucky area, they've had an emphasis on education and fun from the very beginning. "From day one, we've been about brewing and brewing education. Our 'meetings' are monthly group brew-outs hosted by members. There's plenty of fun, Q&A, educational sessions on brewing and judging, etc. No dues. Very laid back, but very serious about improving ourselves as brewers and beer aficionados."

The brew club was soon able to secure the most logical venue for the collaborative competition: The Christian Moerlein production brewery. Roszkowski notes, "The venue was pretty amazing. It's got an 1800s brewery interior, with masonry, arched ceilings and walls. It's unique."

Prizes also set the event apart from the typical homebrew competition. "In addi-

Michael Schuler (right) won Best of Show

Photos courtesy of Michael Roszkowski

tion to the typical first, second, third, and B.O.S. winners, Moerlein added a twist," Roszkowski said. "They wanted to do a 'Brewer's Choice' competition within the usual BJCP finalist round."

From the pool of beers sent to the Best of Show round, Moerlein had then-brewmaster Richard Dube sample all of the BOS entries to pick two of the beers. These were to be brewed on the Moerlein Lager House's 15-barrel system. The two winners' beers will go head-to-head in a "people's choice" voting after they are tapped for a chance to be one of the Lager House's Great American Beer Festival® Pro-Am entries.

Roszkowski himself was one of the Brewer's Choice winners, with an American pale ale with juniper berries. The other top award went to Nate Levengood with his Northern English Brown.

The competition was also a charity fundraiser. "All the proceeds from the competition go to our Alzheimer's foundation team," said Roszkowski. "We've been supporting this charity since our inception and have been able to raise thousands of dollars over the last two years."

Needless to say, the competition was well received by other homebrewers in the area, and it attracted a formidable judging pool. "The best part of the competition itself was the huge amount of support from the other local homebrew clubs. We had entries from 17 different clubs and judges from at least six different clubs. We were able to put four judges on almost every flight. One judge was at least Certified or higher per flight to help along participating novice judges. We're pretty happy to have exposed dozens of newbies to the fun of beer judging and have helped one of the local clubs fill up their next BJCP prep class!"

In all, there were 300 entries in the competition. The Best of Show award went to Northern Kentucky Homebrewers Guild member Michael Schuler for his gueuze. Schuler got off to a great start with the club's emphasis on education, and with a little help from fellow members, was soon able to put together a world-class Belgian sour with an effective but unorthodox approach. His Best of Show winning recipe is included.

"In January I was fortunate enough to cross off Item #7 on my bucket list: win Best of Show in a homebrew competition," Schuler said, but modestly admitted his success was several years in the making. "This was something I had dreamed of since 2008 when I started brewing with an extract beer kit I received for Christmas from my girlfriend (now wife). I started slowly, making barely passable beer. As I got deeper into the craft beer scene, my knowledge, and the quality of my beers, increased dramatically. One of the biggest improvements in my brewing came when I joined the Northern Kentucky Homebrewers Guild in 2012. Being around fellow brewers and beer geeks was not only fun, it provided easy access to a wealth of brewing information."

Schuler has had plenty of time to dream of his next creation. "As someone who works at a desk all day, my favorite part of brewing is that I get to use my hands and create something I can share with friends and family. My brewery is fairly basic and is the same setup I've been using since making the jump to all-grain brewing four years ago. It consists of a cooler with a copper manifold for the mash tun, an unconverted cooler for the hot liquor tank, and a 10-gallon aluminum pot on a propane burner for the kettle. Homebrewing can be as simple or complex as you want to make it, but above all it should be fun!"

Amahl Turczyn Scheppach is associate editor of *Zymurgy*.

"WE WANTED A GREAT VENUE, WE WANTED LOCAL SUPPORT FROM BREWERIES AND HOMEBREWERS, WE WANTED IT TO BE EDUCATIONAL FOR BOTH NOVICE JUDGES AND HOMEBREWERS, AND WE WANTED IT TO BE AWESOME."

Randomly Firing Synapses Gueuze

MICHAEL SCHULER, NORTHERN KENTUCKY HOMEBREWERS GUILD
2014 MOERLEIN CUP BEST OF SHOW

INGREDIENTS

for 5.5 U.S. gallons (20.82 L)

5.0 lb	(2.27 kg) Belgian Pilsner malt (48.4%)
2.0 lb	(0.9 kg) 10° L Munich malt (19.5%)
2.0 lb	(0.9 kg) Belgian wheat malt (19.5%)
1.0 lb	(0.45 kg) Kentucky honey (9.8%)
4.0 oz	(113 g) acid malt (2.4%)
1.0 oz	(28 g) Hallertauer, 4% a.a. (boil 60 min) 16.0 IBUs
1.0 oz	(28 g) Hallertauer, 4% a.a. (boil 20 min) 9.7 IBUs
1 tsp	yeast nutrient (boil 10 min)
	Wyeast 3724 Belgian Saison ale yeast
	distilled water
1.5 g	calcium chloride (mash)
0.25 tsp	lactic acid (sparge)

Original Gravity: 1.052
Color: 5.4 SRM
IBU: 25
Brewhouse Efficiency: 75%
Boil Time: 60 minutes

DIRECTIONS

Use a single infusion mash and a batch sparge. Mash grains at 148° F (64° C) for 60 minutes. Boil vigorously for 60 minutes, chill, and aerate. Pitch Belgian Saison yeast at 63° F (17° C) and let rise naturally. Add heat as necessary to get to 80° F (27° C) and hold until terminal gravity is reached. Rack to secondary and add the dregs of several of your favorite sour beers. I achieved good results in five weeks but it may take longer. Add lactic acid to taste if not sour enough.

BREWER'S NOTES: I have to thank my friends for this one. This originally was a perfectly good Belgian saison with hints of sourness and funk from the yeast, but I decided to do some experimenting on it after hosting a sour beer tasting one night. I kept the dregs of five world-class sour beers that my friends had brought, including some from Russian River and Cantillon. I pitched the dregs into the keg of saison at 65° F (18° C) and waited for five weeks. Upon tasting the beer I was pleasantly surprised to find a nice tart and complex flavor. The sourness was enhanced by adding a little lactic acid. This isn't a traditional gueuze in that it's not a blend of aged lambics, but for the impatient homebrewer it's a good substitute!

TASTING NOTES:

4/18:	1.033. Some esters, orange/lemon hints
4/30:	1.019. Tastes similar to Belgian wit
5/8:	1.013. Tasting more like Dupont
5/20:	1.008
5/22:	1.006 @ 90° F
5/23:	1.005. Kegged.
12/1:	Had been turning a bit sour and funky so added the dregs of the following to the keg: Cantillon Rose de Gambrinus, Goose Island Madame Rose, Russian River Consecration, Russian River Temptation, Rodenbach Caractère Rouge
12/17:	left in 65° F room. Already starting to develop the "sweet tart" flavor of some of the donor beers.

EXTRACT RECIPE

Omit acid, Pilsner, Munich, and wheat malts, substituting with 5 lb (2.27 kg) pale malt extract syrup and 1.5 lb (0.68 kg) wheat malt extract syrup. Dissolve extracts completely and proceed with recipe.

