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VOL 45 • NO 6  
NOVEMBER/DECEMBER 2022



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# The Brewer's Share

Distillers often speak of the angel's share, that portion of a barrel-aged spirit lost to evaporation through permeable wooden staves. *The angel's share*—the image is so charming, the language so euphonious. There are many barrels in this world. The angels must be having one hell of a party.

One of my favorite things to do as a homebrewer is sneak my own brewer's share. That's what I call the sample I get to drink while racking, adding dry hops, packaging, or otherwise interacting with a batch in some meaningful way. Airlock sniffing, albeit a vital part of the process, does not count as meaningful.

Usually it's only a small taste, but sometimes I indulge in a full pour, such as happened not long ago when I packaged a helles. The finished beer is brilliantly clear in the keg, but my glass of Zwickelbier, stolen straight from the fermenter, was hazy enough that it could visually stand in for a New England IPA. I enjoyed the lightly carbonated lager while I racked the remainder to a keg. I'll share the rest of the beer with friends and family, but that glass was all mine.

I've talked about this before, the notion that homebrewing affords one the privilege of enjoying, for a fleeting moment, an experience that is exclusively yours.

"Why would I homebrew?" they ask. "There's so much great beer out there now."

True. There is a lot of great beer out there. But only my homebrew is mine exclusively. And when I'm sipping on that



fresh sample, I know I'm enjoying something nobody else can.

It's a simple pleasure, one shared by all of us who enjoy making things. The person cooking breakfast gets to eat that first sacrificial pancake, the one that's either a little raw in the middle, or a bit too done at the edges, or probably both. Is it the best pancake in the world? Probably not. But is it memorable? You bet.

This issue of *Zymurgy* goes live a few days before Halloween, which is my favorite holiday of the year—not because I'm particularly Gothic, but because Halloween happens to fall (ha!) at the end of my favorite month. Autumn is as elusive as those transitory sips of the brewer's share and must be relished while it's there. Because it's not there long.

As the days grow cooler, I think of the hot Scotchy. That's what you get when you divert a portion of hot mash runoff into a

mug and blend it with a generous measure of your favorite Scotch whisky. The perfect cold-weather cocktail, the hot Scotchy is especially cheering when the brew day has run long (or, more likely, you've mashed in late) and you find yourself lautering after sunset.

Reclaim a bit of what the angels might otherwise have taken and pair it with what you yourself have stolen. It needn't be Scotch, of course—bourbon, rye, Irish whiskey, and rum can all blend blissfully with sweet, warm, malty wort—but then you need to call it something else. Use what you like, and go ahead and float some whipped cream on top while you're at it. Sprinkle on some crushed chocolate malt for garnish. You've earned it.

And the best part? It's all yours.

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

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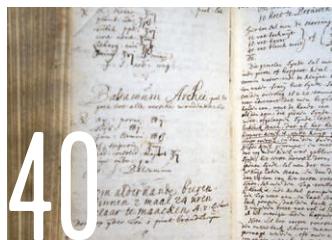


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## FINDING YOUR MOJO

Have your brew sessions degenerated into a chore? Have you lost your homebrewing mojo? You can get it back, but first you need to take a step back. Learn to love your brew days all over again.

By Mark Pasquinelli



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## LOOKING FOR REMBRANDT'S LOST BEER

There's a party going on in Rembrandt's painting *The Prodigal Son in the Tavern*. What's that beer the man is hoisting aloft? What was beer like in Rembrandt's time, in Amsterdam in the 17th century?

By Roel Mulder



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## CIDERS OF THE PACIFIC NORTHWEST

Nowhere is the growth of American cider more evident than in the Pacific Northwest. Cidermakers here are innovative and adventurous, influenced by an abundance of apples, the popularity of craft beer, proximity to wine country, and a favorable climate.

By Kristen Kuchar



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## SKEPTICAL BREWING, PART 6

In the final installment in the Skeptical Brewing series, we aim a critical eye at the IBU, challenge the famous "tongue map," and consider how much a beer's appearance influences judges' perceptions. Stay skeptical!

By Leandro Meiners and Matias Cavanna



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## ZYMURGY'S HOLIDAY GIFT GUIDE

Once again, our sponsors offer up exclusive holiday promo codes for AHA members. From boxes of hops and newly released books to density meters and innovative fermenters, there's something here for every brewer on your list. And probably for you, too.

By Zymurgy's sponsors

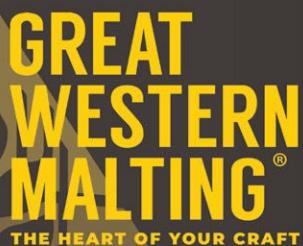


# A THANK YOU TO OUR FARMERS FOR THEIR DEDICATION

Farmers across the United States wrapped up the harvest season for the winter barley crop over the summer and are now finishing up harvest for the spring crop. Overall, weather conditions have been favorable, and growers were grateful for cool, wet weather conditions this spring to combat drought concerns.

Our quality and grain teams are optimistic about the quality and yield that they've seen in the fields. As the 2022 crop rolls into our malting facilities, we raise a glass to our farmers for a successful harvest, knowing that the best beers start with the best barley!

We're proud to be the oldest malting company in the western US, partnering with local barley farmers for the past 85 years. Great Western Malting products are available to North American brewers and distillers exclusively through Country Malt Group, along with a selection of other brewing products.



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Learn more at [GreatWesternMalting.com](http://GreatWesternMalting.com) and [CountryMalt.com](http://CountryMalt.com)

# Columns



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*By Dave Carpenter*



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*By Julia Herz*



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## LAST DROP

Customize Your Hops

*By Steve Ruch*

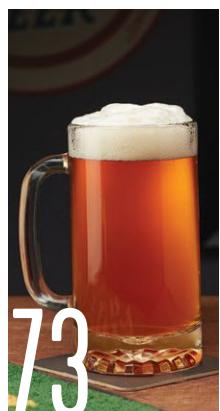
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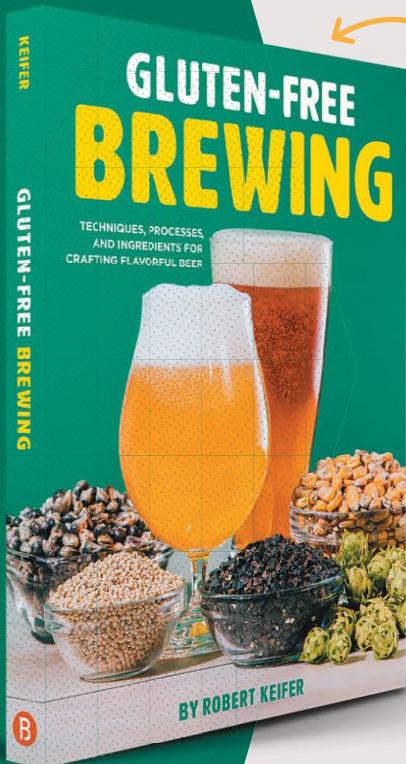
(zī'mərjē) n: the art and science  
of fermentation, as in brewing.



## ON THE WEB

Find these homebrewing recipes  
and more on our website @  
[HomebrewersAssociation.org/  
homebrew-recipes](https://HomebrewersAssociation.org/homebrew-recipes)

# NOW ON Tap



## New Books

### GLUTEN-FREE BREWING TECHNIQUES, PROCESSES, AND INGREDIENTS FOR CRAFTING FLAVORFUL BEER

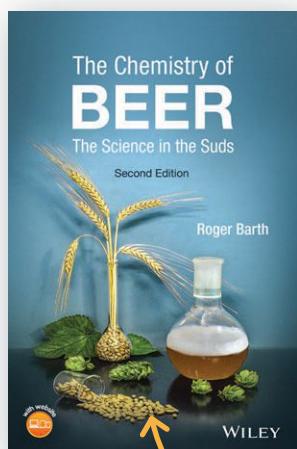
By Robert Keifer

The ubiquity of gluten-containing grains, such as barley, wheat, and rye, in modern-day brewing has prevented many potential consumers from fully enjoying the craft beer revolution. Individuals who have celiac disease, non-celiac gluten intolerance, or gluten sensitivity (as well as those who simply feel better when they avoid gluten) have historically been unable to enjoy today's characterful beers. But many other types of grain can be used to brew beer of all styles; such alternative grains greatly expand the options available to beer lovers and brewers who cannot or choose not to ingest gluten, or those who just want to experiment with new and interesting flavors.

*Gluten-Free Brewing* includes a discussion of available gluten-free ingredients, how to source them, and how to malt them. Explore the world of ancient grains and adjuncts and learn how today's malted and roasted varieties can be used to brew to-style beers. Learn about different mashing techniques, when to use them, what additional ingredients and enzymes can help throughout the brewing process, and how they can deliver specific flavors in your beer. Take a deep dive into recipe formulation and fermentation challenges, as well as flavor, body, head retention, and color considerations when using these not-so-alternative grains to create mainstream flavors.

More than 30 tested recipes are included to help brewers explore British, German, Belgian, New World, and ancient-style beers. *Gluten-Free Brewing* will teach you how to brew full-flavored, world-class gluten-free beers.

*Gluten-Free Brewing* retails for \$19.95 and is available now from Brewers Publications. Read an excerpt on pages 29–31 of this issue of *Zymurgy* to learn about gluten-free stouts, and then [visit BrewersPublications.com](https://www.brewerspublications.com) to snag your copy.



### THE CHEMISTRY OF BEER THE SCIENCE IN THE SUDS, 2ND EDITION

By Roger Barth

One thing we've learned at Homebrew Con over the years is that homebrewers who stay up a bit too late on Thursday can somehow still manage to wake up early on Friday for a lively discussion about pH. If you happened to be in Pittsburgh's David L. Lawrence Convention Center on the morning of Friday, June 24, 2022, then you might have joined the standing-room-only Homebrew Con crowd that gathered at 9:00 to hear Prof. Roger Barth's seminar, "pH Measurement and Control for Better Beer: You Don't Need a pH.d."

Even if you do hold a PhD, you'll still learn something from Prof. Barth's second edition of *The Chemistry of Beer*, available now from Wiley. Upon this volume's more than 350 pages, Dr. Barth, professor emeritus of chemistry at West Chester University, explains beer chemistry with a refreshing combination of rigor and accessibility. Topics range from milling and mashing to fermentation and foam. The text includes an entire chapter on organic chemistry, which will benefit readers who have never studied the subject or whose skills have gone a bit rusty.

A particularly bright note is that Prof. Barth devotes Chapter 15 to homebrewing, a topic we have long felt would improve McQuarrie and Rock's *General Chemistry* immeasurably.

*The Chemistry of Beer* retails for \$50.95. [Learn more at wiley.com.](https://wiley.com)

# WILD BREWS

The craft of home brewing, from sour and fruit beers to farmhouse ales

JAEGA WISE



## WILD BREWS

### THE CRAFT OF HOME BREWING, FROM SOUR AND FRUIT BEERS TO FARMHOUSE ALES

By Jaega Wise

Not to be confused with the Brewers Publications book of the same name, *Wild Brews* offers a broad overview of homebrewing mixed-culture beers and quick sours alike. As the title suggests, *Wild Brews* focuses on fermentations that depend on more than *Saccharomyces* alone.

Jaega Wise, head brewer at Wild Card Brewery in London's Walthamstow district (E17 if you prefer), leads readers through the entire homebrewing process, most of it just as relevant to brewers of clean beers as it is to those who prefer the wild side

of things. Discussions of wood, fruit, and tinctures round things out, and a limited library of recipes includes such classics as Flanders red ale and Gose, plus modern brews such as Kveik New England IPA.

A notable strength of this book is the chapter on off flavors, which addresses most of the flaws homebrewers are likely to encounter in their beer. Wise explains how each off flavor is created, where it's likely to crop up, and, most importantly, how to prevent it.

*Wild Brews* is published by Kyle Books and retails for \$24.99. To learn more, visit [jaegawise.com](http://jaegawise.com).

**MAKING BEER!**

**ALL-GRAIN MASHING WITH "BREW IN A BAG"**

We're Making Beer!  
LEARN TO BREW IN A BAG WITH JULIA

A circular logo for the American Homebrewers Association is visible in the bottom right corner of the video frame.

Julia Herz, American Homebrewers Association executive director, explains the all-grain brew-in-a-bag method in five new and easy-to-follow instructional videos. In 15 minutes, Julia demonstrates:

1. How to Brew in a Bag
2. Steps for All-Grain Mashing
3. Boiling & Adding Hops
4. Adding Yeast & Fermentation
5. Bottling Your Homebrew

Homebrewing makes life more delicious! Get excited, be inspired, select a recipe (found in this issue or on [HomebrewersAssociation.org](https://HomebrewersAssociation.org)), and soon you'll be to enjoying your all-grain homebrew! Scan the QR code above to find the videos, and share it with your friends who have yet to discover how easy and rewarding homebrewing can be.



SCAN ME TO  
WATCH THE VIDEO



Cheers, Jen!

  
**Cheers  
to You!**

Congratulations to **Jen Blair** for being named one of *Wine Enthusiast's* Future 40 Tastemakers & Innovators of 2022. An Advanced Cicerone, National BJCP beer judge, and exam manager for the Cicerone Certification Program, Jen also cohosts the *False Bottomed Girls* podcast and serves on the American Homebrewers Association Governing Committee.



## Official RECIPE

Brew This!



# Learn to Homebrew Day Hoppy Amber Ale

This Hoppy Amber Ale is the Learn to Homebrew Day 2022 official recipe! Learn to Homebrew Day—brought to you by Grainfather—is an annual celebration where homebrewers show newbies how awesome it is to make beer at home.

This extract-based homebrew recipe is quick and easy, yielding 1 gallon of ale (bottling volume) with a hop profile that pushes the limits of American-style amber ale into IPA territory.

For an in-depth walk-through on extract homebrewing, visit the [American Homebrewers Association's How to Brew Tutorials at HomebrewersAssociation.org](#). You can also find a 3-gallon version of this recipe with a video tutorial. And be sure to [join us for Learn to Homebrew Day on November 5!](#)

**Batch volume:** 1 US gal. [3.8 L]

**Color:** 14 SRM

**Bitterness:** 45–60 IBU

**Alcohol:** 4–5% by volume

### MALTS

14 oz. (400 g) Pilsner dry malt extract

10 oz. (280 g) Pale dry malt extract

5 oz. (140 g) Crystal 40 malt

5 oz. (140 g) Crystal 80 malt

### HOPS

0.4 oz. (11 g) Nugget hops (60 minutes)

0.25 oz. (7 g) Amarillo hops (15 min)

0.25 oz. (7 g) East Kent Goldings hops (0 minute)

### YEAST

1/2 packet dry ale yeast

(ex: Mangrove Jack's M42 New World Strong Ale)

### ADDITIONAL ITEMS

0.8 oz. (23 g) corn sugar (for bottling)

### DIRECTIONS

Heat 1.5–2 gallons (3.8–5.7 L) of brewing water to 160°F (71°C). With the specialty grains in a steeping bag (often called a muslin bag at homebrew shops), steep the grains. After 30 minutes, remove/discard the grain bag and stir in the malt extract. Stir until the extract is fully dissolved, taking care none has collected on the bottom of the pot.

Once the extract is dissolved, bring the liquid to a boil. Follow the hop addition schedule listed in the ingredients. Note that the timing of hops is from the end of the boil. This recipe calls for a 60-minute boil, so the 60-minute hops addition is added as soon as the boil begins.

After 60 minutes, turn off the heat and add in the 0-minute hop addition. Chill your wort to below 70°F (21°C), transfer to a fermenter, and pitch the yeast. Ferment in the temperature range called for by the yeast you use.

When fermentation is complete (typically about 2 weeks), bottle condition using the corn sugar listed in the ingredients to carbonate your beer. After another 2 weeks or so in bottles, you're good to taste your homebrew!



JUNE 22–24  
SAN DIEGO, CA

# Homebrew Con 2023

It's almost time to start planning your trip to San Diego for Homebrew Con 2023. Mark your calendar for **Friday, November 4**, which is when hotel rooms become available to book at the San Diego Town & Country, our host venue for the conference. Also on November 4, the American Homebrewers Association will begin accepting proposals for Homebrew Con educational seminars. Proposals will be accepted through December 16, so start brainstorming today!

For more on Homebrew Con 2023, head over to [HomebrewCon.org](#).



### BREW OVER

In the Sept/Oct 2022 issue of Zymurgy, we listed **Billy Lambert** as the gold-medal winner for Category 16 (American Porter & Stout) in the 2022 National Homebrew Competition, but we failed to include co-brewer **Theresa Wilks** in the entry. We sincerely apologize for the oversight and will bravely attempt to console ourselves with an American porter and stout. (Seriously, congrats, Theresa!)

Brew  
This!



## Captain Clutterbuck's Best Bitter

Recipe by Steve Ruch

This British-style bitter was originally brewed using homegrown US Goldings that had been irrigated using grapefruit juice [see Last Drop on page 80 of this issue of *Zymurgy*]. The grapefruit character shows through in the finished beer, but it's also an excellent pint if you go with conventionally grown Goldings. Cheers!

**Batch volume:** 3 US gal. (11.4 L)

**Original gravity:** 1.040 (10°P)

**Final gravity:** 1.010 (2.6°P)

**Bitterness:** 30 IBU

**Color:** 9 SRM

**Alcohol:** 4% by volume

### MALTS

4 lb. (1.81 kg) Maris Otter pale ale malt

8 oz. (227 g) Baird's Carastan malt

6 oz. (170 g) Briess Victory malt

### HOPS

0.5 oz. (14 g) US Goldings, 5% a.a., first wort hop

1 oz. (28 g) US Goldings, 5% a.a. @ 45 min

0.5 oz. (14 g) US Goldings, 5% a.a. @ 10 min

### YEAST

1 packet Fermentis SafAle S-04

### ADDITIONAL INGREDIENTS

Pinch Irish moss @ 15 min

2.5 oz. (71 g) sugar to prime

### BREWING NOTES

Mash grains for 45 minutes at 152°F (67°C) using a mash thickness of 1.5 qt/lb (31 L/kg). Vorlauf until clear, add first wort hops, and sparge with enough water to collect 3.5 gal. (13.3 L). Heat to boiling, remove first-wort hops, add 1 oz. (28 g) Goldings hops, and boil for 35 minutes. Add Irish moss and boil 5 more minutes. Add 0.5 oz. (14 g) of Goldings hops and boil 10 more minutes. Turn off heat, remove hops, and chill to 66°F (19°C). Transfer to fermenting vessel and pitch yeast. Bottle after two weeks.

Brew  
This!



## Cherryish Wheat

Recipe by Steve Ruch

To achieve the subtle cherry character Steve Ruch describes on page 80, you'll need to use customized hops that have been "watered" with cherry juice. However, you can still brew a rewarding American-style wheat beer using this recipe with regular, good old-fashioned Sterling hops.

**Batch volume:** 3.2 US gal. (12.1 L)

**Original gravity:** 1.042 (10.5°P)

**Final gravity:** 1.010 (2.6°P)

**Bitterness:** 16 IBU

**Color:** 4 SRM

**Alcohol:** 4.3% by volume

### EXTRACT

3 lb. (1.36 kg) wheat dried malt extract

### HOPS

1 oz. (28 g) Sterling, 7% a.a. @ 10 min

0.5 oz. (14 g) Sterling, steep 15 min

### YEAST

1 packet Fermentis SafAle K-97

### ADDITIONAL INGREDIENTS

3.5 oz. (99 g) sugar to prime

### BREWING NOTES

Heat 3.3 gal. (12.5 L) distilled water to 150°F (66°C). Thoroughly mix in the extract and bring to a boil. Add 1 oz. (28 g) Sterling and boil for 10 minutes. Turn off the heat, add 0.5 oz. (14 g) Sterling hops, and steep for 15 minutes. Remove hops, chill wort to 66°F (19°C), and pitch yeast. Bottle after two weeks.