KUDOS—BEST OF SHOW

AHA/BJCP Sanctioned Competition Program

March 2013

Homebrew at the W.E.B., 651 entries—*Michael Ericksen, Saline, MI.*

December 2013

Palmetto State Brewers' Open, 366 entries—*Robert Leach, Aiken, SC.*

Primer Concurso Somos Cerveceros 2014, 160 entries—*Omar de Prada, Mar del Plata.*

North Sound Winter Homebrew Competition, 243 entries—*Mark Roberts, Seattle, WA.*

2013 THIRSTY Classic, 185 entries—*Chad Vanderpool, Shelby, OH.*

Happy Holidays Homebrew Competition (HHHC), 743 entries—*Tim Fahrner, St. Louis, MO.*

Alzheimer's Holiday Brew Off, 34 entries—*Justin Berstler, Wake Forest, NC.*

January 2014

Edmonton Homebrewers Guild Winter Warmers Club Only Competition, 17 entries—*Jonathan Zacharko, Edmonton, Alberta, Canada.*

January LIBME Monthly Club Comp, 10 entries—*Christopher Dolan.*

Belle City Winter Warmer Homebrew Competition, 67 entries—*Karl Liebmann, Wausau, WI.*

Lancaster Iron Brewer, 201 entries—*Keith Hartman & Mike Frederick, Lancaster, PA.*

Mardi Gras Casino's 1st Annual Homebrew Competition, 48 entries— *Russ Brunner, Tamarac, FL.*

Winterbrew 2014, 193 entries—*Adam Meyers, Rochester, MN.*

Moerlein Cup Homebrew Competition, 300 entries—*Michael Schuler, Alexandria, KY.*

The 20th Annual Boneyard Brew Off, 263 entries—*Shaun Niemeyer.*

Kris Kringle Challenge, 18 entries—*Brent Otte, Hillsboro, OR.*

The Ruck's Extreme Homebrewing Competition Winter Sixpack 2013, 49 entries—*The Alcoholix - Steven Graham, Jennifer Cutler, Bryan Stradley, West Stockbridge, MA & Albany, NY.*

Wet Your Whistle Homebrew Competition, 109 entries—*Joe Bump, Burke, VA.*

Barley Legal Porters, Stouts, and Winter Beers! 48 entries—*Jim Daugherty.*

2014 Doug King Memorial Homebrew Competition, 118 entries—*Norman Jufer, Ontario, CA.*

Thirsty Boy Homebrew Competition, 42 entries—*Chris Whitbeck, Washoe Valley, NV.*

February 2014

SABC Summer 2014 Amateur Brewing Challenge, 27 entries—*Clinton Fisher, Magill SA.*

Winter Carnival Beer Dabbler Home Brew Contest, 96 entries—*Kate Liebfried and Eric Biederman, Minneapolis, MN.*

Philly Homebrew Club Winter Ales Competition, 75 entries—*Joe Moran.*

Liffey Brewers Dublin Area Competition, 56 entries—*Rossa O'Neill, Dublin, Ireland.*

Fur Rondy Homebrew Competition, 31 entries—*Tyler Doil and Doug Griffin, Anchorage, AK.*

2014 Domras Cup Mead Competition, 102 entries—*Sergio Moutela, South Plainfield, NJ.*

Groundhogs Day Homebrew Competition, 45 entries—*Brian Hall, Portland ME.*

February LIBME Monthly Club Comp, 10 entries—*Brian Giebel, Long Island, NY.*

9th Annual Peterson AFB Homebrew Competition and Fest, 540 entries—*Michael McGuckian, Colorado Springs, CO.*

Homebrew Alley VIII, 601 entries—*Stephen Durley & Hayley Jensen, New York, NY.*

ASH 2014 Cider Competition, 16 entries—*Chuck Howell, Scottsdale, AZ.*

KLCC Microbrew Fest Homebrew Competition, 221 entries—*Justin Bruce, Eugene, OR.*

Whiskey Row Brew Club Hi-Gravity Competition, 9 entries—*Steve Jackson, Prescott, AZ.*

Mad Monk's Mash-Up, 45 entries—*Eric Askea, Jacksonville, FL.*

Third Annual Coal Country Brewer's Cup 2014, 31 entries—*Dave Amiano, Fairmont, WV.*

Bataille des Bieres, 51 entries—*Jim Cox, Lafayette, LA.*

The Great Northern Brew-Ha-Ha!, 251 entries—*Jonathan Portinga, Duluth, MN.*

Institution Ale Co. Inaugural Home Brew Competition, 51 entries — *Gregory Bloom, Ventura, CA.*

Sweethearts Revenge Homebrew Competition, 214 entries—*Paul Hangrove, Tulsa, OK.*

British Beerfest Competition, 184 entries—*Eric Latimer, Akron, OH.*

All-American Homebrew Competition (U.S.-vs-The World), 263 entries—*Cassidy Shibiya, Harrison, OH.*

JBLM Brewfest 2014 Competition, 169 entries—*Charles Macaluso, Saint Helens, OR.*

War of the Worts XIX, 855 entries—*John Slotterback, Fred Rogers, Catawissa, PA.*

Reggale and DredHop, 392 entries—*Greg Foley, Boulder, CO.*

Kansas City Bier Meister's 31st Annual Competition, 566 entries—*Nathan Briscoe, Holden, MO.*

2014 Midwinter Homebrew Competition, 774 entries—*Kevin Kearney, Calmar, IA.*

Helena Winter Homebrew Competition, 35 entries—*Mark Hislop, Butte, MT.*

3rd Annual Lucette Brewing Company Winter Home Brew Competition, 50 entries—*Adam Meyers, Rochester, MN.*

March 2014

Brew Masters Competition, 33 entries—*Dana Collins, Dracut, MA.*

Barley Legal 4, 152 entries—*Anthony Erdman, Glenwood, MD.*

March LIBME Monthly Club Comp, 10 entries—*Jon Brengel.*

Drunk Monk Challenge, 800 entries—*David Fetty, Darien, IL.*

AHA/BJCP SANCTIONED COMPETITION PROGRAM CALENDAR

For complete calendar, competition and judging information go to www.HomebrewersAssociation.org/pages/competitions

May 1
McCoole's Home Brew Competition
Quakertown, PA. Entry Deadline: 4/25/2014.

May 3
Napa Homebrewers Classic
Napa, CA. Entry Deadline: 4/26/2014.

May 3
18th Annual Celtic Brew Off
Arlington, TX. Entry Deadline: 4/11/2014.
www.kobb.org

May 3
War of the Wort
Starkville, MS. Entry Deadline: 4/12/2014.
www.wickdawg.com/warofthewort

May 3
Mother Earth's Rhythm & Brews Home Brew Competition
Vista, CA. Entry Deadline: 4/20/2014.
www.motherearthbrewco.com

May 3
Greg Noonan Memorial Homebrew Competition
South Burlington, VT. Entry Deadline: 4/18/2014.
www.mashers.org

May 3
Sioux Falls South Side Brewing Festival
Sioux Fall, SD. Entry Deadline: 4/30/2014.

May 3
Wort Transformation Challenge
La Vista, NE. Entry Deadline: 2/1/2014.
www.facebook.com/events/1380926295493248/

May 4
Great Basin Brew-Off
Reno, NV. Entry Deadline: 4/19/2014.
www.wzzcomps.net

May 4
Good-Ta-Go Homebrew Competition
Chambersburg, PA. Entry Deadline: 5/4/2014.

May 9
Wisconsin State Fair Homebrew Competition
West Allis, WI. Entry Deadline: 4/16/2014.
wistatefair.com/competitions/other-contests-2/

May 9
2014 American Canned Craft Beer Competition
Scottsdale, AZ. Entry Deadline: 4/28/2014.
cannedcraftbeerfest.com

May 10
3rd Annual Larry Fest Twisted Beer Competition
Mandeville, LA. Entry Deadline: 4/21/2014.
www.mellowbrewfest.com

May 10
COHO's Spring Fling Homebrew Competition
Bend, OR. Entry Deadline: 5/3/2014.
cohomebrewers.org/SpringFling

May 10
Alameda County Fair Homebrew Competition (BABO)
Pleasanton, CA. Entry Deadline: 4/25/2014.
www.beercomps.org/babo/

May 10
Ipswich Show Home Brew Beer Competition
Ipswich, Queensland, Australia. Entry Deadline: 5/3/2014.