## In Pursuit of Local Beer THE SAN DIEGO ESTATE BEER PROJECT

By Pat Walls

What does local beer mean? When we think about buying local, we tend to focus on purchasing products that are made within close proximity. As homebrewers, we consume beer that is truly locally made.

While supporting nearby craft breweries—more than 9,000 breweries of all sizes in the US alone—champions local labor and businesses, the ingredients are often not locally grown or processed. Is the beer made down the street or in your own garage truly “local” if it’s made with European hops, Canadian malt, and San Diego yeast?

The San Diego Estate Beer Project (SDEBP) is the brainchild of San Diego Brewers Guild board members Tom Kiely (Thorn Brewing Co, Slow Food Urban San Diego) and Erik Fowler (White Labs). The SDEBP explores what local San Diego Estate beer style(s) could be and how to better utilize locally grown ingredients. Historically, beer styles are an outcome of readily available agricultural goods, water sources, and technology improvements. (This is why the newly revised History and Style Comparison sections are some of my favorite parts of the 2021 Beer Judge Certification Program Beer Style Guidelines.) The wine industry has long used the term “estate wine” to connote that the wine comes from grapes grown on the winery’s own property. →

San Diego County, like California as a whole, grows an abundance of agricultural goods. We have a nascent hop industry, and commercially grown fruits and vegetables are exported across the US and around the world. We are also the self-proclaimed capital of craft beer, with more than 150 breweries (including three of the top 50 craft breweries in 2021 per the Brewers Association), plus numerous craft cideries, meaderies, wineries, distilleries, and producers of hard kombucha, hard tea, and hard seltzer. Yet, with few exceptions, the fermented beverage producers are disconnected from the local agricultural producers.

The SDEBP aims to close that gap. The first activity of the SDEBP was to explore what local beer means to homebrewers. Erik and Tom reached out to QUAFF, the (arguably) most award-winning homebrew club in the world, to organize a homebrew competition that explores what local beer means to passionate local homebrewers.

We organized the competition a bit differently than other AHA- and BJCP-sanctioned competitions. Homebrewers were asked to not only submit their contact info and the beer style but were also asked to submit a narrative about their recipe and process. Entrants were also to include a narrative answering the question “What does local mean to you and this beer?” There were three criteria for the competition, shown in the accompanying table.

We held the homebrew competition in August 2022 at White Labs. Ben Frymark (QUAFF president) and I coordinated the three-ring circus. Qualified BJCP judges quietly judged with full BJCP scoresheets in one room while professional brewers and members of Slow Food Urban San Diego, Seed Consulting Group, San Diego Community Health Improvement Partners, and California State University (CSU) San Marcos Brewhive judged the flavor profile and locality narratives.

Four beers won the competition and will be scaled up for the second SDEBP activity: the SDEBP Pro-Am Competition at the San Diego Guild Fest in November 2022. Each



pro brewer will be pouring at least two-and-a-half barrels at the fest, plus more in their taprooms, and we will have a consumer choice judging, hopefully using DraughtLab software to gain useful feedback and familiarize consumers to the app.

- **Billy Lambert and Theresa Wilks** will be brewing their *Cherry and Kumquat San Diego Weisse*, made with homegrown fruit and a self-isolated wild yeast strain, with **Thorn Brewing Co.**
- **Eli Palma** will be brewing his *Don Prickles Prickly Pear Kölsch*, made with locally harvested prickly pears and local well water, with **Viewpoint Brewing Co.**
- **Patrick Colchin and Andrea Colchin** will be brewing their *Bay Bridge Wit*, made with locally grown whole juniper berries, black pepper, and lemon zest, with **White Labs Brewing Co.**
- **Billy Lambert and Theresa Wilks** will also be brewing their *San Diego Farmhouse “Twist” SHV Saison*, made with homegrown Saaz hops, pink lemon zest, Makrut lime leaves, and the same self-isolated wild yeast strain, with **Pure Project**.

Given that it is a pro-am competition and the scale that these brewers work on, the beers will deviate from their original recipes. However, the spirit of the beers will continue to evolve. Future SDEBP activities include locally grown food and estate beer dinners, commercial collaborations, and expanding the next competitions to mead, cider, and other fermented beverages.

Additionally, the San Diego Brewers Guild is exploring creating a group purchasing organization so brewers and homebrewers can contract with local farmers to purchase locally grown brewing ingredients on a scale that we previously could not fathom. This helps farmers forecast what brewers need and brewers forecast what they will brew. Admiral Maltings of Alameda, Calif., is exploring opening the first Southern California region craft malthouse. While drought-tolerant barley could possibly grow here, other grains such as rye, triticale, maize, and kernza can readily grow in our region.

The estate beer model is not a short-term investment in time and resources. It is replicable anywhere in the world, and it is the historical model of brewing. See what fruits, vegetables, herbs, and fungi are available at your local farmers markets. Check with your local farm bureau or land grant university for what commercially grows in your area. Find inspiration in Stan Hieronymus’s *Brewing Local: American-Grown Beer*; *The Homebrewer’s Almanac: A Seasonal Guide to Making Your Own Beer From Scratch* by Marika Josephson, Aaron Kleidon, and Ryan Tockstein; Stephen Harrod Buhner’s *Sacred and Herbal Healing Beers: The Secrets of Ancient Fermentation*; Giuseppe Caruso’s *The Botany of Beer: An Illustrated Guide to More Than 500 Plants Used in Brewing*; and *The Homebrewer’s Garden: How to Easily Grow, Prepare, and Use Your Own Hops, Malts, Brewing Herbs* by Joe Fisher and Denis Fisher. We are only getting started in creating local beer styles. Happy brewing!

**Pat Walls** is a Certified BJCP Judge, Certified Cicerone, and published independent historian of food, drink, and culture based in San Diego. He serves as the QUAFF Club-Only Competition Co-Coordinator, the SDEBP Coordinator, and a Slow Beer committee member for Slow Food Urban San Diego, and he spends his days working at San Diego State University. He (occasionally) writes at [muralbrewing.com](http://muralbrewing.com).

# Foraging Brings Authenticity and Awe to Fermented Homemade Gifts

Local is even more local when we source unique ingredients and materials to add to gifts and offerings. With that, getting into nature always prompts a relieving exhale for me, and I often find gems to bring home. #WinWin. Outside in open space, all senses adjust, recalibrate, and slow down. My mind becomes more present, vitamin D boosts the spirits, smells catch my attention, and softer sounds inspire. Then, the basic feeling of relief, exploration, and adventure take over. I know I'm fully in the zone when I transition into a relaxed, alert state, silently wondering what I can forage to add to my diet, homebrew, meal, and handmade presents.

Giving the gift should never feel forced, yet sometimes it does when we are not prepared with something of meaning. You know that empty feeling of last-minute walking around a store? This time of year and the tradition in many, many cultures of gift giving can be overwhelming. All I can say is that we homebrewers have the world's tools (our equipment) and treasures (nature's bounty) to impress the best and most discerning recipients. Plus, when

we ferment or mentor others to do so, we bring magic and marvel to the party, providing a weight of authentic meaning beyond compare.

Over the years, forage-influenced gifts I've made include homemade mead given to each attendee at my and my husband Greg's wedding. It was infused with

dandelion petals picked from a meadow near our cabin outside of Nederland, Colo. We've made a fresh-hop pale ale for whomever stopped over (hey, when you offer food or drink to guests in your home, that is gift giving!) using hop cones growing along the fence line of my backyard. We've also given winter holiday →

DIRECTOR'S  
*Cut*

BY JULIA HERZ





stout infused with spruce tips harvested along the Colorado Front Range mountains at just the right time of year.

For this holiday season, I sourced ruby gem-colored chokecherries that Mother Nature had organically planted in our backyard. As I harvested, the fruit fell into the bucket as easily as pulling popcorn from a bag at the movie theater. Also, late this summer, several mornings before sunrise at my local park, we scored eight-plus pounds of wild plums bursting with a rustic, sugary sweetness balanced by diluted tart acidity and bold tannins from the skin.

After washing the fruit and cooking down both these harvests, the yield was fresh juice that felt nurturing to drink and rebellious to freeze until ready to add to a homebrew. The chokecherries will go



### HOP HUNTING

Join Julia Herz and her family on their annual hop hunt, where they find wild Cluster hops >> [tinyurl.com/vur35b77](http://tinyurl.com/vur35b77)

into a porter to be made in collaboration with Kim and Adam, who are officers with the Southern Nevada Ale Fermenters Union (SNAFU) homebrew club in Reno, Nev. The plums will be added to a Belgian golden strong ale that I brewed to give to loved ones in December.

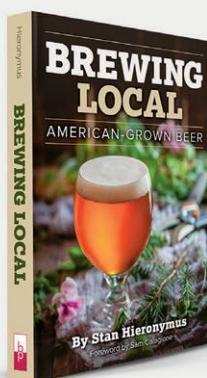
The gift of homebrewing can be a gift in and of itself, with no need to forage for “wild” provisions. One year in the fall, I used my 10-gallon mash tun and outdoor propane burner to can fresh Colorado Western Slope peaches we bought from the Boulder, Colo., farmers market. Another holiday season, we used our smaller homebrew kettle to make ricotta cheese packaged in swing-top Mason jars and seasoned with herbs that only my spice cabinet could produce. Rummaging through one’s home or local market can be foraging, too. It’s not cheating in my book.

Don’t have time to forage outside or in? The American Homebrewers Association has you covered. Buy a loved one a homebrew kit, an AHA membership, or any of the fantastic books on how to up

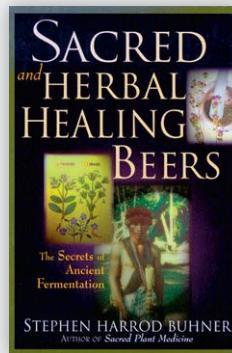
your brewing game. The mighty Stan Hieronymus’s *Brewing Local*, my and Gwen Conley’s *Beer Pairing*, or *Sacred and Herbal Healing Beers: The Secrets of Ancient Fermentation* by Stephen Harrod Buhner come to mind. One year, Greg and I made a St. John’s wort, echinacea, and rosemary mead from Buhner’s book. It was knock-your-socks-off kind of good, and it sure was “gift-level” stuff when we shared that with others.

Whatever your gift giving looks like this year, don’t sweat it. You’ve got all you need around you and at home to make and give something of meaning. No matter how simple or advanced, the fact that it comes from *you* is the best reward of all.

*Julia Herz is executive director of the American Homebrewers Association. Follow her on Instagram @ImmaculateFermentation.*



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# BERRY CHRISTMAS

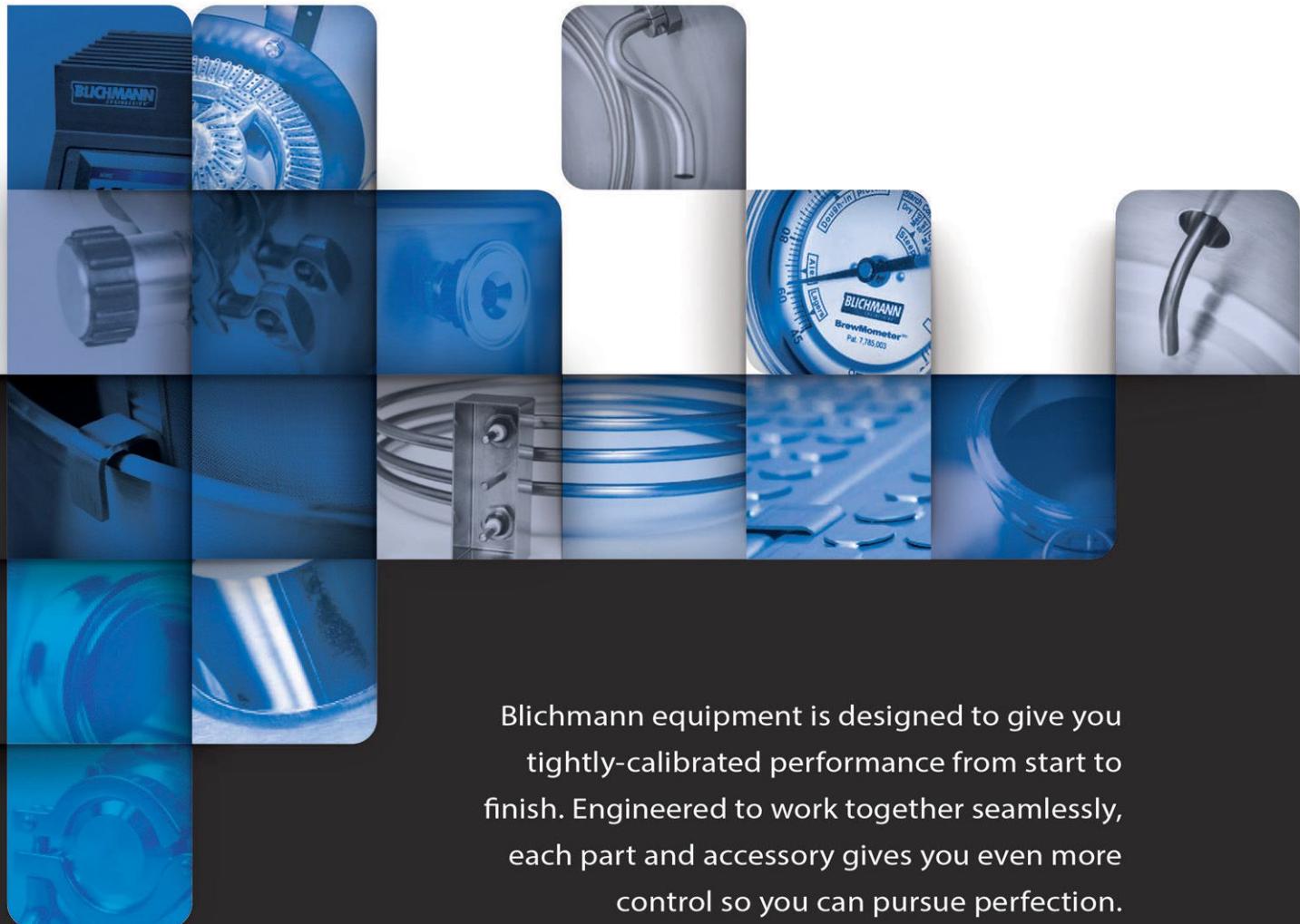


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**Dear Zymurgy,**

Regarding Dave Carpenter's column, "Big Brew, Small Batch" (*Zymurgy*, Jul/Aug 2022), in which Dave encourages an educated breaking of the rules, I brewed my first batch in a stockpot and a pickle bucket following instructions in C.J.J. Berry's book *Home Brewed Beers and Stouts* (Canadian edition, as homebrewing was still illegal in the States).

We found ingredients and a crude bottle capper in the canning section of the local supermarket. I think I bought a hydrometer

sometime later, but it's hard to recall. Of course, we broke rules—most of 'em hadn't been invented yet!

For the record, I've only poured out two batches for being beyond redemption, and there was one early IPA that needed to be cut with cheap lager to be palatable. Most of the experiments turned out OK, though, and some were incomparable. If you ever get enough elderberries or black currants for a fruit beer, go for it!

It's so, so much easier now. **Go for it!**

**Cal Frye**  
Homebrewing since 1976

## FOR ACCURACY'S SAKE

Dear Zymurgy,

The sake recipe in the Jul/Aug 2021 issue of Zymurgy has an apparent issue. Can you help me clear it up before I spend a month possibly making something not exactly unlike sake?

The recipe given on page 52 calls for a total of 6 gallons of water to be used in the batch, which includes water and melted ice. But, if you add up all the water and ice additions summarized in Table 1 and detailed in the article, you get about 6.75 gallons. That is a 12.5 percent discrepancy that would make a significant difference in the alcohol level, a major factor in the balance of the finished beverage.

I have acquired all the equipment and ingredients and would like to know whether the correct amount of water is 6 or 6.75 gallons before I start down this long road.



Other than this problem, I think the article was very informative and well written.

Thanks for your help,  
Mike Riddle

**Zymurgy associate editor Amahl Turczyn responds:**

Hi Mike, glad you liked the article! I went back and ran the numbers, and there is, indeed, too much water in the tomezoe addition. My recipe calls for 12.9 L

water plus 2,610 mL ice, and it should in fact be 10,167 mL water plus 2,610 mL ice. That 2,733 mL discrepancy is where you are seeing the approximately 0.75 gallons of extra water. I went back and checked Fred Eckhardt's New Sake Recipe for 2 gallons, which is what my article is based on, and I noticed that his total batch volume of water adds to 880 milliliters more than it should, which I think is why my water volume was off. But thanks for catching my mistake. Let us know how it comes out!



## DEAR ZYMURGY

Send your Dear Zymurgy letters to [zymurgy@brewersassociation.org](mailto:zymurgy@brewersassociation.org). Letters may be edited for length and/or clarity.

## YOUR HOMEBREW LABELS



Our homebrewery name is taken from our daughter Isabella's nickname from when she was younger. We used to call her Itchy Belly all the time. I can't quite remember where it came from, but I assume she was always snacking. Today, she and her brother Alex both help me in the garage on brew day and they also help me make homemade sodas. (Homebrewer 10+ years, AHA member 4 years)

Anthony Palmisano  
**Ale and Lager Enjoyment School (ALES)**  
Spring Hill, Fla.



I got chastised by other homebrewers in a Facebook homebrewing group because I added lactose to a Kolsch. They thought I was the devil, but I think the best part about homebrewing is the ability and option to experiment if you want to. The beer turned out to be very tasty, with great peach flavor with hints of cinnamon and vanilla. It was a fan favorite among friends and family around Thanksgiving. (Homebrewer 1.5 years, AHA member 1.5 years)

Jordan Vaughn  
Sonora, Calif.

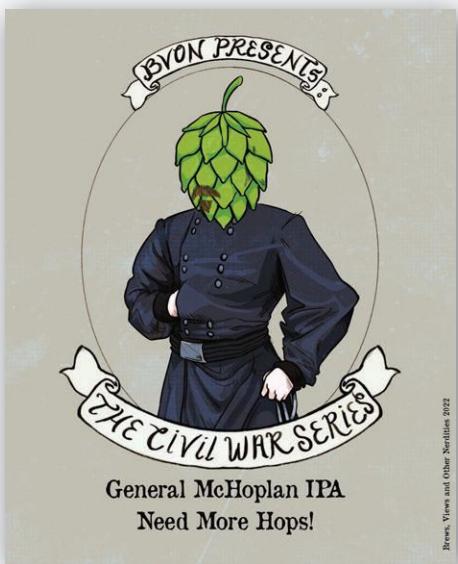


## SUBMIT YOUR LABEL

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

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

## YOUR HOMEBREW LABELS



I cohost a podcast called *Brews, Views and Other Nerdities* (BVON), and I wanted to brew a beer and create a series based on some of the show's contents. We had recently featured several Civil War-themed episodes, so we discussed brewing a beer using a Civil War concept. Thus was born General McHoplant IPA! I discussed the idea with my daughter, Isabella Martinez, who currently attends School of the Art Institute of Chicago, and she designed the label. The General will definitely be coming back soon! Cheers! (Homebrewer 1 year, AHA member 1 year)

Leonard Martinez  
Monterey Park, Calif.

I had been brewing for two years when my best friend's daughter was to be married. She is one of a few women I know who appreciate a good IPA, so I set out to help celebrate the wedding with one made for the happy couple. When I learned they were being married at a rustic stone church, the name was born. I used a common greeting-card program and found a picture of the historic church online. A little personalization on the label made it complete. The IPA turned out to be the best mini-mash I'd made to date—I gifted a case of it to the wedding party, and it was a huge hit. The AHA has been an inspiration for Preacher's Kid Brewery to be creative in all aspects of brewing. Thanks! (Homebrewer 12 years, AHA member 12 years)

Paul Kennon  
Lansing, Mich.



We have been owned by many dogs in our 44 years of marriage, and each time one passes on, I design a memorial beer intended to capture the individual character of each one. Some beers are tastier than others! Here is a photo of just some of the bottle labels created in their memories. (Homebrewer 45 years, AHA member 30 years)

Eric Ginsburg  
Chapel Hill, N.C.