May 10
BrewFest at Mount Hope Homebrew Competition
Manheim, PA. Entry Deadline: 4/30/2014.
www.parenfaire.com/brewfest/main.php

May 10
Operation Fermentation
Katy, TX. Entry Deadline: 4/19/2014.
cialers.org/operation-fermentation

May 10
El Dorado County Fair
Placerville, CA. Entry Deadline: 5/2/2014.
www.hazeclub.org

May 16
Animas Alers - Ska Brewing GABF Pro-Am
Durango, CO. Entry Deadline: 5/13/2014.
www.animasalers.org

May 17
The Upstate's Premier Homebrew Competition
Greenville, SC. Entry Deadline: 5/1/2014.
www.growler-station.com/gs002-greenville

May 17
Beer Bacon Music
Frederick, MD. Entry Deadline: 4/15/2014.
www.beerbaconmusic.com

AHA/BJCP SANCTIONED COMPETITION PROGRAM CALENDAR

For complete calendar, competition and judging information go to www.HomebrewersAssociation.org/pages/competitions

May 17
8 Seconds of Froth
Cheyenne, WY. Entry Deadline: 5/3/2014.
HighPlainsDrafters.com/8-seconds-of-froth/

May 17
SoCal Homebrew Supply First Annual Homebrew Competition
La Verne, CA. Entry Deadline: 5/14/2014.
Socalhomebrew.com

May 17
OC Fair Homebrew Competition
Costa Mesa, CA. Entry Deadline: 5/2/2014.
www.ocfair.com/competitions

May 17
Hopfest
Kansas City, MO. Entry Deadline: 5/1/2014.
www.lewsgrillandbar.com

May 17
BUZZ OFF 20
Downingtown, PA. Entry Deadline: 5/3/2014.
brewdrinkrepeat.com/buzzoff2014/

May 17
22nd Spirit of Free Beer Homebrew Competition
Falls Church, VA. Entry Deadline: 5/8/2014.
sofb.brewcomp.com

May 17
Lansing's Hopped Up Home Brew Competition
Lansing, MI. Entry Deadline: 5/12/2014.
Thatshowwebrew.com

May 17
32nd Annual Oregon Homebrew Festival
Albany, OR. Entry Deadline: 5/2/2014.
www.hotv.org

May 17
King of the Mountain
Mentor, OH. kotm-lmhba.us

May 17
Heart of Cascadia
Portland, OR. Entry Deadline: 5/1/2014.
oregonbrewcrew.org/heart-of-cascadia

May 17
San Diego International Beer Competition
Del Mar, CA. Entry Deadline: 4/25/2014.
www.sandiegobeerfestival.com

May 17
Enchanted Brewing Challenge
Albuquerque, NM. Entry Deadline: 5/9/2014.
dukesofale.com

May 17
18th Annual B.E.E.R. Brew-Off
Bay Shore, NY. Entry Deadline: 5/9/2014.
www.beerhbc.org

May 18
19th Annual Big Batch Brew Bash
Houston, TX. Entry Deadline: 5/10/2014.
www.thekgb.org

May 18
Tijuana Hombrew Club
Tijuana, Baja California, Mexico. Entry Deadline: 5/3/2014. www.tijuanahomebrewclub.com/competencia2014/

May 23
Great Alaska Craftbeer & Homebrew Festival
Haines, AK. Entry Deadline: 5/19/2014.
www.seakfair.org/beer-fest/

May 24
Hogtown Brew Off
Gainesville, FL. Entry Deadline: 5/10/2014.
hogtownbrewers.org/Brewoff/

May 24
Minneapolis Cider Week Competition
Minneapolis, MN. www.townhallbrewery.com

May 29
California State Fair Homebrew Competition
West Sacramento, CA. Entry Deadline: 5/16/2014.
www.northerncalbrewers.com/

May 31
2014 Ohio State Fair Homebrew Competition
Columbus, OH. Entry Deadline: 5/13/2014.
ohiostatefair.com

May 31
Hop Blossom Homebrew Competition
Winchester, VA. Entry Deadline: 5/17/2014.
shenbrew.org/hop_blossom_14

May 31
Barnstormer Brewing and Pizzeria Take a Flight With Us Homebrew Competition
Barrie, ON, Canada. Entry Deadline: 5/21/2014.
www.barnstormerbrewing.com

AHA/BJCP SANCTIONED COMPETITION PROGRAM CALENDAR

For complete calendar, competition and judging information go to www.HomebrewersAssociation.org/pages/competitions

May 31
Sasquatch Beer Fest Home Brew Competition
Eugene, OR. Entry Deadline: 5/25/2014. www.northwestlegendsfoundation.org/homebrew_2014

May 31
San Diego County Fair Homebrew Competition
Del Mar, CA. Entry Deadline: 5/7/2014. www.sdfair.com/entry

June 1
The Mash Bash
Philadelphia, PA. Entry Deadline: 5/24/2014.

June 7
Los Angeles International Commercial Beer Competition
Pomona, CA. Entry Deadline: 5/16/2014. www.labeercomp.com

June 7
Bluegrass Cup
Lexington, KY. bluegrass-cup.bockbrew.com

June 7
All-American Beers Competition 2014
Appleton, WI. Entry Deadline: 5/31/2014. www.aleclub.org/?p=1914

June 7
Alamo City Cerveza Fest
San Antonio, TX. Entry Deadline: 5/3/2014. www.bexarbrewers.org

June 7
Walk on the Wildside 2014
Tampa, FL. Entry Deadline: 5/31/2014. www.specialhoperations.org

June 11
Devils Peak Homebrewing Competition
Cape Town, Western Cape, South Africa. Entry Deadline: 5/30/2014. www.southyeasters.co.za/?page_id=618

June 12
AHA National Homebrew Competition Final Round
Grand Rapids, MI. Entry Deadline: 6/2/2014. www.HomebrewersAssociation.org

June 14
The Beer Project
St. Petersburg, FL. www.fine-arts.org

June 14
Door County Homebrewing Championship
Baileys Harbor, WI. Entry Deadline: 5/31/2014. doorcountybeer.com

June 14
WCB Ironbrewer
Perth, Australia. Entry Deadline: 6/14/2014.

June 14
London & South East Craft Brewing Competition
London, Tottenham, United Kingdom. Entry Deadline: 6/9/2014. londonandsoutheast.brewcompetition.com

June 14
Hangar 24 Craft Brewery 5th Annual Homebrew Competition
Redlands, CA. Entry Deadline: 5/31/2014. www.hangar24brewery.com/homebrew.htm

June 19
California State Fair Commercial Beer Competition
West Sacramento, CA. Entry Deadline: 5/16/2014. www.northerncalbrewers.com

June 20
The Best Little Brewfest in Texas
Lewisville, TX. Entry Deadline: 5/20/2014. BLBFIT.com

June 21
The Ruck's Extreme Homebrewing Competition Summer Sixpack 2014
Troy, NY. Entry Deadline: 5/30/2014. getrucked.com/site/ruck-extreme-homebrewing-summer-sixpack-2014/

June 30
Napa Town & Country Fair
Napa, CA. Entry Deadline: 6/27/2014. www.napavalleyexpo.com

AHA SPECIAL EVENTS

Visit the Events section of HomebrewersAssociation.org for more information.

April 26
AHA Rally – Heretic Brewing Co.
Fairfield, CA

April 27
AHA Rally – Green Dragon & Buckman Botanical Brewery
Portland, OR

May 3
Big Brew/National Homebrew Day

May 4
AHA Rally – Finback Brewery
Queens, NY

May 18
AHA Rally – Heavy Seas
Halethorpe, MD

June 12-14
National Homebrewers Conference
Grand Rapids, Mich.

June 21
AHA Rally – NoDa Brewing Co.
Charlotte, NC

July 13
AHA Rally – Schlafly Brewing Co.
St. Louis, MO

July 13
AHA Rally – Revolution Brewing Co.
Chicago, IL

July 20
AHA Rally – Epic Brewing Co.
Denver, CO

By Jim Wilson and Rives Borland

Comparing Wort Oxygenation Methods

Oxygen's role in brewing is well understood even as research continues into some of its details. It is yeast's limiting essential nutrient and plays a vital role in the assembly of sterols and unsaturated fatty acids needed for healthy reproduction, creation of flavor compounds, and a vigorous fermentation.

The prime time for oxygen addition is after brewing, cooling, and trub separation. Yeast metabolize oxygen quickly at that point, and darkening, stale flavors and haze caused by oxidation are minimized. Dissolving any gas in a liquid can be a challenge. Mixing the two with maximum efficiency is the key. If oxygen is injected inline as wort is being pumped to the fermenter, it can be well mixed. If this isn't an option for you (and it isn't for most of us), read on.

Yeast's need for dissolved oxygen (DO) varies with strain, viability, original gravity (OG), and fermentation temperature. About 8 ppm is essential for complete and quick fermentation of 12° P wort with most ale yeasts. This can be achieved with a single aeration. More DO, up to 14-16 ppm, may be needed for extreme cases of the variables above. This higher level of DO can be reached with either one appropriately sized dose of pure oxygen or a second aeration after the yeast have had a chance to reproduce one generation.

Homebrewers have used many schemes to add oxygen to wort. Just about every imaginable method will allow 8 ppm of oxygen to dissolve, according to many sources. There is no reason to doubt these assertions, but most lack the backup data to be anything more than anecdotes. Variations on pouring or stirring are often used. Shaking is common too, but effective mixing requires a strong back and can be very dangerous—think for a moment about the amount of shrapnel a glass carboy will produce when dropped. Injecting air or oxygen through a 0.5 micron sintered stainless diffusor (stone) is an attractive option. The 0.5 micron stone produces high surface area-to-volume bubbles that are most effective for quick and efficient gas diffusion.

Which scheme, especially for the frugal brewer, is best? Answers to that question grew out of an educational discussion at one of our club meetings. While preparing for the talk, Jim Wilson looked online and found conflicting data that lacked detail about test methods. Rives Borland had a brand new Milwaukee MW600 DO meter and it was decided to put it to good use. You can never have too much data, after all! This instrument is affordable and has an accuracy of ± 1.5% of full scale over a range of 0-19.9 ppm DO, which seemed acceptable for our purposes.

We hoped to get practical answers about the strong and weak points of different methods and how the time compares for each to reach 8 ppm DO.

A test plan was devised and Carl Townsend, a member of the neighboring Pacific Gravity Club, chemical engineer, and BJCP National beer judge, kept us from falling into too many rabbit holes by providing valuable feedback on it and the data that was generated.

Two quarts was chosen as a sample size that would allow us to get through 80-some-odd tests in a reasonable time; 72° F (22° C) was chosen as the test temperature because that was ambient on test days; and tap water, 10° P and 15° P wort made with table sugar were selected as the liquids to be tested.

READER ADVISORY: Warning!

These pages are rated XG (eXtra Geeky) by the Bureau of Magazine Mucktymucks. Items in this section may contain raw data, graphic functions, full statistics and undiluted biochemistry. Keep away from poets, squeamish novices and others who may find the joyously technical nature of this prose to be mindbendingly conceptual or socially offensive. Also, because of the complex nature of brewing science, there is no guarantee that you will live longer, brew better or win any awards in the next homebrew competition based upon the conclusions presented here.

Prior to each series of tests, samples were deoxygenated by bubbling nitrogen into them with a stone. This is a much

faster process than boiling and cooling. Preliminary tests showed that deoxygenation and oxygenation occur at least four times faster when samples are well mixed, so this step was carried out on a magnetic stir plate rotating at about 90 rpm that produced a bulk liquid circulation of about 15 rpm. This rotation, along with the size of the DO probe, didn't allow a whirlpool to form and did let the probe see the moving sample it was designed for. In the 2-liter Erlenmeyer flask used for data production, it took about three minutes for nitrogen to strip the oxygen down from 8 ppm to 2.4 to 2.6 ppm and that was used as the baseline for our tests.

Five oxygenation methods were modeled:

1. Pouring once in a 3/8" diameter stream from the kettle to the fermenter.
2. Vigorous manual stirring at 200 rpm.
3. Shaking a nearly full fermenter. The 2-liter Erlenmeyer with 80 percent liquid and 20 percent air by volume was stoppered, held horizontally, and shaken at about 180 oscillations per minute, which was as fast as could be attained manually. This mixing is probably more energetic than can be achieved in a 5-gallon carboy by all except power lifters.
4. Air injection using a 2 liter per minute aquarium pump (Tetra Whisper 77853) through a stone. The 0.2 micron air filter that would be used in the real world to remove airborne wild yeast and bacteria wasn't necessary for these tests. The nitrogen setup was used, with the Erlenmeyer on a stir plate for consistency. Cost for the air pump, filter, stone, and tubing is about $30.
5. Pure oxygen injection from a Bernzomatic tank through a stone. This tank's regulator lacks a flow meter so the actual oxygen feed rate was unknown. For our tests, the nitrogen process setup was used and the oxygen feed rate was adjusted to be visually similar to the air injection tests.

About 43 ppm of pure oxygen will dissolve in water at 72° F (22° C) and only off gas slowly according to Dalton's law even if the vapor space is air. If the vapor space is pure oxygen, it will stay dissolved. Chris White and Jamil Zainasheff explain in their book *Yeast* how oxygen drives yeast growth and flavor production. Excessive

FIGURE 1

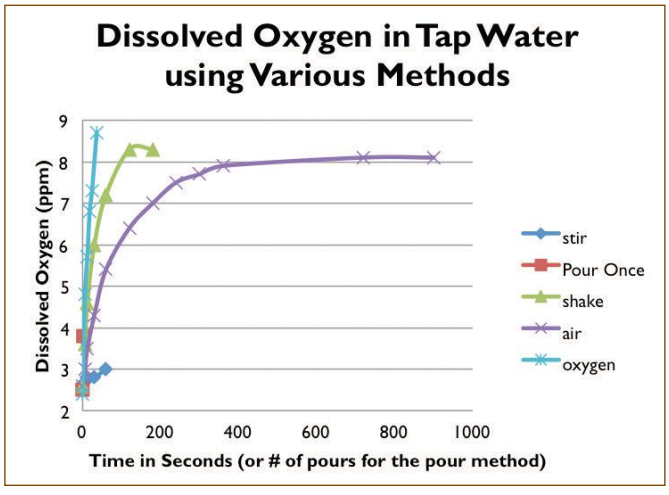


FIGURE 2

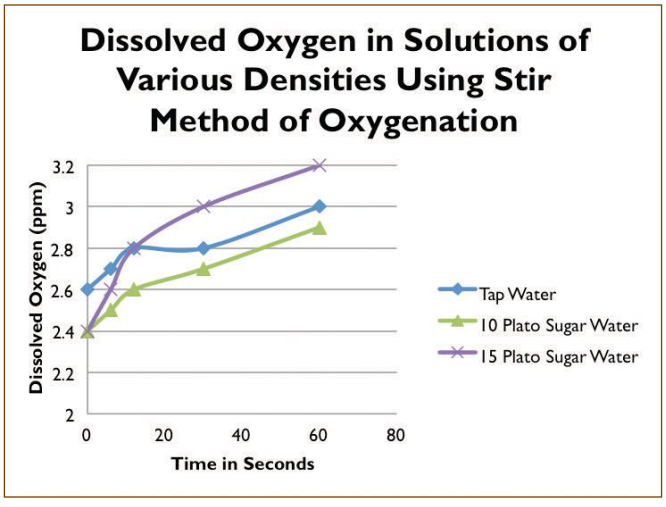


FIGURE 3

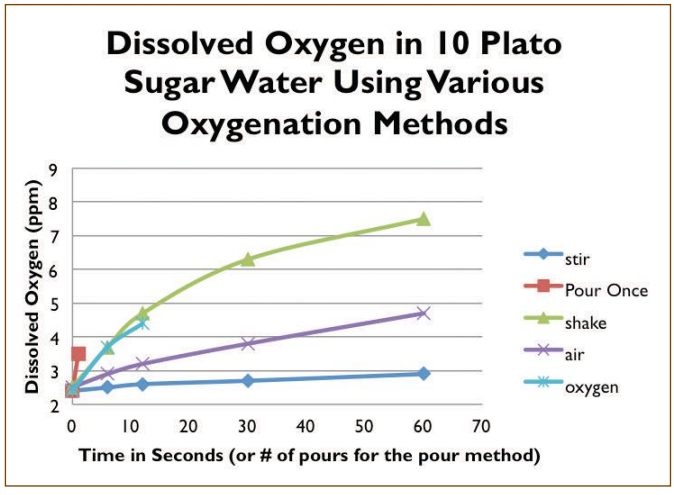


FIGURE 4

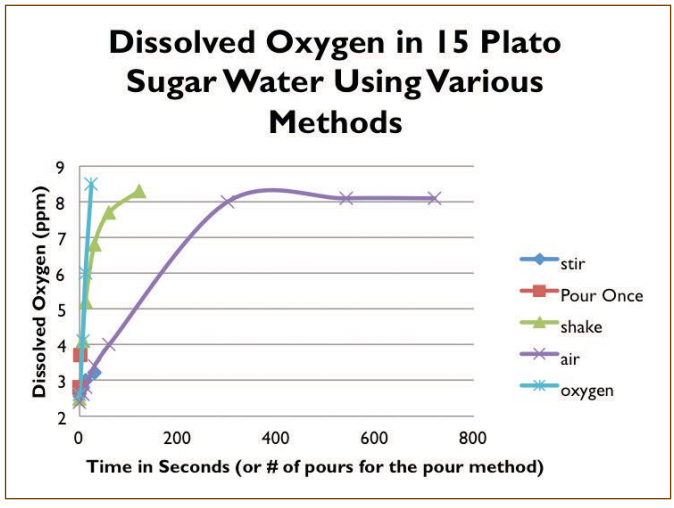


Photo courtesy Jim Wilson

oxygen will change the flavor of your beer and not necessarily in the direction you want, which dictates close management of pure oxygen additions.