## YOUR HOMEBREW EXPERIENCE

Homebrewing is all about sharing, and we get hoppy when Zymurgy readers share their homebrewing and fermentation experiences with us. We'd love to show the AHA community what *your* experience looks like. From 1-gallon batches on the stovetop to 20-gallon brew days on your custom sculpture, we all have fun with family, friends and pets while we make and enjoy our favorite beverage. Show us your brewing/fermentation day, who you brew with, the ingredients you include, what special processes you use, and how you enjoy the final product of beer and beyond.

Upload photos of your homebrew-related fun at  
[HomebrewersAssociation.org/your-homebrew-experience](https://HomebrewersAssociation.org/your-homebrew-experience)



Here is Bucky, my 8-month-old Golden Retriever puppy, absconding with my mash paddle. He isn't always the most helpful brew buddy, but he always has a great attitude! (Homebrewer 10 years, AHA member 9 years)  
Christiana Bockisch  
Forest Grove, Ore.



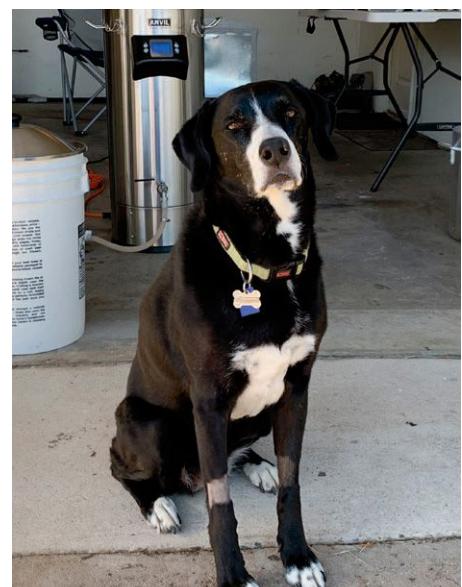
Nathan Wanger's brew buddy Harper helping make a Pilsner.  
(Homebrewer 8 years, AHA member 6 years)  
East Side Brewers (ESB)  
Alton, Ill.



Delta on her 14th birthday, overseeing my American amber ale for my first competition submission and awaiting a spent-grain birthday cake!  
Robert Hedge  
Roanoke, Va.



Bill George and Joe Froehlich brew their 199th batch together with dog Love. She is a Morkie, and her favorite beer is German Leichtbier. (Homebrewer 7 years, AHA lifetime member)  
Joliet Brewers Guild, Plainfield Ale and Lager Enthusiasts, Chicago Homebrew Alchemist of Suds, and Aurora Brew Crew  
Crest Hill, Ill.



Piper was always scared of my propane burner, but since I've switched to electric brewing, she's here for oversight and quality control.  
Loran Hayes  
(Homebrewer 10 years, AHA member 3 years)  
Sandy, Utah



### SHARE YOUR BEST HOMEBREWING SHOTS!

Homebrewing is all about fun and sharing. We would love to show others in the community what your homebrewing/fermentation experiences looks like. Upload photos of your homebrew related fun at [HomebrewersAssociation.org/your-homebrew-experience](https://HomebrewersAssociation.org/your-homebrew-experience) and you may see it in the pages of Zymurgy!

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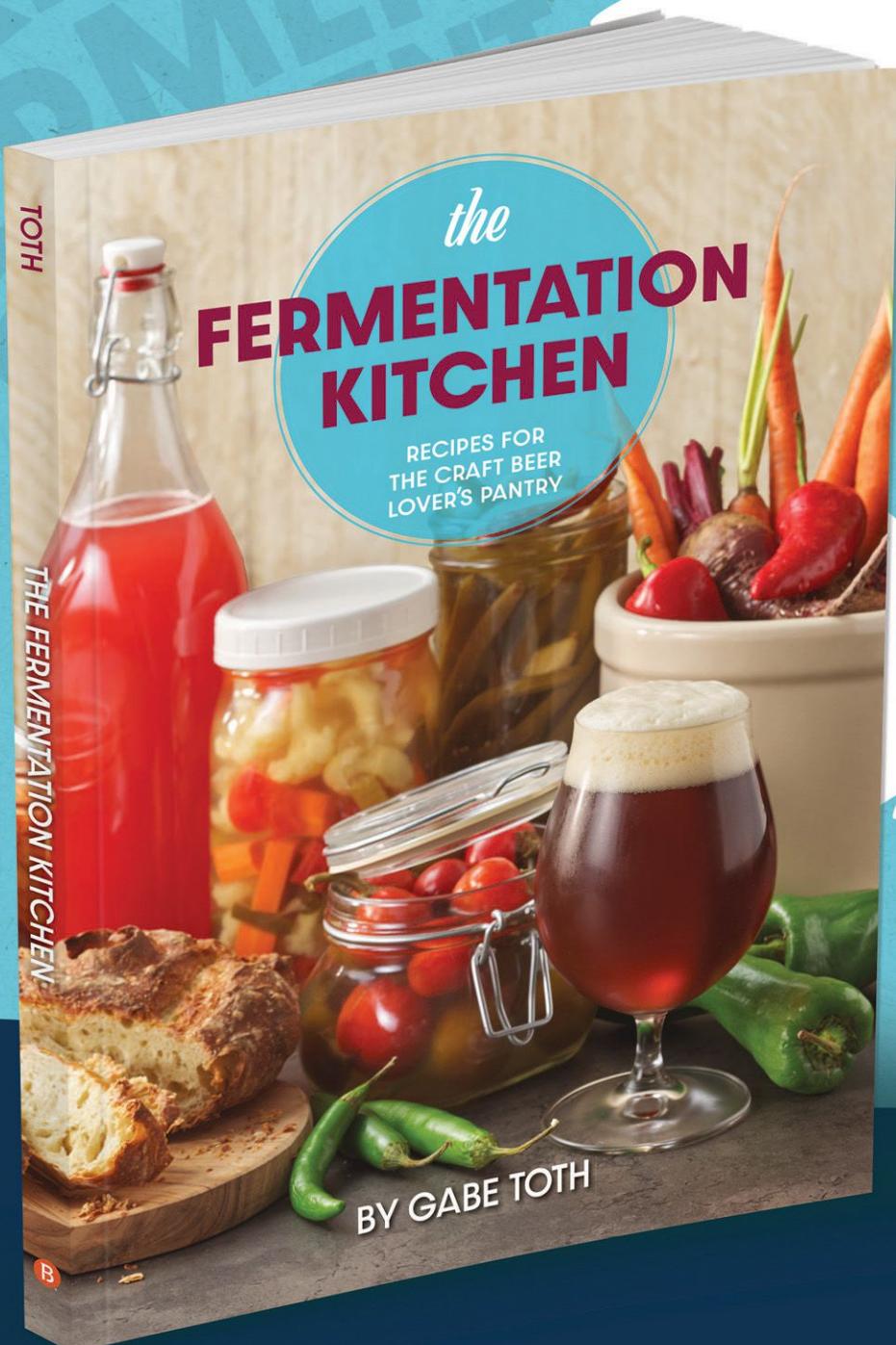
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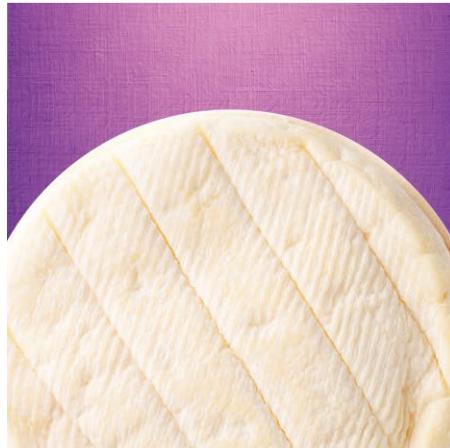


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# You ~~Can~~ Should Ferment That!

## Seven Recipes You Can (and Should) Make for the Holidays

By Zymurgy editors



**A**s the holidays approach, you may find yourself looking for that perfect gift. We say you can never go wrong with something homemade. Here are seven holiday gifts you can still make in time for whichever winter festivals you and your friends and family celebrate. For more

info on processes and the stories behind these recipes, check out the back issues in which they originally appeared by logging into HomebrewersAssociation.org and digging into the *Zymurgy* archive. Happy holidays from all of us at the American Homebrewers Association! →



Ferment This!

## Sauerkraut

Recipe by Amahl Turczyn.

Originally appeared in *You Can Ferment That!*, Zymurgy, Jan/Feb 2020

**Batch volume:** about 1 quart (1L), with liquid

### FERMENTABLES

1 head (approx. 2.2 lb./1 kg) green or red cabbage

### OTHER INGREDIENTS

1 Tbsp. (15 g) plain active-culture yogurt (optional)

1.5% (15 g) sea salt (or any non-iodized salt)

Water or vinegar to cover cabbage (optional)

### NOTES

Wash cabbage and remove outer leaves if necessary. Using a sharp knife, halve the cabbage down the center of the core. Remove core.

Slice cabbage into fine ribbons. Sprinkle with salt and toss occasionally for 20 minutes until cabbage begins to release water. Mix in yogurt evenly, if using. Pack into a glass, plastic, or other acid-safe container, bruising cabbage with extreme prejudice to encourage more liquid if desired. Weigh down solids so that they remain submerged in liquid, topping up with water or cider vinegar if necessary. Cover fermenter with plastic wrap and ferment in a cool (55–65°F, 13–18°C) place for 4–6 weeks until kraut yellows, stops off-gassing, and has reached a pH of at least 3.5. Package in liquid and refrigerate for up to 3 months.



Ferment This!

## Peanut Butter–Banana Dog Treats

Recipe by Amber DeGrace.

Originally appeared in "New Life for Spent Grains," Zymurgy, May/June 2011

Do not use grains that have been in contact with hops. Hops have been shown to be toxic to dogs.

Store spent grains in a large pot or bin after mashing. If you're not going to use all the grains, you can store them in the refrigerator for later use to ensure they don't get moldy.

### INGREDIENTS

6 cups (1.4 L) spent grains

6 cups (720 g) flour

1½ cups (400 g) peanut butter

3 eggs

1 banana, cut into small pieces

### DIRECTIONS

Mix all the ingredients in a large bowl (I usually mix in my stock kettle because the quantity is so large). The dough will be thick and sticky. Lightly spray one or two cookie sheets with baking spray and press the mixture into them. Score treats however you like; I usually create three rows lengthwise. If your dog likes their treats fancy, you can use cookie cutters to create shapes. Make sure you score it now so they can be broken when baking is complete.

Bake in a 350°F (176°C) oven for 30 minutes or until they begin to harden. Remove the trays and finish cutting the treats where you scored them. Put the trays back in the oven, turn down to 200°F (93°C) and bake for 5 to 10 hours. The treats will be done when they are completely dry in the center. If you are unsure whether the treats are ready, break one in half. It should not be gooey inside because this will cause it to mold quickly. Store treats in a sealed bag in the refrigerator and reward your canine friends for all their hard work during brew day.



Ferment This!

## Vegan Kimchi

Recipe by Amahl Turczyn.

Originally appeared in *You Can Ferment That!*, Zymurgy, Jul/Aug 2020

**Batch size:** about 4 lb. (1.8 kg)

### FERMENTABLES

3 lb. (1.36 kg) Napa cabbage

3.5 oz. (100 g) non-iodized salt (to pickle cabbage)

1 bunch scallions, trimmed and chopped finely

1 bunch buchu (Asian garlic chives), trimmed and chopped finely

8 oz. (227 g) Korean white radish or daikon, peeled and julienned

1 medium carrot or red bell pepper, peeled and julienned

0.5 oz. (14 g) fresh ginger root (grated)

1 head (about 10 cloves) garlic, peeled and minced

½ white onion, grated to a pulp

2 oz. (57 g) ripe pear, grated to a pulp

### OTHER INGREDIENTS

0.5 oz. (14 g) glutinous rice powder (or corn starch)

1 cup (236 mL) water or vegetable stock

1.75 oz. (50 g) salt (to flavor gochujang)

1 cup (115 g) gochugaru (Korean red chile flakes)

### RECIPE NOTES

Wash cabbage and remove outer leaves if necessary. Using a sharp knife, chop the cabbage into bite-sized pieces, removing core. Sprinkle with non-iodized salt and toss occasionally for an hour or two until cabbage wilts and releases water.

Meanwhile, make the gochujang by boiling glutinous rice flour briefly in water until very thick. Mix in remaining red pepper flakes, ginger, garlic, pear pulp, onion pulp, and salt to make a thick chile paste.

Soak salted cabbage in fresh water to remove as much of the brine as possible. Rinse, drain, and add to a large bowl. Add remaining vegetables and chile paste and mix thoroughly until everything is coated.

Pack into a glass or earthenware fermenter, cover, and allow to ferment at cool room temperatures (55–65°F, 13–18°C) or in the refrigerator. Try to keep solids submerged as much as possible and stir gently every few days to release bubbles. When desired level of acidity is reached, package (optional) and refrigerate.

Ferment This!

## Fermented Hot Sauce

**Recipe by Amahl Turczyn.**

*Originally appeared in You Can Ferment That!, Zymurgy, Sept/Oct 2020*

The yield of this recipe depends on the chile pepper variety, but a 32-ounce [950 mL] ferment usually makes at least 16 ounces [475 mL] of finished, strained sauce.

### INGREDIENTS

1 lb.	[454 g] hot chile peppers, washed, trimmed, and sliced
3 Tbsp.	[51 g] non-iodized salt
1 qt.	[950 mL] filtered, chlorine-free water
4	large garlic cloves, peeled (in blender)
1	bunch fresh cilantro stems (optional)
½ tsp.	[2.5 mL] whole allspice berries, toasted and then ground
1 tsp.	[5 mL] whole black peppercorns, toasted and then ground
1 tsp.	[5 mL] whole coriander seed, toasted and then ground
1 tsp.	[5 mL] whole cumin seed, toasted and then ground
1 cup	[237 mL] brine, reserved from the pepper ferment
1 cup	[237 mL] coconut vinegar or rice vinegar
1 tsp.	[5 mL] arrowroot, as a thickener (optional)

### FERMENTATION NOTES

Wash and trim peppers, then cut a slit in each one, or coarsely chop. Pack peppers into your fermenter jar. Mix salt and water until salt is dissolved and pour over peppers. Place a weight or water-filled baggie over peppers to keep them fully submerged, then cover jar loosely with a lid or tightly with an airlock. Keep out of sunlight at cool temperatures, topping up with water or brine as necessary. Ferment one to three weeks, or until brine reaches 3.5 to 4.5 pH.

Drain and reserve brine. Add peppers to a blender jar and process with garlic, cilantro, and spices, if using. Strain pulp through a ricer or coarse sieve to remove pepper skin flakes and seeds. Bottle in shatterproof or loosely covered squeeze bottles and refrigerate if keeping probiotic, or heat process or can and use vacuum lids for longer storage.



Ferment This!

## Basic Kombucha

**Recipe by Amahl Turczyn.**

*Originally appeared in You Can Ferment That!, Zymurgy, Sept/Oct 2021*

**Batch volume:** 4 liters [1.06 US gal.]

### FERMENTABLES

200 g	[7 oz.] sucrose (table sugar)
20 g	[0.7 oz.] tea leaves (bagged or loose)

### YEAST

1	fully hydrated, active kombucha SCOBY
---	---------------------------------------

### OTHER INGREDIENTS

- 4 liters [1.06 gal.] filtered, chlorine-free water
- distilled white vinegar as needed to adjust pre-ferment pH
- other flavorings to add at bottling: fruit purees, spices, herbs, etc. (optional)

### EQUIPMENT

- pH meter or test strips in the 2.8 to 4.4 range
- wide-mouth 1.5-gallon [5.7-liter] jar or bucket to use as a fermenter
- coffee filter or tight-weave cloth and rubber band to cover fermenter
- pressure-ready PET bottles

### DIRECTIONS

Boil water and add tea leaves. Steep 1–5 minutes, depending upon tea variety. Remove tea leaves and stir in sugar until it dissolves. Cover tightly with a lid or plastic wrap and allow to come to room temperature (70–80°F or 21–27°C). Add sweetened tea to sanitized fermenter, then add SCOBY and 2 cups of starter kombucha (or ¼–½ cup distilled vinegar). Stir well, then remove a small sample and test pH. If below 4.5, cover fermenter with screen material and secure with rubber band. Keep fermenter in the correct temperature range for 7 days.

Take a small sample, smell, and taste. If you are happy with the flavor and acid balance, use a sanitized funnel to fill your bottles. Don't worry about splashing—*Acetobacter* likes air. Leave about an inch [2.5 cm] of head space in each bottle. If your tea is still too sweet, ferment a few days more and taste again.

To carbonate, there's no need to add additional priming sugar—your tea should still have plenty of sucrose. Just keep the bottles at the same temperature for 3–7 days, squeezing them gently every day or two to gauge the level of condition. When fully carbonated, transfer to the fridge and enjoy cold.

Ferment This!

## Preserved Lemons

**Recipe by Amahl Turczyn.**

*Originally appeared in You Can Ferment That!, Zymurgy, Jan/Feb 2021*

**Batch volume:** 1 US qt. [1 L]

### EQUIPMENT

1 qt. sanitized Mason-style jar with lid and ring

### INGREDIENTS

8	large organic lemons, preferably Meyer
6 tsp.	non-iodized salt
1 stick	cinnamon (optional)
½ tsp.	2.5 mL whole coriander seed (optional)
3	bay leaves (optional)

### DIRECTIONS

Wash the lemons well and trim off the stems. Slice each fruit lengthwise into quarters, but not all the way through: leave about half an inch of the rind to connect the pieces at the end. Sprinkle a teaspoon of salt (or a half teaspoon if you prefer a less salty pickle) evenly over the inside of each quarter, and pack tightly into your quart jar. When the solids come up to about an inch from the rim, juice as many extra lemons as you need to cover the fruit with juice. Tap out any air bubbles and screw on the lid snugly, but without tightening. This will allow any gas from fermentation to escape. Keep in a cool, dark place for three weeks.

Check the jar daily for the first three or four days, using a clean spoon to push fruit down below the level of liquid and to circulate the brine a bit. After a few days, this shouldn't be necessary, and you can let fermentation continue, tapping up the liquid with more fresh lemon juice if necessary.

After three weeks, store in the fridge for at least one more week and then remove, rinse, and taste your pickles, discarding any seeds. You can also keep adding extra, clean lemon rinds or fresh wedges, making sure to push them to the bottom of the jar to keep the ferment going and allow the fully cured pickles to rise. Always make sure everything is submerged in salty lemon juice.



# Camembert

Recipe by Gabe Toth.

Originally appeared in *You Can Ferment That!*, Zymurgy, May/June 2022

You likely already have much of the equipment needed to make cheese. Many homebrew shops stock the necessary cheesemaking ingredients. They're also readily available online.

## EQUIPMENT

- Measuring spoons/cups
- Nonreactive pot (stainless steel or enamel Dutch oven) with lid
- Thermometer
- Long, thin metal spatula (such as an icing spatula) or similar tool for cutting curds (those who want the precise tool for every job might seek out a curd knife, widely available for purchase online)
- Slotted spoon
- 4- to 4.5-inch round cheese molds
- Drying mat
- Ripening box with lid and draining tray
- Curing chamber, temperature-controlled fridge, or other space that maintains about 50°F (10°C)

## INGREDIENTS

- |                     |  |
|---------------------|--|
| 1 gal.              | (3.8 L) cow's milk (whole, pasteurized, and homogenized) |
| 1/4 tsp.            | calcium chloride ( $\text{CaCl}_2$ )                     |
| 1/4 tsp.            | MA11 cheese culture                                      |
| 1/16 tsp. (a pinch) | <i>Penicillium camemberti</i>                            |
| 1/2 tsp.            | liquid rennet  |
| 15 g                | (about 1.5 Tbsp.) salt                                   |

## DIRECTIONS

Add 1/4 cup of unchlorinated, room-temperature water to the cheese bacteria and molds (MA11 and *Penicillium camemberti*) to hydrate.