One liter of oxygen completely dissolved in 5 gallons reaches a DO saturation of about 8.75 ppm. Carl calculated that a 1.4 ounce Bernzomatic tank, arguably good for six to eight 5-gallon batches (this is one of those conflicting bits of online data) holds 30 liters of oxygen at atmospheric pressure, which means that 4-5 liters is a typical real world dose. Poor mixing causes the difference from the ideal case. Cost for a Bernzomatic tank, regulator, stone, and tubing is about $60 and replacement oxygen tanks are about $10. Pure oxygen doesn't require filtration for sanitation.

First, some reality checks were done with the MW600 meter.

Tap water had a measured DO of 8 ppm at 72° F and 7.9 ppm at 68° F (20° C). These levels are realistic and not quite saturated at the given temperatures. Five 1-pint samples were tested in 1-pint jars:

Tap water deoxygenated with N_2 to completion: 0.1 ppm DO
Tap water boiled for 5 seconds and cooled to 72° F: 2.4 ppm DO
15° P wort boiled for 5 seconds and cooled to 72° F: 1.6 ppm DO
15° P wort boiled for 5 minutes and cooled to 72° F: 1.5 ppm DO

We tried deoxygenating tap water in an ultrasonic cleaner for 12 minutes at atmospheric pressure. The resulting DO was 8.0 ppm, which was unchanged from raw tap water. This was an attempt to humor Jim, who read that ultrasonic agitation in a vacuum will deoxygenate water. We learned the key word is vacuum.

See Figures 1-4 for the data.

The results of pouring once and stirring were obscured on the time scale that shows the other methods. Figure 3 is easier to read.

A novel method suggested by Carl was also tested. Two quarts of deoxygenated tap water in the Erlenmeyer with pure oxygen in the vapor space was shaken for 30 seconds. This resulted in 19.9+ ppm DO (scale max on the MW600). The test was repeated with 10° P wort with identical results.

You can determine, with your own tasting skills, if enough oxygen has been added to a batch of wort. Oxygenate at some level and record the times from pitch to start and finish (achieving FG) of fermentation. Both lag and fermentation phases need to go to completion and faster is better for fermentation. Evaluate the beer's taste with a BJCP style structured evaluation, adjust oxygen addition on the next batch if required, and repeat. Even the big boys do this.

Lessons Learned

A DO meter helps brewers understand the effectiveness of various wort oxygenation methods. The MW600's accuracy of ± 1.5 percent of full scale did produce some overlapping data that merits another look.

Pouring and stirring methods were slow because of low gas/liquid mixing. Shaking was effective and demonstrated that good mixing is the primary driver when dissolving a gas. But, 5 gallons of wort is too heavy for some brewers and safety considerations should be taken seriously. At a cost, a machine could do the shaking and a plastic carboy would avoid the danger of glass. All three methods run a small risk of infection if the ambient air contains appreciable wild yeast or bacteria. Filtered air or oxygen injections don't have this risk and when well mixed, are effective and scalable to any length brew. That conclusion deserves reemphasis. Gas and liquid have to be well mixed to dissolve quickly. Bubbling air or oxygen through a still volume of liquid is a slow and inefficient way to dissolve either.

Pure oxygen injection is the most expensive and fastest method but requires careful management to avoid off flavors. Air injection is less expensive than oxygen and is more flexible as it's always available and excessive DO levels are impossible to reach using the suggested method. It does take a little longer, but you were going to wash the dishes anyway, right? Depending on your abilities and needs, air injection has more practical advantages and fewer drawbacks than other methods.

Possible Future Testing

1. Gather DO data from real wort during brewing and compare to these scaled tests. This will take a while.
2. Retest to resolve apparent anomalies, due to the instrument accuracy or test mechanics, compared to Gas Law predictions.
3. Retest at lager fermentation temperatures, say 50° F (10° C). The Gas Laws say this falls into the diminishing returns category, but it still may be interesting to lager brewers.
4. Measure oxygen uptake in flowing systems.
5. Measure yeast's oxygen metabolism rate after pitching. For brewing's equivalent of the Nobel Prize, explain what all yeast strains actually do with the oxygen they take in.

Resources

1. White, Chris and Jamil Zainasheff. *Yeast*. Brewers Publications, 2010.
2. www.wyeastlab.com/hb_oxygenation.cfm
3. Homebrewtalk.com Forum.
4. *Brew Your Own* magazine, columns by Ashton Lewis.
5. DO meter used in these tests: www.milwaukeeinst.com/site/db/doc/manMW600_ENG.pdf
6. Parker, Neva. "Are Craft Brewers Underaerating their Wort?" MBAA TQ vol. 45, no. 4, 2008, pp. 352-354. www.mbaa.com/publications/tq/tqPastIssues/2008/Abstracts/TQ-45-4-0352.htm

Jim Wilson brews at home in Redondo Beach, Calif. and has been a member of the Strand Brewers Club for 14 years. He is a BJCP Grand Master II beer judge and an Associate Exam Director. Rives Borland has been homebrewing four years, is president of the Strand Brewers Club, and is a BJCP Certified beer judge. He and co-brewer Jeff Sanders won a bronze medal in category 22 at the 2013 National Homebrew Competition for their Rum Barrel Aged Russian Imperial Stout.

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 widely available commercial beers (or meads or ciders) using the BJCP scoresheet. We invite you to download your own scoresheets at www.bjcp.org, pick up a bottle of each of the beverages and judge along with them in our Commercial Calibration.

Two Scottish-style ales were sent to our judges for their review.

Kilt Lifter® is the flagship brew for Four Peaks Brewing Co. in Tempe, Ariz. It's a four-time Great American Beer Festival medal winner, including a silver medal in 2013.

Kilt Lifter is a full-bodied ale with strong caramel and roasted barley flavors. Amber in color, it has a malty sweetness and a hint of smokiness with a clean, dry finish. Brewed with two-row, caramel 80L, Carapils, and roasted barley, and hopped with East Kent Golding, Kilt Lifter checks in at 6 percent ABV and 21 IBU. Four Peaks suggests pairing the beer with barbecue, smoked meats, wild game, and duck.

Next up was Laughing Lab from Bristol Brewing Co. in Colorado Springs, Colo. This beer has won nine GABF medals since 1994, as well as a silver medal in the 1996 World Beer Cup.

Laughing Lab is deep red in color and medium/full bodied. It's brewed with two-row, chocolate, crystal, and Carapils malts and hopped with Chinook and Willamette, checking in at 19 IBU and 5 percent ABV. The blend of specialty malts gives Laughing Lab a nutty, roasted flavor that's mildly sweet, but not too rich.

The beer was named for the yellow Labrador that belonged to owners Mike and Amanda Bristol when they opened the brewery in 1994.

ON THE WEB

Bristol Brewing Co.
www.bristolbrewing.com

Four Peaks Brewing Co.
www.fourpeaks.com

BJCP Style Guidelines
www.bjcp.org

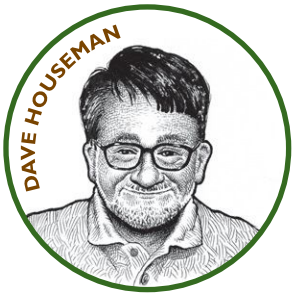
Commercial Calibration
HomebrewersAssociation.org/pages/zymurgy/commercial-calibration

(Note: This is a Members Only area of the website)

OUR EXPERT PANEL includes David Houseman, a Grand Master IV judge and competition director for the BJCP from Chester Springs, Pa.; Beth Zangari, a Grand Master level judge from Placerville, Calif. and founding member of Hangtown Association of Zymurgy Enthusiasts (H.A.Z.E.); Scott Bickham, a Grand Master III 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 VII judge, principal author of the 2004 BJCP Style Guidelines and president of the BJCP board who lives in Beavercreek, Ohio.