Gently bring milk to 90°F (32°C), being careful not to heat it too quickly, which could scorch the milk. Add calcium chloride while heating and whisk in. Once the milk is up to temperature, add the hydrated cheese cultures, whisking them into the milk using an up-and-down motion to fully incorporate. Let the milk rest 90 minutes. At around minute 75, low heat may be needed to return the milk to 90°F (32°C) before proceeding to the next step.

After a 90-minute rest, add 1/2 tsp rennet diluted in 1/4 cup of unchlorinated water. Mix rennet in using an up-and-down motion to fully incorporate into the milk. Let rest another 90 minutes.

After the second 90-minute rest, once the curds have coagulated and are cleanly separated from the whey (testable by performing an initial cut into the curds to see if they have knit together), use the spatula, curd knife, or another long, thin tool to cut vertically through the curd in 1/2-inch increments. Turn the pot 90 degrees and repeat the cuts, giving you 1/2-inch by 1/2-inch square curds. Turn the pot again and, rather than cutting vertically, angle your cutting tool 45 degrees and cut again at 1/2-inch increments. Turn the pot once more and cut again at diagonal 1/2-inch increments. Gently stir the curds, which will be very delicate still, to check for large masses of curd that didn't get cut.

Let the curds sit for ten minutes, gently stirring every couple of minutes to prevent them from matting and to encourage them to release additional whey.



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Read about more fermentation magic by Gabe Toth in his book *The Fermentation Kitchen* at [BrewersPublications.com](https://BrewersPublications.com).

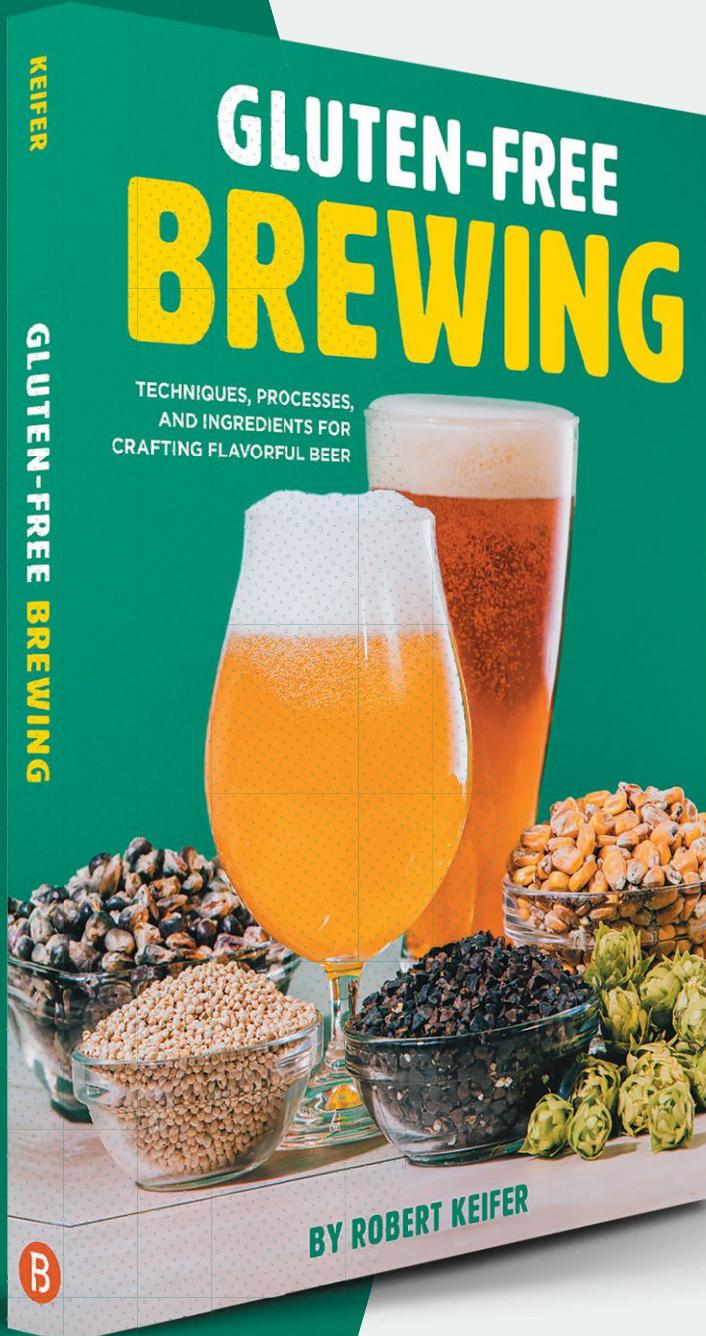
Place two round cheese molds about four to four-and-a-half inches in diameter onto a draining mat on a draining tray in a ripening box or other space that will allow whey to drain off the rounds. Using a slotted spoon, gently ladle off the curds into the cheese molds and let drain for at least two hours, until the curds have firmed up enough to flip the molds. After the initial hours of sitting, flip the molds and let sit for an hour. Continue flipping once an hour for five hours. The easiest way to flip the cheeses is to have an extra mat and tray to put on top of the molds, which allows the cheesemaker to put one hand under the bottom tray and one hand over the top tray, pick everything up at once, and turn it over in one swift motion.

After five hours of flipping every hour, remove the plastic molds. The curds should be consolidated and the cheeses firm enough to stand on their own. Pat them dry and evenly salt all surfaces of the cheeses. Handle gently—they will still be fairly soft. Place both rounds on a drying mat, on a draining tray, inside of a plastic ripening box. Leave the ripening box open at room temperature overnight or for up to a day, wiping out any residual moisture that accumulates in the tray. This stage will help excess moisture to evaporate and encourage the growth of the surface mold, though it won't be visible yet.

When the room-temperature rest is complete, put the lid on the ripening box and move to a space that is about 50°F (10°C) and 80 to 90 percent humidity. If the aging box begins to collect moisture, the humidity is too high, and if the cheese rind begins to dry out, the humidity is too low. Too moist an environment will allow the surface mold to form, but the layer just inside the cheese rind will age too quickly, resulting in a gap between the rind and the interior of the cheese and a rind that can slip right off of the cheese. Insufficient humidity will interfere with the growth of the *P. camemberti*.

Condition for five to seven days in the aging space, after which a layer of white fuzz should be developing on some of the cheese surface. This is the *Penicillium* gaining a foothold and starting its work. Flip the cheeses and let age for another three to five days as necessary, until white mold covers most of the cheese (it doesn't have to be completely covered). When the cheeses are mostly covered with white mold, they can be wrapped in cheese paper or wax paper and put into the regular refrigerator for another month.

The cheese is ready when the center feels soft or when it's at the preferred ripeness. Camembert will continue to ripen as it sits in the fridge, moving gradually from firmer and more delicately flavored to very soft and pungent. As with many fermented foods, "ready" is a very subjective point on a spectrum of ripeness, and it may take eating some too-fresh and some too-ripe Camemberts to determine the Goldilocks moment when it's just right. Because cutting into the cheese will interrupt further ripening, it helps to make a few cheeses at once, especially when still learning to gauge the desired level of ripeness.



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# Gluten-Free Stout

By Robert Keifer

For most drinkers, roasted barley flavor is what typically denotes a stout, especially in competition categories. From the many gluten-free grains available, you will find it necessary to turn to roast malts like Eckert's dark, "Gas Hog", and Pitch Black rice malts, and Grouse's roasted buckwheat malt, chocolate roast millet, dark roasted millet, and Caramel 240L millet malts. You might get away with using small quantities of these grains in a porter, but specific stout categories should have larger quantities of these very dark roasts, with special attention paid to aspects like darker foam and promoting slightly higher finishing gravities than found in the average porter while still preserving dry roast character. This is especially true when making something like an export stout or sweet stout, as the roast will help balance the residual sweetness that is characteristic of these styles. No matter what, a layering of additional medium roasts and unmalted grains and adjuncts to provide additional body and smoothness will help you stay true to style when crafting a gluten-free stout.



## DRY IRISH STOUT

Thanks to the brewing juggernaut that is Guinness, dry Irish stout is likely most beer drinkers' first impression of a stout. There is often a smoothness that is described as a creamy character in some guidelines but not others, and may not actually be as appropriate as it would be in other stout categories. Coffee flavors and a dry finish are important, as the flavors should not linger on the palate. These beers are noticeably lower in alcohol than other stout styles; while some commercial versions may be a little higher in ABV, their dry finish puts them into this category. Since this is a drier style, you will likely want to focus on enzymatic contact times and stay away from caramel malts and similar ingredients.

**Commercial examples:** Moka Diosa Stout (Divine Science Brewing), TantaMount Stout (Evasion Brewing), No Doubt Stout (Two Bays Brewing Co.), Glutenberg Stout (Glutenberg)

## EXPORT STOUT

Export stouts are typified by coffee, roasted malt aroma, some acidity and astringency but with body and sweetness, a higher ABV than dry stout, and persistent head retention. Higher ABV aside, this category has specific notes about more body and sweetness that distinguishes it from dry Irish stout, although the two styles are strikingly similar in description and guidelines. Just bear in mind that neither dry Irish stout nor export stout should be confused with a sweet stout or specialty stout.

With export stout, you can follow many of the suggestions from dry Irish stout

when selecting base and roast malts, but this style may also benefit from some deeper caramel malts (like the caramel millet malts from Grouse) to lend a bit of sweetness. You will likely want to have your enzymes in contact with the mash for less time to elicit a higher finishing gravity—this will also mean that you will need to use more malt than with a dry Irish stout.

**Commercial examples:** Watchstander Stout (Ghostfish Brewing Company), Riva Stout (Holidaily Brewing Co.), Blackbird Stout (Bierly Brewing)

## IMPERIAL STOUT

Imperial stouts are rich and malty, with high finishing gravities usually between 1.020 and 1.030. For a gluten-free imperial stout, this will mean either using back-sweetening as a strategy or carefully selecting malts and adjuncts to achieve a high finishing gravity. Base malts like Grouse's millet and buckwheat malts naturally make good choices, and the various rice malts from Eckert will help with both sugar extraction and color.

American versions of imperial stout tend to have higher levels of fruity esters. Therefore, I suggest adding sorghum syrup to the recipe to boost starting gravity and lend a noticeable fruit note in an American version of a gluten-free imperial stout, but I do not recommend this for a British version of the same. When brewing a British version and your brewing system limits mash tun space, I recommend double or triple batching into your fermentor

**Editor's Note:**  
*This excerpt from Gluten-Free Brewing: Techniques, Processes, and Ingredients for Crafting Flavorful Beer is reprinted with permission of Brewers Publications. Gluten-Free Brewing, written by Robert Keifer, is available now at [BrewersPublications.com](http://BrewersPublications.com).*

to achieve the correct volume with an appropriately high starting gravity.

You can also consider exposing the mash to your enzymes for a shorter time to ensure a higher finishing gravity. Adding ample amounts of maltodextrin is another way to boost the final gravity and increase fullness in the mouth.

**Commercial examples:** Santa's Nightcap (Holidaily Brewing Co.), Imperial Darkness and Kantankerous Stout (Ground Breaker Brewing), Batch 2 Barrel Aged Imperial Stout (Evasion Brewing), Hella Nibs (Otherwise Brewing).

*Robert Keifer discovered craft beer in his early 20s and started living a gluten-free lifestyle shortly thereafter. Dismayed by the limited selection of gluten-free beers, he soon took up homebrewing. His quest for excellent gluten-free beer propelled him into teaching others about gluten-free brewing. He is a frequent guest speaker and writer on the subject for brewing magazines. Robert is a member of the Zero Tolerance Gluten-Free Homebrewing Club and co-founder of Divine Science Brewing Company.*



## COMPARING ROBUST PORTER AND STOUT

The line between porter and stout is often hard to define. Consider brown porter compared with dry Irish stout, which have the same starting and finishing gravity ranges; travel to the Guinness factory and even there they'll say it's hard to tell the difference between a porter and a dry Irish stout. All porters and stouts are opaque, and all of them have roast, chocolate, caramel, or coffee notes permissible by style. The largest difference is the presence of fruity flavors in porters, especially stone fruit and citrus. Robust porter recipes can feature various fruity hops, or even coriander, to achieve noticeable fruit flavors, as well as adjuncts like coffee, cacao nibs, or vanilla. This is due to the lower level of roasted malts in porter compared with stout. Where you might even be able to get away with a little bit of banana flavor in a porter, stouts have almost no fruit esters whatsoever.

The most interesting comparison that can be drawn is when digging into American-style stout categories. One could contend that the American stout style overlaps with robust porter to some degree, as it calls for fruity and citrus aromas and flavors. The largest difference is American stouts call for a distinct dry roast finish, high bitterness and astringency, and a noticeable hop contribution. When designing a robust porter recipe, where sorghum seems to be a common ingredient in gluten-free examples, you can consider achieving fruitiness through syrups with additional roasted grains peppered in. Stout recipes, by contrast, are better when brewed all-grain, as this appears to be the best way to achieve the right "stout-like" qualities. Grains like oats, quinoa, and buckwheat will help lend a fuller mouthfeel when paired with grains like millet and rice in a stout.

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# Hello Darkness Dry Oat Stout

## Gluten-Free Dry Irish Stout

Contributed by Brian Newcomb (Gluten Free Brew Supply)

Brian Newcomb, owner of Gluten Free Brew Supply, says, "I love a good stout with a silky body. A huge dose of gluten-free malted oats combined with the sorghum malt base and specialty malts and highlighted with hops results in a classic DARK dry oat stout."

**Batch volume:** 5 US gal. (18.9 L)

**Original gravity:** 1.045 [11.2°P]

**Final gravity:** 1.006 [1.5°P]

**Color:** 59 SRM [116 EBC]

**Bitterness:** 25 IBU

**Alcohol:** 5.1% by volume

### FERMENTABLES

5.0 lb.	[2.27 kg] red sorghum malt
4.0 lb.	[1.80 kg] gluten-free oat malt
1.5 lb.	[0.68 kg] Eckert biscuit rice malt 5°L
1.5 lb.	[0.68 kg] Grouse pale buckwheat malt
1.0 lb.	[0.45 kg] Grouse chocolate roast millet malt
1.0 lb.	[0.45 kg] Grouse medium roast millet malt
1.0 lb.	[0.45 kg] Grouse Caramel 120L millet malt
0.5 lb.	[0.23 kg] Eckert Pitch Black rice malt

### ENZYMES

15.5 mL Ceremix® Flex (equivalent to 1 mL/lb. grain, or 2.2 mL/kg)

15.5 mL Ondea® Pro (1 mL/lb., or 2.2 mL/kg)

### WATER

Aim for a "Kilkenny" water profile:

Ca<sup>2+</sup>: 35 ppm, Mg<sup>2+</sup>: 8 ppm, Na<sup>+</sup>: 46 ppm, Cl<sup>-</sup>: 77 ppm, SO<sub>4</sub><sup>2-</sup>: 21 ppm, CaCO<sub>3</sub>: 90 ppm, pH: 5.6

### HOPS

0.5 oz.	[14 g] Northern Brewer (9.5% AA) @ 60 min.
0.5 oz.	[14 g] Northern Brewer (9.5% AA) @ 30 min.
0.5 oz.	[14 g] Fuggle (4.5% AA) @ 30 min.
0.5 oz.	[14 g] Fuggle (4.5% AA) @ 15 min.
1.0 oz.	[28 g] cocoa nibs @ 15 min.

### YEAST

1 sachet (1 g, or 0.39 oz.) Lallemand Nottingham ale yeast

### BREWING NOTES

Heat strike water to 135°F (57°C) and mash in with entire grist; mash temperature should be 125°F (52°C). Add Ceremix Flex and Ondea Pro and rest for 25 min. at 125°F (52°C).

Raise mash to 150°F (66°C) and rest 25 min. Raise mash to 175°F (79°C) and hold for an additional 25 min. Mash out at 180°F (82°C) for 10 min., then perform sparge and boil.

Chill wort to 60°F (16°C), and pitch yeast. Ferment at 60–65°F (16–18°C) for 7–10 days, then cold crash and package.



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# FINDING YOUR MOJO

A Tale of Homebrewing Redemption

By Mark Pasquinelli

I was recently at a homebrewing crossroads. It should have been a time of bliss. My beers were good; some would say excellent. I'd never possessed more brewing savvy. The quality and variety of ingredients at my disposal were unsurpassed. I brewed with equipment that I could only have dreamt of when I began homebrewing in the mid-'90s. Yet something was amiss.

My soul-restoring brew sessions had degenerated into a chore. The joy was gone, having been somehow incrementally sapped. In short, I'd lost my homebrewing mojo—that loving feeling—and I needed to bring it on back.

But to do so, I needed to take a step back.



## SPACE

The discovery process was arduous and continues to this day. I spent countless hours reading, interacting on social media groups, watching podcasts, and thinking (and occasionally over thinking). My findings were simultaneously revealing and humbling. To paraphrase a famous *Pogo* cartoon strip, “I have met the enemy, and he is me.”

One look around my garage told me where to start. I crave order, but my homebrewery had cratered into chaos. My garage—bequeathed to me by my wife, mostly to get me out of the kitchen—is enviably large, yet the layout neglected a sane workflow. Thus, a goodly portion of my brew days was spent wandering, like Moses in the wilderness, searching for this, that, and the other.

Fortunately, this realization coincided with a Pennsylvania winter, when I usually take a hiatus to plan my homebrewing activities for the year. It was the perfect time for a major renovation. I gutted a wall of haphazardly constructed shelving and replaced it with twice as much storage. Like items were retrieved from all corners of my brewery and properly arranged. Bags of base grains were moved to Vittles Vault containers and neatly stacked on heavy-duty shelving. Specialty grains were sorted into labeled containers. With those simple changes, my garage was transformed—chaos into order, bringing an instant sense of feng shui and tranquility.

## TIME

Time is perhaps our most important commodity. It's irreplaceable, and I realized I was wasting lots of it. Anything that would shorten my brew day would surely be a huge stress relief.

A quick analysis singled out my fly sparging. Knowing my boil evaporation rate, I'd sparge over a 45-minute period—the time-honored method—until my wort hit the desired temperature-corrected gravity. Sadly, though, I was over-sparging, haphazardly adding to my hot liquor tank as if I were assisting in the birth of triplets instead of homebrewing. This caused me to leave precious gravity points in my mash tun.

BeerSmith solved the problem with a function that I'd simply ignored. It calculated the water absorption of the grain and, with my boil evaporation rate, determined how much sparge water I really needed. No more leaving wasted wort in the mash tun.

I also examined my 45-minute sparge time. Was it really necessary? Modern thought seemed to say otherwise. I now hastily sparge into the mash tun and pump the wort to the boil kettle. The new process takes only ten minutes, saving me over half an hour.

And while I was trying to shorten my brew day, was a 90-minute boil also necessary? It was my standard, and conventional wisdom held that it was required to eliminate dimethyl sulfide (DMS) and its unmistakable aroma of creamed corn in brews with large amounts of lightly kilned base malts.



Modern malts are highly modified, and the majority of the recipes I see recommend only a 60-minute boil. I cut another half hour from my brew day with no ill effects, although I make sure my Pilsner-laden brews get a more vigorous boil, and I still boil my wee heavies and barleywines for 90 minutes or more. My brew days were gradually falling into place. I could now sense feelings of my lost mojo just within my grasp, yet one more problem needed to be addressed.

## INSPIRATION

Perhaps the biggest source of my angst was the beers themselves. I consider myself to be a traditional brewer. I love the classic styles: Pilsners, stouts, saisons, IPA, and so on. But I also have a wild, adventurous streak that must be nourished. I'd see an outlandish recipe and say, *I have to brew that!* That is after, after all, one of the joys of homebrewing—being limited only by your imagination.

However, as Hamlet opined, "Ay, there's the rub." These off-the-wall homebrews often turned out well, but I'd flit from recipe to recipe, never mastering a particular one. After over two decades of homebrewing, I didn't have any "house" recipes, vetted by time, that were usually on tap. I needed tried-and-true recipes that could be brewed by memory—a concept I call *déjà brew*. That's when I reached out to two homebrewing senseis—Chris P. (Crispy) Frey and Denny Conn—for guidance. They were more than happy to help.

Crispy started homebrewing in 1994. At someone's suggestion, he decided to pick a favorite beer and clone it. Sierra Nevada Pale Ale (SNPA) made sense. It was hoppy, malty, and (by current standards) not over the top. He started with several clone recipes that he winnowed to his first iteration, which didn't match the original SNPA. A dozen recipes followed over the next year, "tweaking this that and the other thing."

Trying to change multiple things—mash temperature, yeast strain, or hop additions—only made him realize the need to focus on one variable at a time. "In addition, I needed to be sure that I could reproduce my process time and time again. This meant taking lots of notes regarding ingredients, processes, temperatures, time, etc.," he notes.

He brewed it 10 or 12 times before feeling it was close to what SNPA should be and then another five or six times

Photos © Getty/NisarN [astronaut], courtesy of Mark Pasquinelli



My single-tier brewing rig.

before feeling confident he could replicate it. Crispy's recipe—Nearly Nirvana Pale Ale, now in its 88th iteration—is a bit more malty than SNPA, with a little more hop flavor and aroma. The recipe is so revered that it became an official recipe for National Homebrew Day in 2000.

Crispy's efforts aren't confined to SNPA. He's brewed his tripel approximately 35 times and also made a Belgian quad for his 444th career batch, using four grains, four hops, and four water adjustments.

Denny Conn developed his famous rye IPA recipe for his wife's yearly birthday party. In slightly edited form, here's his story:

It began as a fairly straight-ahead IPA. At the time, there was a lot of talk about using rye. I started experimenting with it in various amounts, and it took me maybe five or six tries before I got it where I wanted it. Then, I started playing with the hops. For some reason, I decided to use both German(ish) and American hops. Columbus was starting to gain popularity so I decided to give that a try. I also had some Mt. Hood in the freezer, and I decided those two would be it. It took another three or four batches before I settled on amounts and timing. The final tweak was the yeast. I'd just started culturing Brewtek CL-50 (which later became Wyeast 1450) and decided to give it a try. Its velvety mouthfeel was a perfect complement



Closed CO<sub>2</sub> transfer of Hey, Porter to a corny keg.

to the rye. Next, I brewed a few more batches exactly the same way to be certain it was going to be repeatable.

All told, I made about 13 test batches, changing one thing at a time, before deciding I had the recipe. Since then, the only changes I've made were usually to

brew it without the wheat and Carapils. If I was designing that recipe today, I wouldn't have used them. But for my 24th anniversary, I went back to the original recipe and was surprised to find that they indeed make a difference. I won't be brewing it without them again!

Back then, I was using my "Cheap'n'Easy" system: a 48-quart rectangular cooler, with a hose braid to separate the wort from the grain. I used that and a converted keg cooler for over 20 years and 500-plus batches. That system has been retired in favor of Grainfather equipment: a G40 and G70 brewing system, three conical fermenters, and their glycol chiller unit. It's no longer cheap, but it can't be beaten for easy! As I've aged, I've found that the brewing experience is the most important thing for me. I want it to be fun and easy—and that supersedes even the beer. With my new equipment, I can have a flawless brew day in less than four hours, including cleanup. The enjoyment that's added to my hobby is immense. I would never go back to the old equipment.

Crispy had found his Nirvana. Denny's homebrewing enjoyment was at an all-time high. Now it was my turn. With their wisdom in hand, I set out to create a few "house" homebrews—not by trying to make clones, but by fine-tuning the recipes to my personal tastes via constant iterations. My first choices were based on two favorites: Surly's Todd the Axe Man and Great Lakes Brewing's Edmund Fitzgerald Porter. For a jumping off point, I turned to the internet, the world's go-to source for unimpeachable information.

## FORMULATION

I culled information for Todd the Axe Man from Surly and a homebrewing forum, came to a consensus, plugged my guesstimates into BeerSmith, and hoped for the best. I had to compromise on the forum's original and final gravity (OG and FG) estimates (1.072–1.076 and 1.016–1.020) and Surly's (1.065 and 1.011) to get an alcohol content of approximately 7.2% by volume.

My first attempt was surprisingly good, but there was still work to be done. Due to my equipment and terroir, I knew some tweaking would be in order. The recommended choices of White Labs WLP007 Dry English Ale Yeast and 100% Simpsons Golden Promise malt looked to be good ones. However, the body seemed light. I bumped the mash temperature from 150°F (66°C) to 153°F (67°C) and added a few

ounces of Carapils for good measure. The bitterness also seemed to be lacking—I'd been a little cautious on the first try—and in keeping with the spirit of the beer, I ditched my standard Magnum bittering addition for the prescribed Warrior hops.

As the iterations proceeded, I adjusted the late hopping schedule of Citra and Mosaic (in a 2:1 ratio) and tried to interpret the exact quantity of hops needed for "dry hopped through the roof," as described in the homebrewing forum. I tend to go overboard with dry hopping. Not surprisingly, my initial amounts were too much, well past the point of diminishing returns. I eventually settled on the current guideline of about two ounces of dry hops per gallon for hoppy brews.

In the process, I also stumbled on to more efficient hopping techniques. My manic

brewing had allowed me to fall prey to the siren call of gadgetry. Each session was different—a vain attempt to recreate the wheel. Stepping back allowed me to literally separate the grain from the chaff. Seeing clearly, I learned to simply dump hops into the fermenter rather than bagging; to use a closed hop addition method that shielded my IPA from oxygen; and how to do a closed transfer of IPA from fermenter to the keg.

But a closed transfer wouldn't be possible until I addressed the vexing problem of hops clogging my lines, which I solved by patiently dumping the hops over several days instead of trying to do it in one or two shots. In addition, the clogging issues were leading to oxidation, resulting in a torrent of profanity (that's still reverberating through the loft of our garage)



Prepping for closed addition of Citra and Mosaic dry hops.

and my wife's walking out on me. These simple changes restored a great deal of marital bliss, and my blood pressure is much lower.

As a sidebar, I realized the value of Crispy's admonition to take notes. I used to kid myself and rely on my "steel trap" memory. Now, I jot everything down on a (paper) tablet and transfer the information to my BeerSmith notes.

My house IPA, dubbed Todd the Rush Man, after homebrew club member Todd Rush, is now in its fourth iteration. There are still some minor adjustments in the works before I call it a done deal. "Rush Man" is a big favorite at club meetings or when entertaining. With aromas and flavors of mango, grapefruit, and hints of pine, it's exquisitely smooth and crushable. And there's enough bitterness to satisfy hopheads while not offending those who claim not to like IPAs.

I could never homebrew without my wife's support. As Denny did for his wife, I made a porter in my wife Karol's honor. It's one of her favorite styles, and Great Lakes Edmund Fitzgerald is at the top of her list. Using the same approach, I turned to the AHA's clone recipe (*Zymurgy*, Jul/Aug 2008).

The first try went well; Karol was pleased. But the beer was understated, hardly robust. I reviewed my recipe, first finding that I'd been a little tame with the original gravity. Northern Brewer bittering hops were swapped for my standard Magnum, with the IBUs increased, and the late East Kent hopping additions—which really only contributed bitterness—were sunk into the Magnum charge. To get some East Kent Goldings hops into the recipe, I opted to add an ounce at knock-out for complexity.

Specialty malts looked to be key to up my porter's game. I'd always been hesitant about using black malt (formerly black patent) since I'd once gotten carried away with it in a Russian imperial stout. I cautiously added more.

Roasted barley, however, had the potential to be the biggest game changer. Great Lakes touts its porter as roasty. Mine wasn't. I increased the amount, making me think of another friend in my homebrew club, who had the pleasure of knowing "Rocket Rod" Romanek. Rod won the Homebrewer of the Year award in 2004 and formulated Positively Porter, which was featured as an AHA Big Brew recipe in 2011. When sampling someone's porter, he'd always admonish, "Needs more



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# HEY, PORTER

Recipe by Mark Pasquinelli

**Batch volume:** 5.0 US gal. [18.9 L]

**Original gravity:** 1.060 [14.7° P]

**Final gravity:** 1.014 [3.6° P]

**Efficiency:** 72%

**Bitterness:** 47 IBU

**Color:** 44 SRM

**Alcohol:** 6.1% by volume

## MALTS

10.0 lb. [4.5 kg] Briess pale malt

12.0 oz. [340 g] Briess 60°L caramel malt

10.0 oz. [284 g] Briess black malt

10.0 oz. [284 g] Bairds roasted barley

4.0 oz. [113 g] Dingemans Special B malt

## HOPS

0.90 oz. [26 g] Magnum, 12.2% a.a. @ 60 min

0.50 oz. [13 g] East Kent Goldings, 4.8% a.a.

@ knockout

## YEAST

1 pack [11.5 g]

Fermentis Safale US-05

## ADDITIONAL ITEMS

0.5 tsp. Wyeast Nutrient @ 10 min

1 tablet. Whirlfloc @ 10 min

## BREWING NOTES

To adjust my very soft water, I add 1 tsp. of gypsum and 0.5 tsp. of calcium chloride to the mash. Adjust the minerals as needed for your water profile. Mash at 153°F [67°C] for 60 minutes. Sparge to collect 5.75 gal. [21.8 L] and boil for 60 minutes, adding hops as directed. Chill and ferment at 68°F [20°C] to completion. Cold crash to 38°F [3°C] and keg or bottle. Carbonate at 2.3 vol. [4.6 g/L] CO<sub>2</sub>.

## EXTRACT VERSION

Steep specialty malts at 155°F [68°C] in 5.75 gal. [21.8 L] of water for 20 minutes, add 6 lb. [2.7 kg] light dried malt extract, and follow all-grain directions from boil. Top off volume if necessary.



Base malts and specialty malts neatly arranged.

roast." Who was I to argue? As a tribute, I followed his advice, increased the roasted barley, and also added a touch of Special B that's prominently featured in his recipe.

Hey, Porter (Karol is a big Johnny Cash fan) is in its third iteration. The roasted character is much more pronounced now and the Special B addition provides a nice caramelly-dark fruit complexity to go with the notes of chocolate and coffee. I've always thought of porter as a fall/winter beverage, but Hey Porter is proving to be a refreshing year-round thing.

## BREWER, HEAL THYSELF

With a series of simple changes (and a little help from my friends), I'm in a much better homebrewing place now. The mojo that I'd lost, like a Biblical tale of redemption, was

found. Although sometimes I think it was intentionally hiding, forcing me to challenge myself and vault my homebrews to a higher level.

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*Mark Pasquinelli resides in the bucolic town of Elysburg, Pa., where he spends his time in varying degrees as a husband, writer, homebrewer, microbiologist, and manservant for seven felines.*

Brew  
This!



# TODD THE RUSH MAN

American IPA

Recipe by Mark Pasquinelli

**Batch volume:** 5.5 US gal. (20.8 L)  
**Original gravity:** 1.070 (17.1°P)  
**Final gravity:** 1.015 (3.8°P)  
**Efficiency:** 72%  
**Bitterness:** 81 IBU  
**Color:** 3 SRM  
**Alcohol:** 7.3% by volume

## MALTS

19.5 lb. (8.9 kg) Simpson's Golden Promise malt  
6.0 oz. (170 g) Briess Carapils malt

## HOPS

0.60 oz. (17 g) Warrior, 17.5% a.a. @ 60 min  
1.50 oz. (43 g) Citra, 12% a.a. @ 10 min  
0.75 oz. (21 g) Mosaic, 11.3% a.a. @ 10 min  
1.50 oz. (43 g) Citra, 12% a.a. @ 0 min  
0.75 oz. (21 g) Mosaic, 11.3% a.a. @ 0 min  
2.50 oz. (71 g) Citra, 12% a.a. – 20 min. whirlpool @ 180°F (82°C)  
1.25 oz. (35 g) Mosaic, 11.3% a.a. 20 min whirlpool @ 180°F (82°C)  
2.0 oz. (57 g) Citra, 12% a.a., dry hop 3 days  
into primary fermentation  
1.0 oz. (28 g) Mosaic, 11.3% a.a., dry hop  
3 days into primary fermentation  
2.0 oz. (57 g) Citra, 12% a.a., dry hop 6 days  
into primary fermentation  
1.0 oz. (28 g) Mosaic, 11.3% a.a., dry hop  
6 days into primary fermentation

## YEAST

2.5 L  
starter White Labs WLP007 Dry English Ale Yeast

## ADDITIONAL ITEMS

0.5 tsp. Wyeast Nutrient @ 10 min  
1 tablet Whirlfloc @ 10 min

## BREWING NOTES

The recipe is set for 7.0 gal. (26.5 L) to compensate for wort absorption by the hops. My water is very soft, so I add 3 tsp. gypsum and 1 tsp calcium chloride to the mash. Adjust the minerals for your water profile. Mash at 153°F (67°C) for 60 minutes. Sparge to collect 8.0 gal. (30.3 L) wort and boil for 60 minutes. (To decrease vegetal matter, you can use HAAS LUPOMAX Citra and Mosaic hops for whirlpool and dry hop additions, in which case decrease the quantities by 40%) Add hot side hops and additional ingredients as directed. Chill and ferment at 68°F (20°C) to completion. Dry hop as directed. If possible, dump hops, crash to 38°F (3°C), and close transfer by CO<sub>2</sub> to keg. Bottle or carbonate at 2.5 volumes (5 g/L) CO<sub>2</sub>.



## EXTRACT VERSION

Substitute 11.0 lb. (5.0 kg) extra-light dried malt extract for malts and follow directions from boil.

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*The Prodigal Son in the Tavern*, a 1635 painting by Rembrandt, is a portrait of the artist and his wife Saskia. The striped beer glass, a so-called "pass glass," was used in drinking games.

# SEARCHING FOR REMBRANDT'S LOST BEER

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One of the original  
recipes for Soet bier as  
recorded by Melchior  
Mels. Was this the  
beer that Rembrandt  
was drinking?

By Roel Mulder

A young man joyfully lifts a glass of blond beer, a smiling woman on his lap. A large white feather adorns his hat, and he has a glimmering sword on his belt. On the table, we see a knife and a pastry with a bird's head and two wings. There sure is a party going on in Rembrandt's painting *The Prodigal Son in the Tavern*, which dates from 1635. It may be the biblical prodigal son. The woman might be a prostitute. Today we might even call it a "selfie," as it is in fact Rembrandt himself we see looking at us, while the woman's face is that of his wife, Saskia.

But I'm not an art historian, and the picture's artistic value was not necessarily the reason why CRAFT, the Dutch trade association for independent brewers, asked me to look at it. No, their question was in fact quite mundane: what beer is Rembrandt drinking here?

They had their reasons, of course. As part of a campaign to make beer lovers in the Netherlands aware of the vitality of the Dutch craft beer scene, CRAFT had envisaged a project to recreate the beer seen in Rembrandt's painting. They asked me to come up with a plausible historical recipe that they could adapt into a more contemporary version and then invite their members to brew. The whole process would be filmed for use as an online marketing tool.

Good idea! Beer history is great, but it's even more wonderful when you can taste the past. But where do you find such a recipe? And what was beer like in Rembrandt's time, in Amsterdam in the 17th century?



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## A PRODUCT OF ITS TIME

Today, *The Prodigal Son in the Tavern* is in the Gemäldegalerie Alte Meister, a museum in Dresden, Germany. The painting is a typical product of its time, seemingly just showing a scene of joy and drunkenness, but with a biblical connotation nonetheless. The parable of the prodigal son, who first wastes all his money but is still welcomed home by his loving father, was a popular theme in art.

The work also enabled Rembrandt to show off his skills for painting fabrics and other materials, such as the feathers and the lady's shining pearl. It's also one of the many self-portraits Rembrandt painted, this time accompanied by his wife. It gave art collectors of the time an opportunity to have a likeness of the great master in their home, and at the same time, Rembrandt could show the world what a great rich life he had. It had at least some parallels to today's self-promotion on Instagram and other social media.

## A BOOMING CITY

Rembrandt van Rijn was born in 1606 in the city of Leiden, home to the country's oldest university. His father was a miller, but Rembrandt was destined for greater things. After taking the first steps as a painter's apprentice in his hometown, he moved to Amsterdam in 1631. At the time, Amsterdam was booming. Within a few decades, its population had tripled to over 100,000 and that number was still growing. It had become the largest city in the Republic of the Netherlands, a bustling trade hub where merchants from all of Europe would flock to sell their goods.

Clever businessmen made their fortune, and all these wealthy and proud burghers paid good money to have their portraits made by skillful artists like Rembrandt. It was Holland's Golden Age, and the arts flourished. Of course, not everybody benefited. A large gap between rich and poor remained, and Amsterdam's wealth was in part due to its colonial enterprises in Asia, where the Dutch did not shun the use of violence.

In the Netherlands, beer was part of everyday life. In fact, after the introduction of hops in the 14th century, it had been a major beer-producing and -exporting country, even teaching the Belgians and the English how to make hopped beer. They introduced the word *beer* to the English language, as a counterpart to the unhopped ale that had been produced on the British Isles up to that point. Amsterdam was not a major export center for beer, but one of the reasons it had managed to develop from a small fishing village into a major port of trade was that, in the 14th century, it had been designated as a place where foreign beer merchants were to stop and pay import taxes.

By the time Rembrandt came to Amsterdam, there were 19 breweries in the city, with names like Het Duijfe ("The Dove"), De Dubbele Arend ("The Double Eagle") and De Keizerskroon ("The Emperor's Crown"). Another one was De Hooiberg ("The Haystack"), which in 1864 would be bought by Gerard Heineken, founder of the well-known brand with the green label and the red star that is still with us today.

But now the real question—what was that beer? As anyone can see, it was pale and clear and had at least some foam. The depicted glass is a so-called "pass glass" that was used in a drinking game. The long, cylindrical glass, which was marked like a measuring cup, would be passed from one drinker to the next. The goal was to drink just the right amount so that the level of the beer would arrive exactly at the next mark. If the player failed, naturally he was required to drink even more.

A party beer, then: no weak brew, but probably also not too heavy or the game wouldn't have lasted very long. Naturally, the light color suggests pale malts were used. It probably was a multi-grain beer, as most Dutch beers of the time were. And it would have been top-fermented, as bottom fermentation would not reach the Low Countries until the 19th century.

Now, all I needed was a contemporary

Brew  
This!



## SOET BIER, 1683

A nice three-grain 17th-century Dutch "sweet beer" recorded by Melchior Mels from Dordrecht, that just may resemble what Rembrandt was drinking in his painting *The Prodigal Son in the Tavern*. The secret addition of coriander and anise seeds was apparently well kept from the brewery workers. This is my adaptation of the original recipe. The 5.0% ABV version elaborated by the members of CRAFT, the Dutch trade association for independent brewers, has an original gravity of 1.057 (14°P). Their ratio for both coriander and anise is 300 grams each for 1,500 liters of beer.

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

**Original gravity:** 1.080 [19.3°P]

**Final gravity:** 1.028 [7.1°P]

**Efficiency:** 75%

**Color:** 5 SRM (10 EBC)

**Bitterness:** 20 IBU

**Alcohol:** 6.8 % by volume

### MALTS & ADJUNCTS

3.51 kg [7.7 lb.] Pilsner malt

2.36 kg [5.2 lb.] buckwheat or buckwheat malt

1.62 kg [3.6 lb.] flaked oats

### HOPS

50 g [1.75 oz.] traditional European hops @ 60 min

### ADDITIONAL ITEMS

2.5 g [0.1 oz.] ground coriander @ 10 min

5 g [0.2 oz.] ground anise seeds @ 10 min

### YEAST

Traditional European top-fermenting beer yeast

### BREWING NOTES

Mash at 66°C (151°F) for 60 minutes. Boil 60 minutes, adding hops, coriander, and anise seed as indicated. Chill to 18°C (65°F) and ferment to completion.