Laughing Lab—Bristol Brewing Co., Colorado Springs, Colo.
BJCP Category: 9C Scottish Export 80/-

THE JUDGES' SCORES FOR LAUGHING LAB



Aroma: Moderate nutty caramel malt aroma with high fruity esters. Very low earthy hop aroma. No diacetyl. No DMS. No perceived alcohol aroma. No smokiness. A plastic-like phenolic content to the aroma, not attributable to the tasting glass. (7/12)

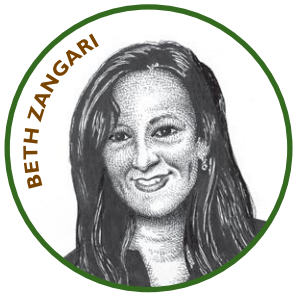
Appearance: Brownish, amber color. Bright clarity. Thin, rocky, tan head dissipated quite rapidly. (2/3)

Flavor: Sweet, nutty caramel maltiness up front with low-to-medium supporting hop bitterness. Very estery. No hop flavor. Some light roastiness. Bitterness and roasty notes linger in aftertaste, along with sweet malt and a plastic-like phenol. No DMS. No diacetyl. Moderate alcohol presence. (14/20)

Mouthfeel: Medium to thin body. Smooth, almost creamy mouthfeel with a bit of hop and roasted malt astringency. No apparent alcohol warming. Low carbonation for a bottled beer, but appropriate for a Scottish ale served on draught. (4/5)

Overall Impression: Combination of esters, plastic-like phenols, and caramel define this beer. Likely quite oxidized as it's not as clean and crisp as Scottish ales tend to be; the caramel character seems to be from age rather than kettle caramelization or crystal malts. Packaging code indicates this beer is five months since bottled so to be fair it's not so fresh; the caramel and esters are indicative of age. The strength of this beer is correct for the style. A fresher example would be great as a session beer to have with friends in the pub. (6/10)

Total Score: (33/50)



Aroma: Rich caramel notes dominate initial aroma, with a hint of smokiness in the background. A fresh light plum fruit ester is present, though no hop aroma is detected. (8/12)

Appearance: Burnished copper, brilliantly clear. A light creamy foam falls quickly to an island in the center of the glass on the surface. (2/3)

Flavor: Pronounced kettle-caramel burnt sugary sweetness dominates at first, following aroma. No hop flavor, but a hint of bitterness provides balance mid-palate, then accentuates a dose of roastiness in the finish. A light plum fruitiness rounds out the middle. No smokiness or diacetyl. (16/20)

Mouthfeel: Medium bodied with moderate carbonation. The crisp, dry finish lingers with a mix of low alcohol warmth and moderate drying astringency. (4/5)

Overall Impression: Balance leans heavily toward malt and a rich, rounded mid-palate that gives way to a crisp, dry finish. A showcase for kettle caramelization. An oatmeal raisin cookie with vanilla ice cream would be a noble accompaniment. (7/10)

Total Score: (37/50)

Aroma: Moderately strong malty aroma with light toffee notes, toasted breadcrumbs, and a slight grainy edge. Very low roast emerges as it warms, more like bittersweet chocolate than coffee. Light pear esters but otherwise the profile is clean. I also picked up a trace of alcohol in my second impression. (8/12)

Appearance: Copper color with excellent clarity and a wispy white crown of bubbles that fades a bit too quickly. (2/3)

Flavor: A malt-focused beer that does not have as much depth compared to the classic examples. Light toffee and caramel notes in the forefront, followed by toasted malt and the somewhat acrid graininess noted in the aroma. The finish has a moderate to high bitterness—more bitter than expected for this style, and this seems to be due to tannin components from the grains rather than hop alpha acids. There is little contribution to the flavor from the yeast and hops, appropriate for this style. (13/20)

Mouthfeel: Low alcohol is appropriate for the style, but as evidenced from the head, the carbonation is a little low. A lingering astringency coats the mouth after the beer is swallowed. (3/5)

Overall Impression: A nicely quaffable beer with some malt complexity, but not as much depth as required for the style. The graininess and astringency are not overpowering, but detract from the smoothness. Great job with the fermentation—the yeast character is subtly present but remains politely in the background to let the malt character shine. (6/10)

Total Score: (32/50)

Aroma: Moderate grainy and dark caramelly malt sweetness. Light esters and alcohol. Bready-rich malt notes emerge, adding complexity to the caramel impression. Barest hint of earthy hops. Generally clean. Hint of roast or smoke, very deep in background. (9/12)

Appearance: Very deep amber color, nearly copper. Low beige head, settled quickly. Clear but not brilliant. (2/3)

Flavor: Grainy-rich malt with toasty notes. Medium bitterness, lasting into the finish. Palate initially is malty but bitterness takes over at the end and into the aftertaste. Caramel is low in intensity, but has a dark, slightly burnt quality. Aftertaste is somewhat harsh. Low earthy hop flavor. Aftertaste is bitter and slightly burnt with supporting malt. Malt flavors are good, but bitterness/harshness overwhelms them in the balance. (14/20)

Mouthfeel: Medium-full body, creamy. Lightly warming. Medium carbonation. Seems a bit full/rich. (3/5)

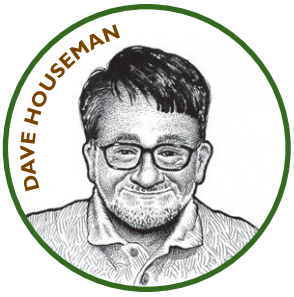
Overall Impression: Bitterness seems to be on the high side, taking the balance away from the malt. Seems a bit tired—could be showing age. Harshness is unpleasant. Malty flavors are interesting, if on the neutral side. Caramel flavors seem a bit low, and have a burnt sugar quality to them. Could be on the big side; some alcohol was noted. (6/10)

Total Score: (34/50)

Illustrations by Terry McNerney

Kilt Lifter—Four Peaks Brewing Co., Tempe, Ariz.
BJCP Category: 9C Scottish Export 80/-

THE JUDGES' SCORES FOR KILT LIFTER



Aroma: Low caramel and roasted barley aroma. Light earthy hop aroma. Light but noticeable fermentation esters. No apparent alcohol stands out. No DMS. No diacetyl. Crisp and clean aroma. (9/12)

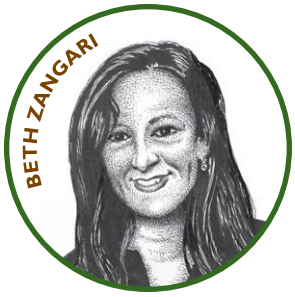
Appearance: Amber color. Clear but not bright. Dense, beige, rocky head with good retention. (3/3)

Flavor: Nutty, sweet maltiness with hints of caramel and roast. Medium supporting hop bitterness. No hop flavor. Light esters in the background. No DMS. No diacetyl. Finishes sweet with noticeable hop balance. Nutty roastiness dominates aftertaste. Some apparent alcohol. (16/20)

Mouthfeel: Medium to medium-thin body. Crisp mouthfeel with just a bit of astringency from hops and roasted grains. Lively carbonation. Noticeable alcohol warming. (5/5)

Overall Impression: A very nice Scottish-style ale with a complex malt profile. Fresh, clean, very drinkable. Alcohol is a bit on the high side for the style. Sweet, malt dominant without being cloying. Well-balanced. Good session beer to enjoy by the pint(s) with aged cheddar cheese and friends. (8/10)

Total Score: (41/50)



Aroma: Initial pronounced toasty malt, with fairly strong caramel notes. Low earthy hop aroma, and light pear-like fruitiness. A light smoky note emerges as the sample is swirled. (7/12)

Appearance: Golden amber, brilliantly clear, with a pearly off-white rocky foam that falls very slowly. Doesn't quite lace the glass. (3/3)

Flavor: Moderately pronounced caramel maltiness hits the tongue first, followed by light stone fruit, like Queen Anne cherries (the yellow variety), then hints of toasted malt. A firm crisp hop bitterness follows, then finishes with a light grainy dryness. The dry finish accentuates a lingering hop bitterness. (15/20)