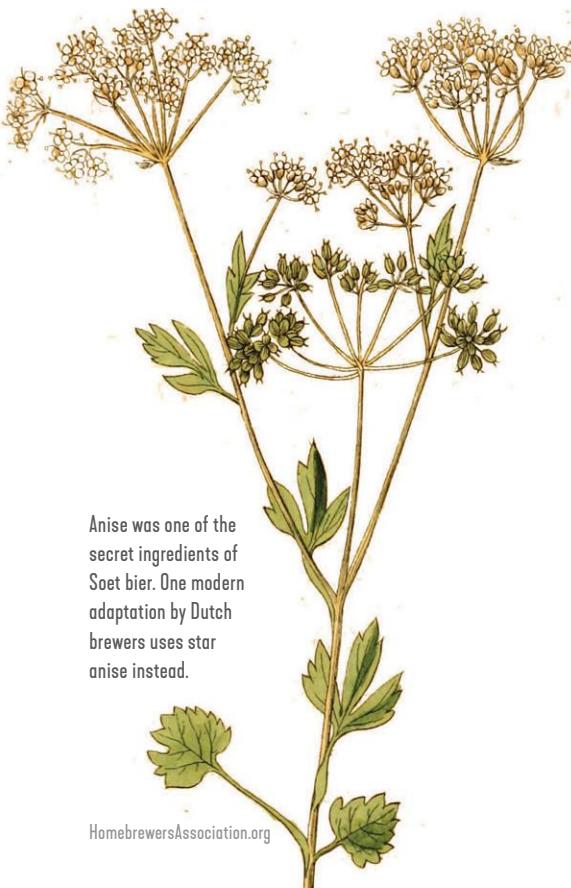
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recipe that matched these requirements. However, 17th-century brewing records or recipes are quite rare, in the Netherlands or elsewhere. Luckily, there is one source that contains a whole lot of them. But it does require us to have a look around in another Dutch city: Dordrecht.

## DRAWBRIDGES AND COBBLED STREETS

Dordrecht is about 100 kilometers to the south of Amsterdam. At first glance, it looks similar to the Netherlands' capital, with drawbridge-spanned canals, tall old houses and warehouses, and cobbled streets. It is situated at the confluence of three rivers where large barges pass over the shimmering water all day. In fact, in the Middle Ages, Dordrecht was easily Holland's biggest city, and it had a flourishing trade when Amsterdam was still a tiny fishing village. By the 17th century, Dordrecht's fame had waned somewhat, but it remained a bustling place.

Here, on Voorstraat ("Fore Street"), that runs along the narrow old harbor, there was a brewery called Het Witte Anker ("The White Anchor"). In 1660, one Adriaan Mels (1636–1673) is mentioned as its owner. Not much is known of his life, but we know what he brewed thanks to his son Melchior Mels, who left us an interesting set of handwritten notebooks.



Anise was one of the secret ingredients of Soet bier. One modern adaptation by Dutch brewers uses star anise instead.

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3 vingeren breed nae vol is. Dit gedekt  
al het overige. ind's hoppere ketel

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The Waereld ('World') brewery in Amsterdam. Horses would carry the beer barrels around town on a large wooden sled.



## BRUINBITTER BIER, 1687

"Brown bitter beer," another fun 17th century Dutch brew recorded by Melchior Mels. I simplified it by leaving out the complicated mash scheme. The original recipe just mentions "brown malt," which I substituted here with Munich and Vienna malts, which, combined, should have enough diastatic power. I've added some caramel malt to recreate the effect of a long boil. The amount of cardamom is an educated guess. Eighteenth-century beer writer Wouter van Lis from Rotterdam notes that some brewers also added poppies and dyer's alkanet (probably the roots) to give it a red color, and wormwood for bitterness.

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

**Color:** 36 SRM [71 EBC]

**Original gravity:** 1.069 [16.8°P]

**Bitterness:** 40 IBU

**Final gravity:** 1.017 [4.3°P]

**Alcohol:** 6.8 % by volume

**Efficiency:** 75%

### MALTS & ADJUNCTS

3.2 kg [7.1 lb.] Munich malt

1.84 kg [4.1 lb.] Vienna malt

0.96 kg [2.1 lb.] flaked oats

### HOPS

95 g [3.4 oz.] traditional European hops @ 60 min

### ADDITIONAL ITEMS

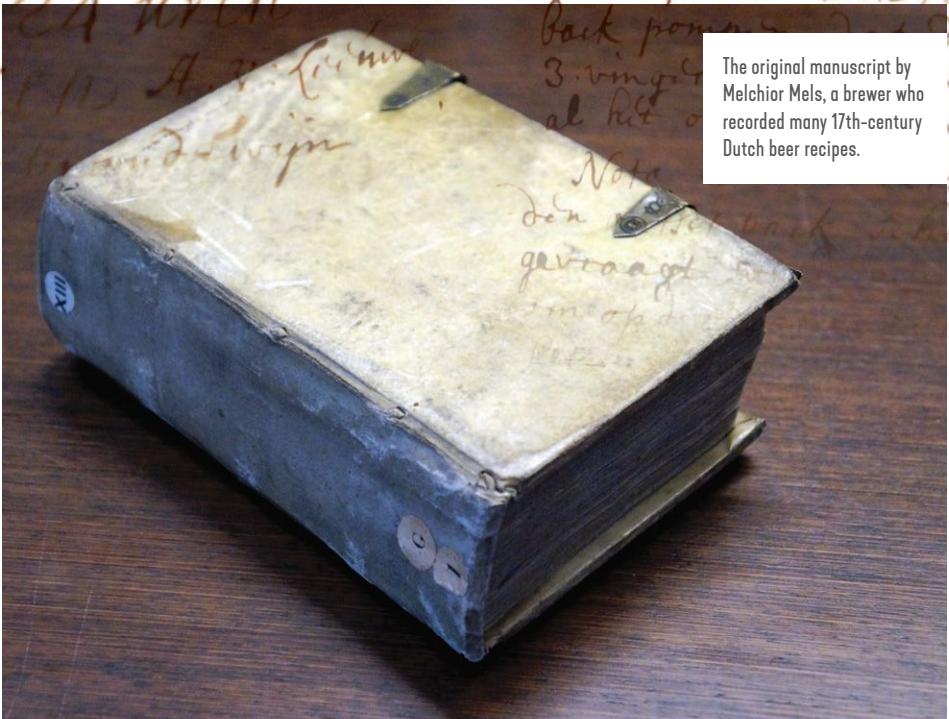
10 g [0.35 oz.] cardamom @ 10 min

### YEAST

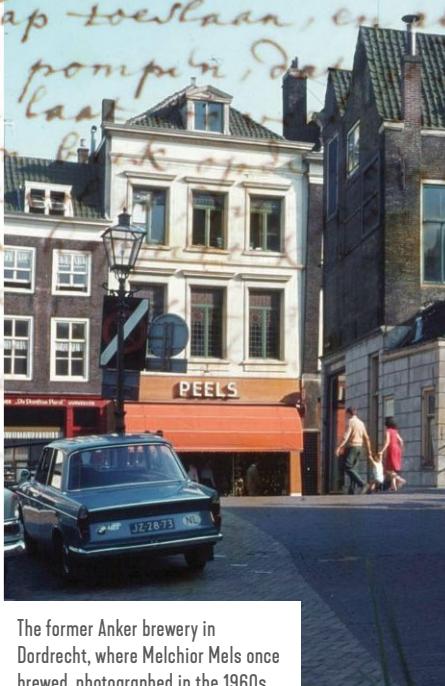
European top-fermenting beer yeast

### BREWING NOTES

Mash at 66°C [151°F] for 60 minutes. Boil 60 minutes, adding hops and cardamom as indicated. Chill to 18°C (65°F) and ferment to completion.



The original manuscript by Melchior Mels, a brewer who recorded many 17th-century Dutch beer recipes.



The former Anker brewery in Dordrecht, where Melchior Mels once brewed, photographed in the 1960s. It is the building marked "Peels."

Melchior was a brewer like his father, but probably also a physician and pharmacist. In his notebooks, today preserved at the Allard Pierson museum in Amsterdam, he wrote down a large number of medicinal recipes and medical instructions. But more interestingly, he also recorded recipes for various foodstuffs, such as sweet pastries, waffles, pudding, smoked sausages, onion soup, and head cheese. There are even instructions how to make fireworks and a camera obscura.

But, of course, I wouldn't mention all this if there weren't any beer recipes. There are more than 50 of them, dating from the period from 1660, when his father was still running the brewery, up to 1696, when a few immigrants from Wallonia (today the southern part of Belgium) were working there. Several beers are mentioned more than once, such as brown bitter beer, English beer, sweet beer, Mechelen beer, and Liège beer (the latter is featured in "Lost Belgian Beers: Liège Saison," Zymurgy, Sept/Oct 2019). There is a raspberry beer (mentioned in "Lost Fruit Beers of Belgium and the Netherlands," Zymurgy, Jan/Feb 2022), a medicinal beer that was also used in the city's hospital, and a laxative beer "from the doctor currently serving the king of England."

Another beer of interest is the *mol* from the city of Nijmegen near the German border. It was an all-barley light-colored beer, hopped very sparingly. A portion of the wort would be removed at the start of the brewing process and boiled for three days until a sweet syrup was left. The rest of the wort was used to make a rather sour Berliner weisse-like beer, to which the syrup was added. Thus, the

Brew  
This!



## MOL FROM NIJMEGEN, CA. 1690

A unique beer from the eastern part of the Netherlands, preserved by Melchior Mels in his notebook, and adapted by Rudolf Nunes Ferro (1994). It can only be kept for a short period of time (unless you pasteurize it) once the sweet-sour combination has started foaming. A good beer to try for a festival or an event.

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

### MALTS

3.5 kg (7.7 lb.) pale barley malt

### HOPS

5 g (0.2 oz.) traditional European hops @ 60 min

### YEAST

European top-fermenting beer yeast

### BREWING NOTES

First wort: Mash the barley malt. From this, collect 13.5 L (3.6 gal.) of wort with a gravity of 1.059 (14.5°P). Keep 2.2 L (2.3 qt.) of this wort apart. Boil the rest for one hour with the hops.

Second wort: From the same mash, collect another 8 L (2.1 gal.) of wort with a gravity of 1.020 (5.1°P).

Combine the hopped wort with the unhopped second wort to get 19.3 L (5.1 gal.) of wort with a gravity of 1.043 (10.7°P). Leave this to sour for ten hours and then add top-fermenting yeast. This will ferment to a sour white beer of approximately 4.3% ABV.

Boil the 2.2 L (2.3 qt.) of reserved wort from the first mash to get a syrup-like substance of 0.7 liters (0.75 qt.) and an OG of 1.189 (41.9°P). In the original recipe, this takes three days.

Add the syrupy wort to the sour white beer. Wait for fermentation to restart. The result is a foaming, sweet-sour white beer. This is the moment to drink it! Do not bottle—it is still fermenting. After about 10 days, all the sugar from the wort syrup will have fermented, leaving a sour, flat beer.



The Star, one of the many breweries in 17th-century Amsterdam.

acidity of the beer was complemented by the syrup's sweetness, and, as refermentation kicked in, it produced a generous foam. That was the moment to drink it. In this state, it could only keep for a few days until only a sour, dull liquid was left. *Nijmegen mol* was a unique beer type that disappeared near the end of the 18th century and never seen again.

### CORIANDER AND ANISE

But what beer was Rembrandt drinking in his painting? Mels's manuscript provides a detailed overview of the beers that existed in Holland in the 17th century, and at least his father Adriaan was Rembrandt's contemporary. Adriaan Mels even brewed a brown bitter beer explicitly stated to be brewed for sale in Amsterdam. But we were looking for a light-colored beer. An interesting candidate is the *soet* beer (pronounced "soot"), which means "sweet." Sweet beer was made with pale malt, oats, and buckwheat. The manuscript contains no fewer than seven descriptions of it dating from 1660 to 1688.

These sweet beer recipes are rather complicated, with several mashes conducted in sequence, but it seems that in the end all the wort was combined again to form one beer. Interestingly, the wort from third mash was not hopped, but instead ground coriander and anise seeds were added. This was done by Mels himself "after the workers had gone to bed," to keep this addition a well-kept secret.

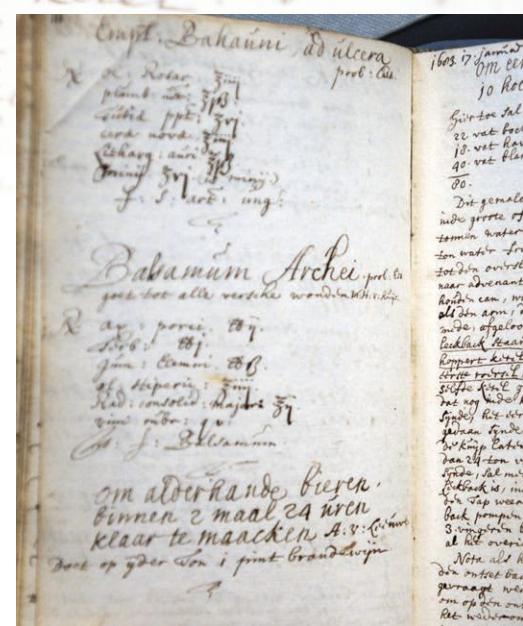
A three-grain beer with a "secret" addition of spices would be, of course, an excellent recipe for today's Dutch brewers to experiment with, I thought. A rather

original one too, especially since anise is not often found in historical beers, and it requires some skill not to make it too dominant in the resulting brew.

In any case, from this information I reconstructed a simplified recipe that was then given to a few Dutch brewers, members of CRAFT. Over the course of a few months in early 2022, they made several test brews with the goal of establishing a combined new recipe that all members could use once the publicity campaign had started—a "beer of the past, to drink in the present."

On 25 April, 2022, we all gathered at the Jopen brewery, located in a wonderfully repurposed church building in the historic city centre of Haarlem. Shining copper kettles; warm, red-painted walls; and fluffy carpeting. Of course, no Dutch brewer is using 17th-century equipment anymore, which led one of them to comment, "Of course, we're using the ingredients of the past to create a new beer." Another said, "Only by using our modern equipment, we are already modernizing this recipe." As a nod to the past, they had added some smoked malt. Though 17th-century brewers already used coal to dry their malt instead of wood, in order not to make it too smokey, it may still have had some taste of it. One of the brewers had replaced the anise with star anise, which gave excellent results.

All in all, we were happy with this "new old" beer we recreated. Despite the name, it was not too sweet, and the combination of the spices, grains and the pinch of smoked malt made for a beer we had never tasted before. A beer Rembrandt would have loved.



One of the original recipes for Soet bier as recorded by Melchior Mels. Was this the beer that Rembrandt was drinking?

**Roel Mulder** is a Dutch historian writing about beer history. He has written a book about Dutch beer including historical recipes and is currently researching the origins of the many Belgian beer styles. 



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# Ciders

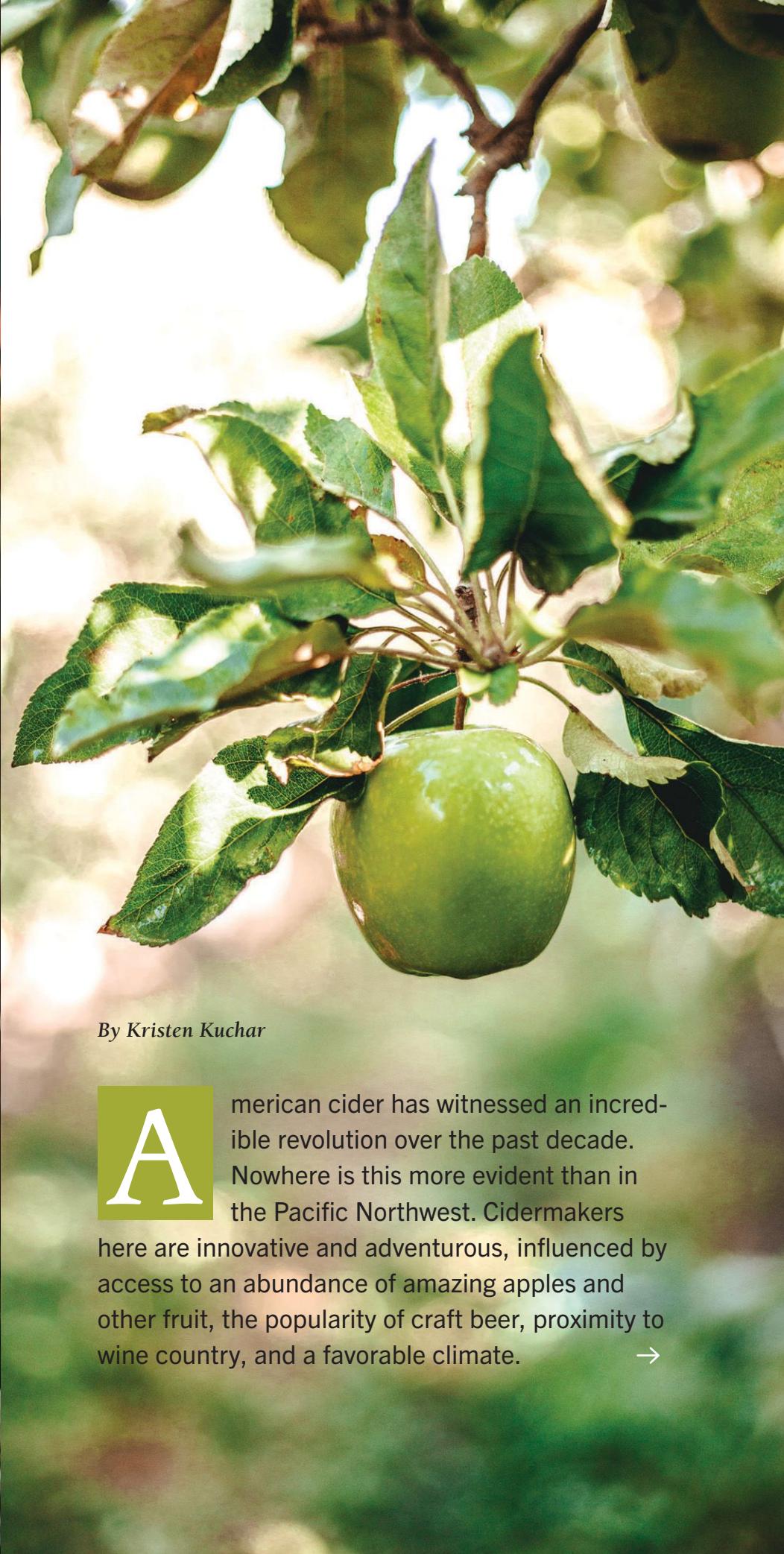
OF THE

## PACIFIC NORTHWEST

WASHINGTON, OREGON, AND CALIFORNIA



**Editor's note:** This is the second in a series of articles that explore regional ciders produced in the United States and around the globe. In this installment, we discover ciders of the Pacific Northwest.



By Kristen Kuchar

A

merican cider has witnessed an incredible revolution over the past decade. Nowhere is this more evident than in the Pacific Northwest. Cidermakers here are innovative and adventurous, influenced by access to an abundance of amazing apples and other fruit, the popularity of craft beer, proximity to wine country, and a favorable climate. →



Many of the producers in Oregon and the greater Pacific Northwest grew up during the birth of the craft beer revolution, including us.

— Dave Takush

"There is a lot of access to great apples here in the Pacific Northwest; there is no doubt about that," says Dave Takush, head cidermaker at 2 Towns Ciderhouse in Corvallis, Ore. Two-thirds of the nation's apples are grown in Washington state, but Takush points out that the region has even more to offer.

"There is also access to other amazing agriculture like Oregon marionberries, Oregon blueberries, Oregon honey, Pacific Northwest fruit in general," he adds. "It's all here at our fingertips."