Mouthfeel: Medium-light bodied with softish carbonation, giving a smooth texture. Some low alcohol warmth. The finish has a hint of roast astringency that provides a crispness. (4/5)

Overall Impression: Malt-hop balance definitely leans toward hop bitterness, accentuated by a dry, grainy finish. Refreshing and crisp, the hop presence betrays this beer's Western source. Simple, not complex, which makes it a good everyday beverage, though at 6 percent ABV, it's a little bigger than its UK cousins. A good nightcap after a harrowing day. (7/10)

Total Score: (36/50)

Aroma: Caramel and light toffee notes at the forefront, followed by low grainy notes. An interesting honey-like sweetness with moderate floral/rose petal notes that are higher than in most cool-fermented ales. (8/12)

Appearance: Medium copper color with outstanding clarity. The head forms wisps of bubbles that leave some lace on the glass. (2/3)

Flavor: Malty sweetness dominates, with a leading edge of caramel and toffee malts. I also get light toasted notes, a touch of roast, and a slightly pungent graininess that carries through to the finish. The hop bitterness is low, which makes the overall balance somewhat sweet, in accordance with the style. The yeast fruitiness is less apparent than in the aroma, but the floral notes are still more assertive than most examples of this style. A slight roast bite in the finish helps dry it out a little. (14/20)

Mouthfeel: Smooth, with a hint of astringency. I also pick up mineral and metallic notes, which leave a lingering twang in the finish. A higher carbonation level would make the beer a little less heavy. (4/5)

Overall Impression: A nice example of a Scottish ale, but with some minor flaws. The sweet balance is on par with many examples of the style, but metallic notes detract from the finish. These may have been a consequence of oxidation that occurred during shipping and handling, although these mineral notes sometimes also originate from the water. The conditioning could also be improved but may be better on fresh samples from draught. (7/10)

Total Score: (35/50)

Aroma: Toasty malt initially, clean and moderately strong, giving an impression of sweetness. Medium-low esters. No hops. Some bready-rich malt notes follow. Toast takes on a slightly buttery or butterscotch quality over time. (8/12)

Appearance: Tall off-white head, average retention. Medium amber color, slightly pale. Mostly clear but has some tiny flakes of suspended particulates. (2/3)

Flavor: Toasty, bready malt, moderately strong. Medium bitterness with a fairly dry finish. Bitterness and malt are nearly even in balance. Slightly sharp bite from the high carbonation. Medium-low esters. Slightly buttery caramel flavor; it has a light toffee quality, kind of like Lyle's Golden Syrup. The bitterness and carbonic bite skew the balance away from the malt. (14/20)

Mouthfeel: High carbonation, with lots of prickly bubbles. Medium body. Slightly astringent. Not warming yet seems to have an impression of strength. (3/5)

Overall Impression: Malt depth seems low, more toasty than caramelly. Seems light in malt intensity. Bitterness a bit high in the balance. The high carbonation level also makes the malt seem thin. Doesn't really seem rich and caramelly. Fresh and clean, though. Not sure I'd recognize this as a Scottish ale if tasted blind. (7/10)

Total Score: (34/50)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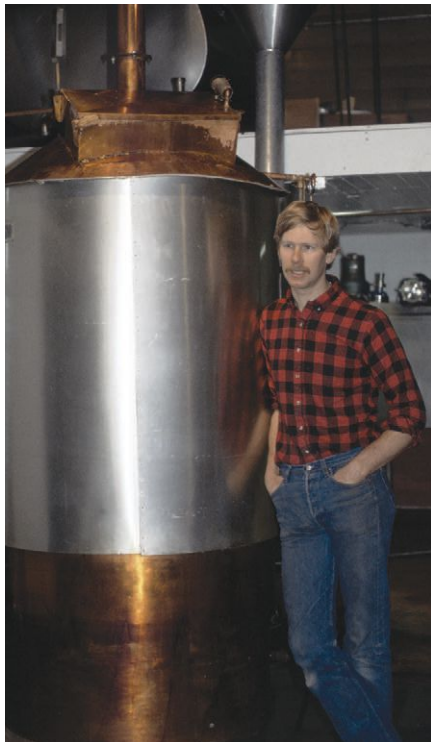
by Charlie Papazian

The Original American Wheat Beer

Note: This article is excerpted from Microbrewed Adventures, *Charlie's recollection of the early microbrewery pioneers published in 2005.*

The address of the brewery was 176 First Street, reached by taking Exit 30 off Interstate 5, just north of the Washington-Oregon border. It could arguably be called the birthplace of American-style wheat beer. Someone should erect a historic landmark memorial, for that was where the original Pyramid Wheaten Ale was brewed at the Hart Brewing Company. In 1984, company founder and homebrewer Tom Baune and his wife, Beth Hartwell, breathed life back into a building that could only be described at the time of my visit in 1986 as a general store orphaned by the construction of the interstate.



Tom Baune, founder of Hart Brewing Co. and creator of Pyramid Wheaten Ale.

The brew kettle, keg washing equipment, fermenters, keg washers, and bottling line were all salvaged, reconditioned, or self-fabricated. Visiting with a small group of established brewers and aspiring brewers, I was surprised that such a remote brewery in an all-but-abandoned locale could and did resurrect the passion of beer and brewing. It was called sweat equity. We were all in awe of owner and jack-of-all-trades Baune, not only for the establishment of a brewery in such a remote loca-

Original 1986 Pyramid Wheaten Ale

ALL-GRAIN RECIPE

INGREDIENTS

for 5 U.S. gallons (19 L)

3.5 lb	(1.59 kg) American two-row pale malt
3.5 lb	(1.59 kg) American wheat malt
1.0 lb	(454 g) crystal malt (10° L)
1.0 oz	(28 g) Cascade hops 5% a.a. (5 HBU/140 MBU) 120 min
0.25 oz	(7 g) Perle hops 8% a.a. (2 HBU/56 MBU) 15 min
0.5 oz	(14 g) Perle hops, 1 min
0.25 tsp.	(1 g) powdered Irish moss
	English ale yeast
0.75 cup	(175 ml measure) corn sugar (priming bottles) or 0.33 cup (80 ml) corn sugar for kegging

Target Original Gravity: 1.045 (11 B)
Approximate Final Gravity: 1.008 (2 B)
IBU: about 25
Approximate Color: 7 SRM (14 EBC)
Alcohol: 4.5% by volume

DIRECTIONS

A step infusion mash is employed to mash the grains. Add 7 quarts (6.7 l) of 140° F (60° C) water to the crushed grain, stir, stabilize and hold the temperature at 132° F (56° C) for 30 minutes. Add 3.5 quarts (3.3 l) of boiling water, add heat to bring temperature up to 155° F (68° C) and hold for about 30 minutes. Raise temperature to 167° F (75° C), lauter and sparge with 3.5 gallons (13.25 l) of 170° F (77° C) water. Collect about 5.5 gallons (21 l) of runoff. Add 120-minute hops and bring to a full and vigorous boil.

The total boil time will be 120 minutes. When 15 minutes remain, add the 15-minute hops. When 10 minutes remain, add the Irish moss. When 1 minute remains, add the 1-minute hops. After a total wort boil of 120 minutes, turn off the heat and place the pot (with cover on) in a running cold water bath for 30 minutes. Continue to chill in the immersion or use other methods to chill your wort. Strain and sparge the wort into a sanitized fermenter. Bring the total volume to 5 gallons (19 l) with additional cold water if necessary. Aerate the wort very well.

Pitch the yeast when temperature of wort is about 70° F (21° C). Ferment at about 70° F (21° C) for about one week, or until fermentation shows signs of calm and stopping. Rack from your primary to a secondary fermenter and if you have the capability, "cellar" the beer at about 55° F (12.5° C) for about one week. Prime with sugar and bottle or keg when complete.

Original 1986 Pyramid Wheaten Ale
MALT EXTRACT RECIPE

INGREDIENTS
for 5 U.S. gallons (19 L)

5.5 lb	(2.5 kg) wheat malt extract syrup (50/50 wheat/barley)
1.0 lb	(454 g) crystal malt (10° L)
1.25 oz	(35 g) Cascade hops 5% a.a. (6.3 HBU/175 MBU) 60 min
0.25 oz	(7 g) Perle hops 8% a.a. (2 HBU/56 MBU) 15 min
0.5 oz	(14 g) Perle hops, 1 min
0.25 tsp	(1 g) powdered Irish moss
	English ale yeast
0.75 cup	(175 ml measure) corn sugar (priming bottles) or 0.33 cup (80 ml) corn sugar for kegging

Target Original Gravity: 1.045 (11 B)
Approximate Final Gravity: 1.008 (2 B)
IBU: about 25
Approximate Color: 7 SRM (14 EBC)
Alcohol: 4.5% by volume

DIRECTIONS
Place crushed grains in 2 gallons (7.6 l) of 150° F (66° C) water and let steep for 30 minutes. Strain out (and rinse with 3 quarts [2.8 l] hot water) and discard the crushed grains, reserving the approximately 2.5 gallons (9.5 l) of liquid, to which you will now add malt extract and 60-minute hops. Bring to a boil.

The total boil time will be 60 minutes. When 15 minutes remain, add the 15-minute hops. When 10 minutes remain, add the Irish moss. When 1 minute remains, add the 1-minute hops. After a total wort boil of 60 minutes, turn off the heat.

Immerse the covered pot of wort in a cold-water bath and let sit for 30 minutes, or the time it takes to have a couple of homebrews. Strain out and sparge hops and direct the hot wort into a sanitized fermenter to which 2.5 gallons (9.5 l) of cold water has been added. Bring the total volume to 5 gallons (19 l) with additional cold water if necessary. Aerate the wort very well.

Pitch the yeast when temperature of wort is about 70° F (21° C). Ferment at about 70° F (21° C) for about one week, or until fermentation shows signs of calm and stopping. Rack from your primary to a secondary fermenter and if you have the capability, "cellar" the beer at about 55° F (12.5° C) for about one week. Prime with sugar and bottle or keg when complete.

I WAS SURPRISED THAT SUCH A REMOTE BREWERY IN AN ALL-BUT-ABANDONED LOCALE COULD AND DID RESURRECT THE PASSION OF BEER AND BREWING.

tion, but for the quality of his ales brewed in small, handcrafted batches.

In the early 1980s, knowledgeable American homebrewers were aware of beers made with a combination of wheat and barley malt, called weizenbier (wheat beer) in Germany. The recipes were available. The techniques were known. But one important ingredient was essentially inaccessible to American microbrewers: the yeast creating the unique character of German-style wheat beers. Not to be deterred, American homebrewers and microbrewers followed the essential techniques for making German-style wheat beers, but substituted various English-style ale yeasts. A new beer style was born: American-style wheat beer.

Brewed with a significant proportion of wheat malt, Pyramid Wheaten Ale was a smooth, subtly caramel-flavored, light-bodied pale wheat ale balanced with a floral hop character that made it distinct from most other heavily hopped Pacific Northwest homebrewed and microbrewed ales.

Not only a microbrewery pioneer, Baune combined diversity with creativity. Pyramid Wheaten Ale remains one of the bestselling beers of Hart Brewing Company's successor, Seattle-based Pyramid Breweries.

Based on my own taste memory, data, and descriptions published in their early years, this recipe for Original 1986 Pyramid Wheaten Ale is presented with confidence. It's smooth, with a mild yet distinctive caramel character, a refreshing beer for all sessions.

Charlie Papazian is founder of the American Homebrewers Association.

Photos courtesy of Charlie Papazian

ADVERTISERS INDEX

By Bill Ridgely

Cycling to the NHC

Last year I mentioned to my partner Wendy Aaronson that the National Homebrewers Conference was going to be in Philadelphia, about 150 miles away. "Would you like to go?" "Sure," she responded. "But only if we can bicycle to it."

This wasn't an unusual response from Wendy, who bicycles everywhere, including to work every day. We're both avid bicycle tourists, and there are a fair number of active cyclists in our homebrew club, BURP (Brewers United for Real Potables).

BURP members have organized and participated in beer-themed bicycle tours throughout the U.S., Canada, and Europe (we call them "Tours de BURP"). We made some inquiries amongst club members and quickly enlisted a group of eight cyclists willing to ride with us on the tour. But bicycling from Washington, D.C. to Philadelphia posed some special challenges. Friends snickered and asked if we planned to ride up I-95. That would be the shortest route, of course, but interstate highways tend to not be particularly bicycle-friendly.

A quick look at the map showed that there were indeed some interesting options. We had already cycled many times from D.C. to Baltimore for overnight pub crawls. It was a 35-mile ride between the two cities, largely following an old stagecoach route using lightly traveled back roads. So the first part was simple enough. From Baltimore, there is a fully-developed rail trail, following the old Northern Central rail line (used by President Lincoln to reach Gettysburg). This trail began just north of the city and continued to York, Pa., a total of 44 miles. The Baltimore

light rail system covered the 17-mile distance from downtown to the trailhead, and bikes could be rolled onto the trains. So we quickly had our first two days of riding planned out.

We covered the approximately 100 miles between York and Philly over three days, with overnight stops in Lititz, Pa. (an old inn attached to a traditional English-style pub) and Exton, Pa. (reached after a happy hour stop at Victory Brewing Company in Downingtown). The final day's ride took us through Valley Forge National Historic Park and then along the Schuylkill River through Manayunk, where we enjoyed a fine lunch at the Manayunk Brewery.

On day 5, we finally rolled into Philly and gathered at the conference hotel for our victory photo.

It was an all-around excellent trip, covering a bit more than 225 miles and including lots of fine beer and gorgeous scenery. We never had to cycle in the rain, always managing to reach our destination each

day before the storms arrived. The weather was hot and humid, but nothing beat feeling the breeze in our faces while riding.

It was a great way to get to the conference, and we were primed and ready for the excitement of the next three days. Would we do it again? Absolutely—although cycling from D.C. to Grand Rapids, Mich. for this year's conference could offer some additional challenges.

Bill Ridgely is a member of the Brewers United for Real Potables in Washington, D.C. and a lifetime member of the American Homebrewers Association.

Photos courtesy of Bill Ridgely

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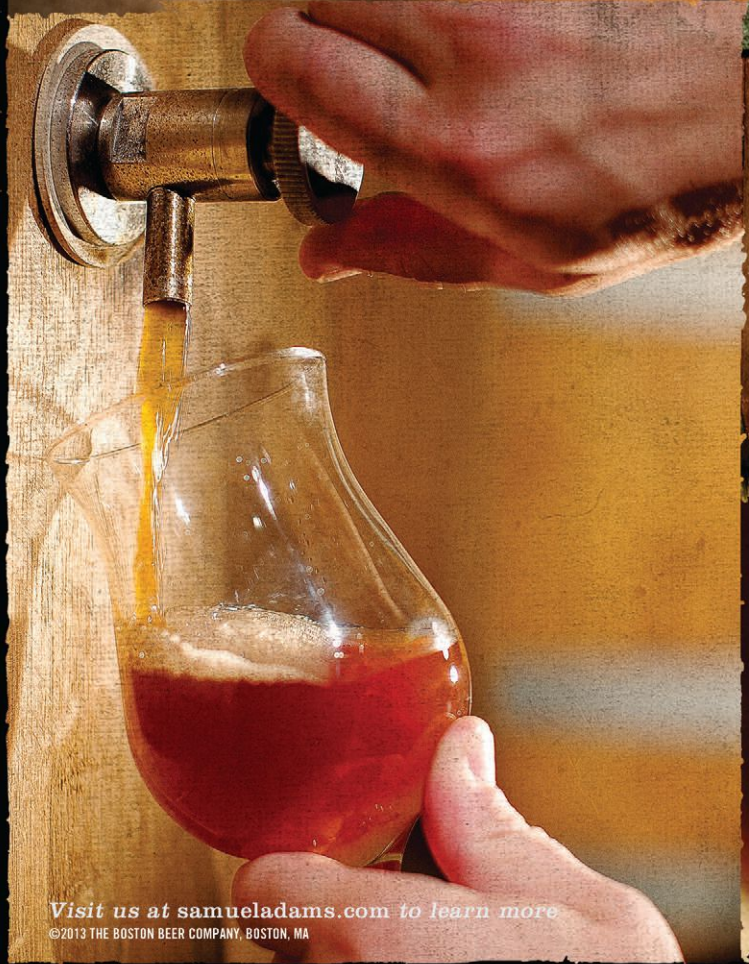

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