Takush believes the region's thriving craft beer presence also influences cidermakers. "Many of the producers in Oregon and the greater Pacific Northwest grew up during the birth of the craft beer revolution, including us," he says. He explains that cider producers in the Pacific Northwest are influenced by craft beer styles, which sparks stylistic diversity in the cider community.

"In 2010, we even coined the use of 'imperial ciders,' borrowing from the imperial IPAs of the day, to communicate to the consumer a stylistically high-ABV, rich cider that was the first commercial example of its kind," he says.

"American cider is pushing the envelope and evolving fast," says Dan Pucci, co-author of *American Cider* and founding beverage director at New York City's first cider bar, Wassail.

This area is home to the Northwest Cider Association—the only regional cider trade association that crosses state lines—which serves Washington and Oregon, as well as Idaho, Montana, and British Columbia. The goal of the organization is to support the region's cidermakers, increase sales, improve the quality of cider produced, and cultivate the cider community in the Northwest.

What started in 2010 with 13 cideries has grown to almost 200 cideries throughout the region. "It has just exploded," says Northwest Cider Association Executive



Director Emily Ritchie. Nowadays, it's not just beer and wine on the menu. "There's been this revival and interest in cider across the country," Ritchie says.

Thanks in part to a population that appreciates good cider, there is an abundance of cider festivals in this region as well. These include Washington Cider Week, Oregon Cider Week, Cider Smash, Portland International Cider Cup, Cider Summit Seattle, Olympic Peninsula Apple and Cider Festival, Hood River Cider Fest, Cider Summit Portland and Central Coast Cider Festival.

Cider expert and "The Ciderologist" Gabe Cook says cider is experiencing not only an increase in quality, but a growth in the range of ciders, and cidermakers are better than ever.

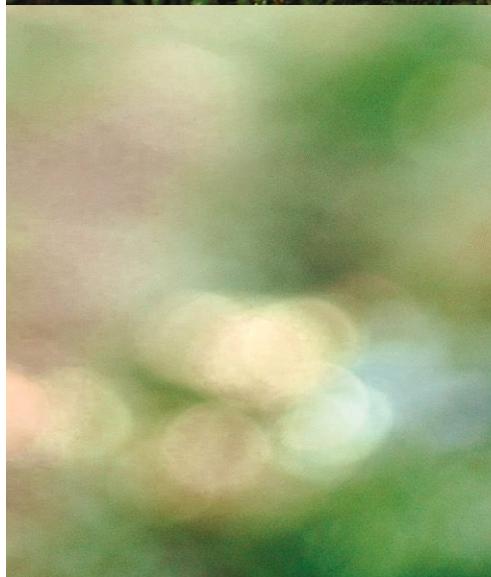
"There's never been a better time to be a cider drinker," Cook says.

## WASHINGTON

It's no surprise that Washington is a top cider location since it's the leading state for apple production. "We have this thriving apple industry that really provides the backbone of cider here," Ritchie says.

What began as one orchard in the 1820s has flourished to more than 175,000 acres of apple farms. With approximately 1,260 growers throughout the state, Washington produces more than 70 percent of the fresh apples in the United States and 85 percent of the country's certified organic apples. There are more than 100 million bushels (40-pound boxes) produced each year, and during peak harvest season, it takes approximately 40,000 pickers to harvest these apples.

More than 30 varieties of apples grow here—top cultivars include Gala, Red Delicious, Fuji, Granny Smith, Cripps Pink, Golden Delicious, Honeycrisp, and Ambrosia. Takush's favorite apple variety, Cosmic Crisp, was 20 years in the making. Bred by Washington State University, this



American cider is pushing the envelope and evolving fast.

— Dan Pucci



hybrid of Honeycrisp and Enterprise is, according to Takush, “outrageously crunchy and high in acid, and has some really unique Sauvignon Blanc-esque qualities when fermented.”

According to the Washington Apple Commission, the state’s arid climate and nutrient-rich soil make it an ideal growing condition for apples. There are five main growing regions in Washington: Columbia Basin, Lake Chelan, Okanogan, Wenatchee Valley, and Yakima Valley.

Craft Brewing Business named Seattle one of the hottest cider spots in the country and the number two on a list of the top U.S. cities for drinking cider.<sup>1</sup> Capitol Cider, Seattle Cider Company, Schilling Cider House, Locust Bar and Number 6 Cider are just a few of the cideries here.

**It is really fun to be a cidermaker in Oregon since the craft beer industry is so strong here.**

— Dave Takush

The Olympic Peninsula Cider Route is one of the first established in the United States. This features Alpenfire Organic Hard Cider, Eaglemount Wine and Cider, and Finnriver Farm & Cidery. Other notable cideries in Washington include Meriweather Cider Company and Dragon’s Hard Cider. In downtown Olympia, The Cider Barrel serves hundreds of hard ciders.

#### OREGON

Dave Takush, 2 Towns Ciderhouse head cidermaker, says it's awesome to be a cidermaker in Oregon, and they like to say they have a winery license but a brewery spirit, which offers the best of both worlds.



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"It is really fun to be a cidemaker in Oregon since the craft beer industry is so strong here. Consumers are not afraid of innovation and products that push the boundaries of what cider can be," Takush says. "That is not the case in all states and definitely not true across the pond in Europe."

Takush is particularly fond of unique Oregon-born apples. "Two of my favorites are Hudson Golden Gem and Airlie Red Flesh/Hidden Rose/Mountain Rose—the name depends on who you ask," he says.

The cidemaker has had the opportunity to see Oregon cider evolve in recent years. In the past, he says, it used to be about sweet versus dry, or what type of single berry you would use to complement the cider, such as raspberry or blackberry.

"These days, it is more about flavor innovation, whether that comes from fermenting with a specific kind of yeast strain, or doing some wild combos with exotic fruit," he says. "For example, we just released Dragon's Day Off, a Pacific Northwest blend of apples fermented with dragon fruit, passionfruit, and hibiscus."

Portland is home to one of the largest populations of cider consumers in the

nation, and *Craft Brewing Business* ranked the city number one out of the top 10 U.S. cities for drinking cider.<sup>1,2</sup>

Oregon is also the birthplace of hopped cider. According to a 2013 *Brew Your Own* article by Glenn BurnSilver, Salem's Wandering Aengus Ciderworks came up with the idea.<sup>3</sup> Spruce Eats recently named Washington's Finnriver Dry Hopped Cider one of the best hard ciders of 2022 and the best cider for beer drinkers.<sup>4</sup>

The city is home to numerous innovative cidemakers, such as Portland Cider Company, Bushwhacker's Cider, Reverend Nat's Hard Cider, Cider Bite, Cider Riot and Schilling Cider House.

The Hood River Valley has 15,000 acres of orchards and is home to Slopeswell Cider, Fox Tail Cider and Crush Cider Café, which showcases local and regional ciders with 17 on tap.<sup>2</sup>

In the Willamette Valley area of Oregon, you'll find E.Z. Orchards, 2 Towns Ciderhouse, Salt Creek Cider House, Wildcraft Cider Works and Bauman's Cider at Bauman Farm. CiderBite is an award-winning cider house in Portland's Pearl District, with 32 rotating taps.

## CALIFORNIA

In the last few years alone, more than 100 new cideries have launched in California, according to BevZero.<sup>5</sup>

"A lot of the U.S.'s fruits come from California, which gives cideries out here an advantage with better access and freshness," says Jason House, vice president of production and operations.

"In Sonoma County, we're known for our Gravenstein apple, a dessert apple that makes for a slightly tart, naturally sweeter cider," House says.

"Cider in California has gotten more experimental over the years," House says. Dan Pucci notes there has been a rise in winemakers embracing cider.

Prominent California cideries include Far West Cider Co., Tilted Shed Ciderworks, Posterity Ciderworks, The Honest Abe Cider House and Meadery, North Canyon Cider Company, Red Branch Cider and Brewing Company and Ironbark Ciderworks.

Cider bars in the state include Redfield Cider Bar and Bottle Shop, Crooked City Cider Taphouse, The Cider Junction and Upsider, the first cider house of California, established in 2012.

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"We are really happy to see a thriving cider culture and community here in the Pacific Northwest, and honored to be a part of it," Takush says. "We look forward to seeing it continue to grow and evolve."

## RESOURCES

1. [craftbrewingbusiness.com/news/top-10-cities-for-cider](http://craftbrewingbusiness.com/news/top-10-cities-for-cider)
2. [bestofthenorthwest.com/northwest-travel-ideas/best-of-northwest-cider](http://bestofthenorthwest.com/northwest-travel-ideas/best-of-northwest-cider)
3. [byo.com/article/hopped-cider](http://byo.com/article/hopped-cider)
4. [thespruceeats.com/best-hard-ciders-4774266](http://thespruceeats.com/best-hard-ciders-4774266)
5. [bevzero.com/the-cider-market-at-all-time-high](http://bevzero.com/the-cider-market-at-all-time-high)

*Kristen Kuchar has covered the food and beverage industries for the past 14 years and is a regular contributor to Zymurgy. She has written for Brew Your Own, BeerAdvocate, CraftBeer.com, The Beer Connoisseur, DRAFT, All About Beer, VinePair, and many more.*

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**WLP520 - Sigmund Kveik Ale Yeast**

Also known as Voss Kveik, this strain can produce earthy-like flavors with a touch of orange peel aromas.

**WLP631 - Appalachian Tart**

Mildly fruity, Tart beers result from this unique co-fermenting blend. Ideal for beer styles like Berliner weisse, gose, or experimental beers.

**October – December**

**WLPO09 - Australian Ale Yeast**

This yeast produces a clean, malty beer with pleasant ester characters that can be described as "bready."

**WLP519 - Stranda Kveik Ale Yeast**

Considered a "cleaner" Kveik strain, used to produce a wide range of beer styles over a large temperature gradient.

**WLP665 - Flemish Ale**

Blended culture used to produce classic styles of the West Flanders region of Belgium. Complex, dark stone fruit character.

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A cartoon illustration of a man with dark hair and glasses, wearing a blue shirt, looking through a magnifying glass at a large glass of beer. The beer is golden-yellow with a thick white head. The number '6' is printed in blue on the side of the glass.

# SKEPTICAL BREWING

This is the sixth in a series of articles called “Skeptical Brewing,” a deep dive into commonly held brewing beliefs. In this series, we discuss their origin stories and review the science and research behind them to reach a verdict on their plausibility. We have chosen common brewing superstitions to try to challenge established paradigms and shed light on many supposedly unquestionable truths. We hope this helps foster the habit of questioning handed-down wisdom. Always be skeptical!

By Matias Cavanna & Leandro Meiners

## THE IBU IS AN EFFECTIVE BEER BITTERNESS SCALE

### ORIGIN STORY

The IBU (international bitterness unit) gauges beer bitterness. That's what most of us are taught when we start our paths in the beer world. The higher the IBU value, the higher the bitterness of the beer.

Beer aficionados over the age of 40 likely remember the “IBU wars” of the early 2000s, when new IPAs pushing the IBU limit to the max were launched almost daily.

The IBU story dates to the mid-1900s. In 1952, iso- $\alpha$ -acids were discovered in beer, and a few years later, in 1956, a study concluded that alpha-acids (adhumulone, cohumulone and humulone) from hops were beer's primary source of bitterness.<sup>1,2</sup>

Between 1956 and 1968, at least six methods were designed to measure the amount of iso- $\alpha$ -acids in beer. In 1968, the American Society of Brewing Chemists (ASBC) created the IBU, defining it as

1 IBU = 1 part per million (mg per liter) of iso- $\alpha$ -acids in beer  
The ASBC adopted Moltke & Meilgaard's IBU testing protocol as the official IBU testing method.<sup>3</sup>

### WHAT DOES SCIENCE HAVE TO SAY

To assess if the IBU is effective at measuring beer bitterness, we will evaluate it from four different angles:

- Definition
- Measurement
- Calculation
- Tasting

### DEFINITION

The IBU *only* considers the concentration of iso- $\alpha$ -acids in beer. Several studies have since proven that while iso- $\alpha$ -acids are still the main contributors to bitterness in beer, they are certainly not the only ones.

A 2016 paper concludes that humulinones are 66 percent as bitter as iso- $\alpha$ -acids and that hulupones are 84 percent as bitter as iso- $\alpha$ -acids. The study also found that both hulupones and humulinones were bitter enough to have a potentially significant impact on beer bitterness.<sup>4</sup>

Another study from 2017 talks about “Auxiliary Bitter Compounds in Hops,” which refer to “all bitter compounds in the hop resin which are transferred to the beer and are not iso- $\alpha$ -acids.” These “auxiliary” compounds include those previously →

mentioned, as well as non-isomerized  $\alpha$ -acids, which are 10 percent as bitter as their isomerized equivalents, together with other hop compounds (i.e., polyphenols, etc.).<sup>5</sup>

The study mentions that beers brewed with only one hop addition at the beginning of the boil don't have such compounds; however, in beers brewed with several hop additions, mainly dry hopping, the concentration of auxiliary bitter compounds can more than double the concentration of iso- $\alpha$ -acids.

## MEASUREMENT

The official IBU testing method uses a solvent to extract all bittering compounds. Then, using an ultraviolet (UV) spectrophotometer, it measures UV absorbance and applies a calibration formula to estimate the concentration of iso- $\alpha$ -acids.<sup>3</sup>

A book from 1991 called *Chemistry and Analysis of Hop and Beer Bitter Acids* states that "iso-alpha acids determination in beer, has not yet advanced to a generally accepted, reliable state, but this may change in the near future." Many years have passed since 1991, but the IBU measurement method hasn't changed.<sup>6</sup>

The spectrophotometry method was calibrated with beers with known iso- $\alpha$ -acid concentrations back in the late 1960s. It thus makes several assumptions that might have been true back then but do not necessarily apply anymore.

- Thirty percent of the absorbance is for non iso- $\alpha$ -acids, i.e., auxiliary bitter compounds.
- Hops in the 1960s were baled and had high oxidation levels with 30 to 50 percent alpha acid loss.
- Hops alpha-to-beta acid ratios were close to 1:1, which is typical for noble hops.
- At that time, it was believed that bitterness potential was not affected by hop age.

## CALCULATION

There are several IBU estimation methods, but the best known among homebrewers is probably Tinseth's method, created in 1997. Some people use Garetz's (1994), Rager's (1990), or Daniels's (2000).

In principle, all calculations try to estimate the hop utilization factor,  $U$ , as close to reality as possible.  $U$  was originally calculated based on empirical testing of different beers with known parameter changes during the brewing process. The issue with such  $U$  calculations is that for each formula they were calculated with

- A particular kettle design,
- A specific hop (remember from

our previous article that different hops have different alpha acid isomer proportions and different isomerization efficiencies),

- A particular wort composition (different grists can affect isomerization rates),
- A specific boil vigor, and
- Specific atmospheric conditions (elevation, etc.).

Even if you can match all these factors, other factors are not considered by any of the IBU estimators, such as

- Boil pH, which has been proven to affect isomerization rate (higher pH increases the rate)<sup>10</sup> and
- The addition of calcium or magnesium to the wort, which increases isomerization efficiency.<sup>11</sup>

## TASTING

Several other characteristics can also influence perceived bitterness without affecting the IBU (or auxiliary bitter compounds) value.

- A study from 1957 shows that at higher pH, the same IBU level tastes more bitter.<sup>8</sup>
- A 2016 study concluded that increasing hop aroma in beer also increases the perception of that beer's bitterness.<sup>9</sup>
- Grist selection can reduce the perception of bitterness. A high percentage of crystal malts lessens this perception, as does the "relative bitterness ratio" (IBU/OG) in high-gravity beers.

These and other perception factors, such as polyphenol impact, translate into the IBU not being a reliable indicator of the perceived bitterness level in beer. Thus, when comparing perceived bitterness of a 50 IBU imperial stout with a 20 IBU session IPA, the session IPA will most probably be perceived as more bitter.

## VERDICT

When first created, the IBU was a suitable scale for measuring bitterness in the beers of that time: macro lagers with simple hopping regimes using noble hops. The evolution of the brewing industry over the past 50 years has been significant, specifically in

- Creation (or revival) of new styles
- Creation (or revival) of new brewing processes and techniques, such as hop bursting, whirlpool/hop-stand additions at lower temperatures, and dry hopping
- Creation of new ingredients, such as modern hop varieties, hop pellets, concentrated lupulin powder/pellets, extracts, etc.

All these changes have had such an impact as to make the IBU, as a bitterness scale for finished beers,

- Not relevant from a **definition** point of view, given that it only considers concentrations of iso- $\alpha$ -acids and none of the many auxiliary bittering compounds present in modern beers.
- Not relevant from a **measurement** point of view with a spectrophotometer for modern beers, given that the calibration coefficient to transform an absorbance measurement into an IBU result will greatly vary from beer to beer.
- Not relevant from an **estimation** point of view, given that all calculators available are specific to the authors' conditions and don't factor in several elements that influence isomerization.
- Not relevant from a **tasting** point of view, given that higher IBUs don't necessarily translate to more bitter-tasting beers.

We must conclude that the commonly held belief that IBUs objectively measure beer bitterness is an outright myth.

As brewers, we can, however, still use IBUs to measure and correct bittering hop additions, meaning that it's a good tool to standardize the quantity of hops for each bittering addition in more than a 15- to 20-minute boil. In this case, we use it to control the IBU contribution of each addition (when using different batches or substituting hops) but not as an indicator of the overall perceived bitterness of the beer.

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## TEST IT YOURSELF!

Still skeptical and unwilling to let all this scientific research change your mind? Make this experimental brew and challenge your and your mates' taste buds!

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# BUSH TELLY

*Modern Australian Sparkling Ale*

"Bush telly" is Aussie slang for a campfire or for looking at the stars while sleeping in your swag (a kind of Australian bivvy bag). Featuring Aussie Galaxy and Eclipse hops, this modern take on the good, old thirst-quenching, highly drinkable Australian sparkling ale, very dry and highly carbonated, will have you looking at the stars. It will also allow you to test how pH can affect perceived bitterness, which is one of the reasons why the IBU scale is not helpful for gauging beer bitterness.

To test this impact, you just need to brew the recipe once and then do a triangle test between the original beer and the same beer with the addition of either phosphoric or lactic acid to reduce the pH by at least 0.2 points. To do this, we suggest serving two pitchers of the beer and adding the acid to one of them, drop by drop, until the pH drops, for example, from 4.3 to 4 or 4.1. Once achieved, do the triangle test to assess which beer feels more bitter. It's the same base beer with the same IBUs and even the same IBU/OG ratio. The only change is the final pH.

If you can't get your hands on Eclipse hops, Enigma is a good substitute from Australia. Or, stick with the celestial theme by substituting Ekuanot (formerly known as Equinox) or Comet. If Super Pride hops are hard to come by, try swapping in Centennial.

**Batch volume:** 19 liters (5 US gal.)

**Original gravity:** 1.048 (11.9°P)

**Final gravity:** 1.006 (1.5°P)

**Color:** 4 SRM

**Bitterness:** low/medium

**Alcohol:** 5.5% by volume

## MALTS & ADJUNCTS

3 kg [6.6 lb.] pale malt (72% of grist)

650 g [1.4 lb.] white wheat malt (15% of grist)

300 g [10.6 oz.] Weyermann Carahell malt (7% of grist)

250 g [8.8 oz.] sucrose/table sugar @15 min  
(6% of grist)

## HOPS

4.5 g [0.16 oz.] Super Pride, 9% a.a. @ 60 min (5 IBU)

15 g [0.53 oz.] Galaxy, whirlpool @ 90°C (194°F)

15 g [0.53 oz.] Eclipse, whirlpool @ 90°C (194°F)

25 g [0.88 oz.] Galaxy, dry hop when SG < 1.015

25 g [0.88 oz.] Eclipse, dry hop when SG < 1.015

## WATER

Ca ≥ 50 ppm, Mg ≤ 10 ppm, Na ≤ 10 ppm, SO<sub>4</sub> ≈ 75 ppm,

Cl ≈ 50 ppm, HCO<sub>3</sub> ≤ 10 ppm

## YEAST

White Labs WLPO09 Australian Ale, Wyeast 1335 British Ale II Yeast; Omega British Ale VI (OYL-013) or British Ale I (OYL-006); Lallemand Nottingham; or Fermentis Safale S-04.

Alternatively, if you can get hold of a Coopers Pale Ale or Coopers Sparkling Ale, propagate the dregs from the bottle.

## ADDITIONAL ITEMS

0.5 tablet Whirlfloc @ 10 min

1 tsp. [3 g] yeast nutrient @ 5 min

160 g [5.6 oz.] table sugar (sucrose), if naturally carbonating

## BREWING NOTES

Mash at 64°C (147°F) and adjust pH to 5.2–5.5.

Rest for 60 minutes. If sparging, do so at 75–78°C (167–172°F). Collect enough wort in the

kettle to yield 5 gallons (19 L) in the fermenter.

Boil the wort vigorously for 60 minutes, adding the hops, sucrose (table sugar), Whirlfloc, and yeast nutrient as indicated. After the 60-minute boil, lower the temperature to 90°C (194°F), add whirlpool hops, and let steep for 10 minutes before chilling the wort.

Chill wort to 19°C (66°F) and transfer to the fermenter. Aerate thoroughly and pitch the yeast. Increase fermentation temperature by 1°C (1.8°F) each day. Add dry hops per the indicated schedule.

After 3 days with no yeast activity (no gravity change), cold crash and chill the beer to as close to 0°C (32°F) as you can. Keep chilled for a week or two prior to bottling or kegging.

Australian sparkling ales are normally naturally carbonated (at higher than normal levels) with table sugar (sucrose), so if you are kegging, feel free to keg condition the beer to 3.4 vol. (6.8 g/L) CO<sub>2</sub>.

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## 2

## DIFFERENT AREAS OF THE TONGUE HAVE DIFFERENT TASTE RECEPTORS

### ORIGIN STORY

The tongue map, with its four taste areas, is arguably one of the most recognized icons of the taste sense. Most of us have first seen it in elementary school biology, and many would have even done an experiment with cotton swabs dipped in different solutions to prove it.

This map was first brought to life by Edwin Boring in a book he published in 1942,<sup>1</sup> based on his interpretation of data from a study conducted in 1901 by David Hänig, a German scientist.<sup>2</sup>

In the original study, Hänig indicates that subjects could detect several tastes all around their tongues and that even though there seemed to be different taste sensitivities for each taste in the different areas of the tongue, these differences were small.

Forty years later, Boring uses a graph from Hänig's study that was designed to visually showcase differences in *relative* sensitivities for each taste detector. He assumed the minimum value was 0 and that the curves overlapped with each other, implying no detection for that particular taste in that region of the tongue.

The main issue with this assumption is that it ignores all the tabulated data in Hänig's study with the *absolute* or *total*

sensitivity for each taste in each region, seeding an idea that different areas of the tongue have different taste receptors and creating the "tongue map."

This map has even influenced beer glass design, with some beer glass manufacturers claiming things like:

"A wide-mouthed glass allows beer to flow more directly to the back of the tongue, where bitterness registers."

"A narrow and stemmed glass encourages sipping which is perfect for sour and salty beers that register on the sides and tip of the tongue"

### WHAT DOES SCIENCE HAVE TO SAY?

In the 1970s, Virginia Collings's study reviewed this subject and concluded that differences in sensitivities of taste around the tongue, as well as the soft palate and even in the epiglottis, are insignificant.<sup>3</sup> This is in line with Hänig's original study from 1901 and basically means that all tastes can be detected anywhere.

David Smith's nerve cell activity tests prove that all taste neurons can respond to different types of taste stimuli—sweet, salty, sour, bitter, and umami.<sup>4</sup>

The Sense of Taste section of the 2012 edition of the *Encyclopedia of Human*

*Behavior* indicates that each taste bud contains 50 to 100 receptors for each taste and that an average Jane or Joe has approximately 5,000 to 7,500 taste buds. This article also indicates that current scientific research proves that all taste qualities are found on all regions of the tongue.<sup>5</sup>



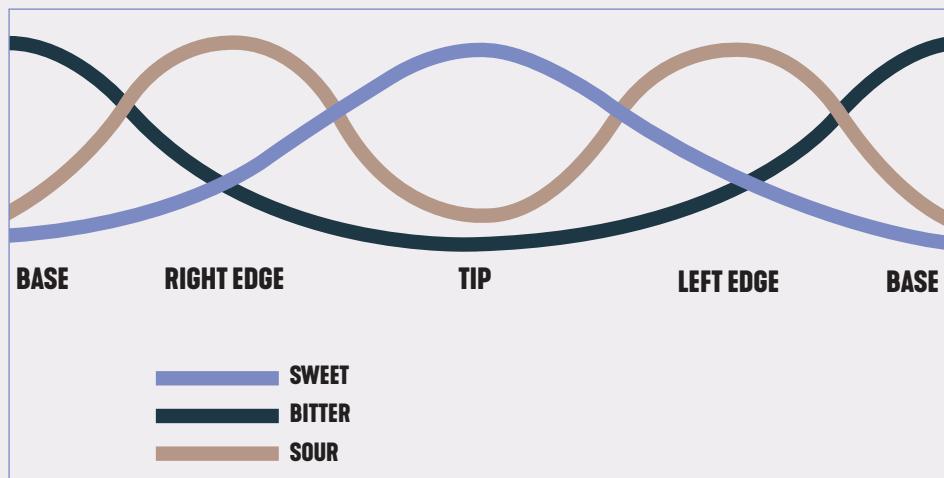
### VERDICT

Even though the tongue map is highly appealing as an idea and would be a great excuse to justify the design of different beer glasses, there is no solid foundation to its inception, and it was created mainly from a lost-in-translation and badly interpreted results mishap. All scientific studies on the subject indicate that taste receptors for sweet, sour, bitter, salty, and umami are distributed all over the tongue, palate, and epiglottis, which allows us to conclude that the tongue map is an outright myth.

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### RELATIVE SENSITIVITY GRAPH



Relative sensitivity from Hänig's study. Note that there is no indication of horizontal axis values and that they all share minimum and maximum values. Graph is adapted from Hänig, D.P., "Zur Psychophysik des Geschmackssinnes," *Philosophische Studien* [1901].

## 3

## VISUAL APPEARANCE HAS NO IMPACT ON JUDGE TASTING PERFORMANCE

### ORIGIN STORY

Although not strictly an explicitly held belief, our standard beer judging approach assumes that visual appearance doesn't affect our aroma and flavor perceptions as we judge with clear glasses. But is that really the case?

Numerous academic studies analyze the impact color has on our perceptions and preferences.<sup>1,2</sup> Additionally, there are studies that focus on specific impacts related to coloring and on our perceptions, for example

- How the color of a plate alters the perception of food<sup>3</sup> and
- How the color of a label affects our perception of a product.<sup>4</sup>

Given the surprising results from these studies, we decided to dive into the literature to understand if beer color has a discernible impact that could merit reconsidering how we judge beers.

We decided not to consider the more general questions relating to ambiance, such as the environment in which tasting takes place or the effect background music can have on how much you enjoy a beer.<sup>5</sup> Most books related to beer evaluation do recognize the effect such variables as lighting, color, and sound could have on beer assessment and offer recommendations on what an ideal tasting setting should be.

### WHAT DOES SCIENCE HAVE TO SAY?

The first study we reference, despite its focus on wine, offers forceful results with which we might frame our analysis. The authors of that study organized a tasting with 54 oenology university students who were asked to evaluate a white wine and the same white wine that had been dyed red with an odorless, tasteless beverage-grade colorant. The authors found that the descriptors used by the tasters reflected the color of the wine and not its aroma; that is, the tinted white wine was described as a red wine despite having the same aroma as the unchanged white wine.<sup>6</sup>

For Spearot's thesis, a similar experiment was conducted in which 85 participants were given three beers: a blonde, a brown, and a black, all of which were the same beer dyed with varying amounts of Sinamar.<sup>7</sup> Sinamar is a Weyermann colorant produced from dark/roasted malts that does not affect flavor or aroma. Its flavor- and aroma-neutrality were verified by a triangle test in Spearot's thesis.<sup>8</sup>

Participants were asked to taste the three beers and rate their level of bitterness, sweetness, acidity, and saltiness, on a scale from 1 to 15. The results of the statistical analysis showed that there was a significant correlation only with the level of bitterness. The participants evaluated bitterness not just by taste, but also considering the color, with darker beers coming in as less bitter.<sup>7</sup>

In another study, the participants—one group of trained tasters and one of casual beer consumers—were asked to group nine beers of three different colors and from three different breweries, under two different experimental conditions: being able or not to see the color of the beers. In the tests where they could see the color, the beers were grouped according to the color, both by the trained and the amateur tasting panel.<sup>9</sup>

However, when these beers were grouped without being able to assess color, the resulting classes were more strongly determined by beer brands, indicating that at an organoleptic level, there were more similarities between beers based on brand than on color.

That the results of the two tests are so different indicates that even trained tasters are strongly influenced by color.

In another study, multiple visual parameters—foam, head retention, and lacing (how foam adheres to the glass)—are evaluated as quality predictors for consumer expectations.<sup>10</sup> The study was repeated in the United States and Scotland, and the results were similar: moderate levels of foam and lacing were interpreted by con-



sumers as an indicator of better product quality, again exemplifying the prejudice that the visual aspect entails.

### VERDICT

What does all this mean? First, upholding the belief that you can separate your evaluation of aroma and taste without being influenced by appearance is an outright myth. Thus, we should really try to taste our beers blindly in order to concentrate on their organoleptic qualities and not let ourselves be influenced by color, clarity, turbidity, and other appearance characteristics.

Second, asking whether tastings in competitions should be appearance-blind is a valid discussion to have as a beer community. One might imagine initially scoring aroma and flavor blindly and then considering appearance with a new pour in a crystal-clear glass.

The BJCP tasting sheet awards only three points out of 50 to appearance, effectively assigning it low importance relative to other factors. However, study results suggest that judges may subconsciously assign higher weight to appearance by adding points to or subtracting them from other attributes. Hence, we should acknowledge this and either start tasting blindly or accept that appearance has a greater impact than the mere three points awarded in the score sheet.

Moral: Do not present bad-looking beers in a competition. They probably won't be judged fairly, despite judges' best intentions.

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*Matias Cavanna is head brewer at Dos Dingos Cerveza Independiente in Argentina and De Puerto brewpub and Rural barrel program in Uruguay. Matias started homebrewing in Australia and developed practical and technical knowledge in Australia, New Zealand, and Japan at Asahi's small and large breweries. Matias also co-hosts Birratecnia.*



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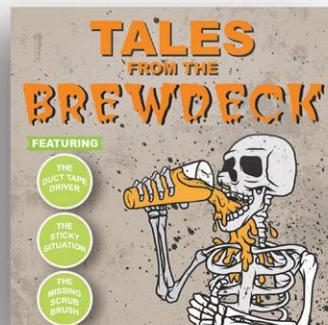
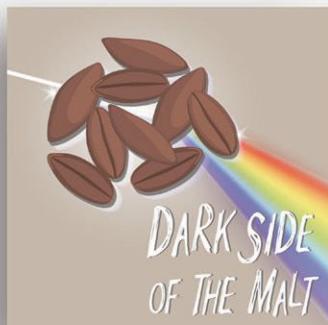
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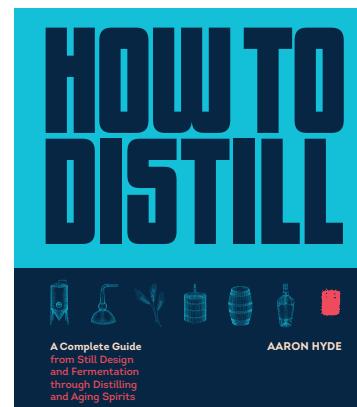
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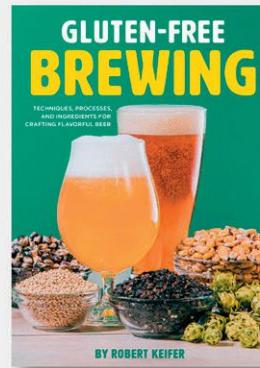
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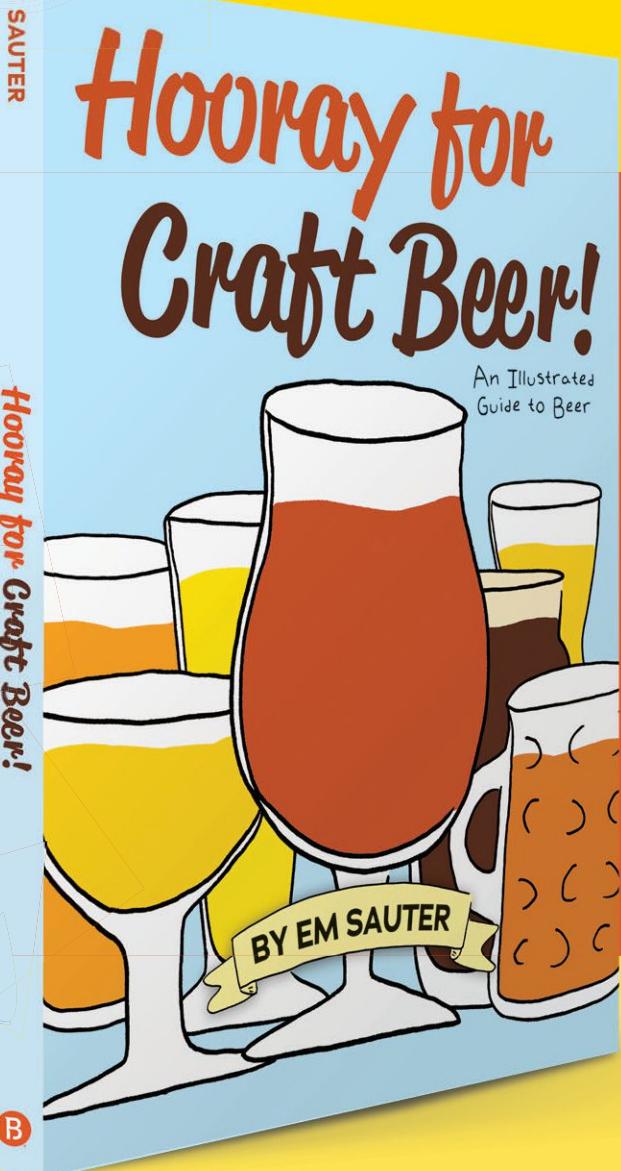
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# Relax, Don't Worry, Have a Homebrew!

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



## ON THE WEB

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

## BREWING WITH ZYMGURGY

### MAKING WORT

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

might include a water profile. If you can't (or don't want to) deal with water chemistry, don't worry about it: just go ahead and brew! Extract brewers needn't add minerals to water.

### Malt Extract Recipes

Making wort from malt extract is easy.

- Crush specialty grains, if any.
- Place milled grains in a mesh bag and tie it off.
- Steep bag of grains in 150–160°F (66–71°C) water for 30 min. in your brew pot.
- Remove bag of grains from the pot.
- Fully dissolve extract in the hot, grain-infused water (if there are no specialty grains in the recipe, you can skip directly to this step).
- Top up with water to your desired boil volume. (Leave some room for foam!)



### All-Grain and Partial-Mash Recipes

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

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

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

### BOILING

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



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

# Brew Lingo

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

**AA** – alpha acid

**ABV** – alcohol by volume

**AHA** – American Homebrewers Association

**BBL** – US beer barrel (31 US gal or 117.3 L)

**BIAB** – brew in a bag

**BJCP** – Beer Judge Certification Program

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

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

**DME** – dry malt extract

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

**DO** – dissolved oxygen

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

**FG** – final gravity

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

**HERMS** – heat exchange recirculating mash system

**HLT** – hot liquor tank

**IBU** – international bitterness unit

**LHBS** – local homebrew shop

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

**LME** – liquid malt extract

**LTHD** – Learn to Homebrew Day

**MLT** – mash-lauter tun

**NHC** – National Homebrew Competition

**OG** – original gravity

**°P** – degrees Plato (wort/beer density)

**RIMS** – recirculating infusion mash system

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

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

**SMaSH** – single malt and single hop

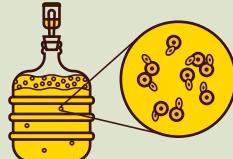
**SMM** – S-methyl methionine, precursor to dimethyl sulfide (DMS)

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

## FERMENTING & CONDITIONING

Pitch yeast into chilled, aerated or oxygenated wort.

- Use twice as much yeast for lagers as you do for ales.
- Ales ferment at 60–70°F (15–20°C). Lagers ferment at 45–55°F (7–13°C).
- Condition ales at room temperature or colder for a week or two.
- Condition lagers at close to freezing for several weeks if you can (traditional but not required).



## BOTTLING & KEGGING

If you bottle,

- Use 1 oz. of dextrose (corn sugar) per gallon of beer (7.5 g/L) for a good, all-purpose level of CO<sub>2</sub>.
- Use less sugar for less fizz.
- Take care with higher carbonation levels—many single-use beer bottles aren't designed for high pressure.



If you force carbonate in a keg,

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



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

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

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

■ = PSI

Source: Brewers Association Draught Beer Quality for Retailers

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# The German Reinheitsgebot

## 506 Years of Purity?

By Jan Brücklmeier

The German Reinheitsgebot, translated literally as the “purity commandment,” is often called the oldest still-valid food purity law, having been in place in Germany since 1516 without major changes. This statement couldn’t be more wrong.

Everyone seems to know the facts—that Bavarian dukes Wilhelm IV and Ludwig X proclaimed the Reinheitsgebot in Ingolstadt on April 23, 1516, and that this exact law, to protect the purity of beer, has been in place in Germany ever since. Also, many brewers around the globe know the famous words:

*We wish especially that, henceforth and everywhere, in our towns, markets, and in the countryside, shall be employed and used in no beer more constituents than alone barley, hops, and water.*



(Original: *Ganz besonders wollen wir, dass forthin allenthalben in unseren Städten, Märkten und auf dem Lande zu keinem Bier mehr Stücke als allein Gersten, Hopfen und Wasser verwendet und gebraucht werden sollen.*)

I don't know how many copies of the proclamations adorn the walls of breweries and bars worldwide today. Unfortunately, I am here to destroy your romantic dreams about brewing purity.

### THE LAW OF THE LANDS

First, there was no such thing as Germany in 1516, when Wilhelm and Ludwig were dukes of Bavaria. The "Bavaria" they ruled at that time was much smaller than the modern state of Bavaria. At best, their decree would have been the "Bavarian purity law" or, more precisely, the purity law of the Bavarian Duchy.

Second, the 31 words dealing with beer ingredients are just one part of an entire book called the *Landesordnung*, or general code of law. This book has four parts and deals with topics like how to deal with murderers or muggers and how and when to apply torture in interrogations. It was never just a

## REINHEITSGEBOT

*We wish especially that,  
henceforth and everywhere,  
in our towns, markets,  
and in the countryside, shall  
be employed and used in no  
beer more constituents than  
barley, hops, and water alone.*

*Wilhelm IV & Ludwig X  
Ingolstadt, Germany, April 23, 1516*

proclaimed law for beer ingredients. In fact, a larger part of the law that concerns beer actually addresses the price of it.

Third, the 1516 law has nothing to do with the purity of beer. The food supply

in the 1500s was anything but secure. Compared to wheat, barley is a relatively undemanding crop that can grow on comparatively unfertile ground. Critically, though, barley can't be used to bake bread due to its low gluten content. So, to secure wheat for use in bread production, Wilhelm and Ludwig banned its use in brewing. Had they truly been convinced of barley's "purity" for brewing, it would have been crazy for them to allow the Baron of Degenberg in 1548, only 33 years after the proclamation of the "Reinheitsgebot," to brew wheat beer and to make brewing with wheat a privilege of the royals.

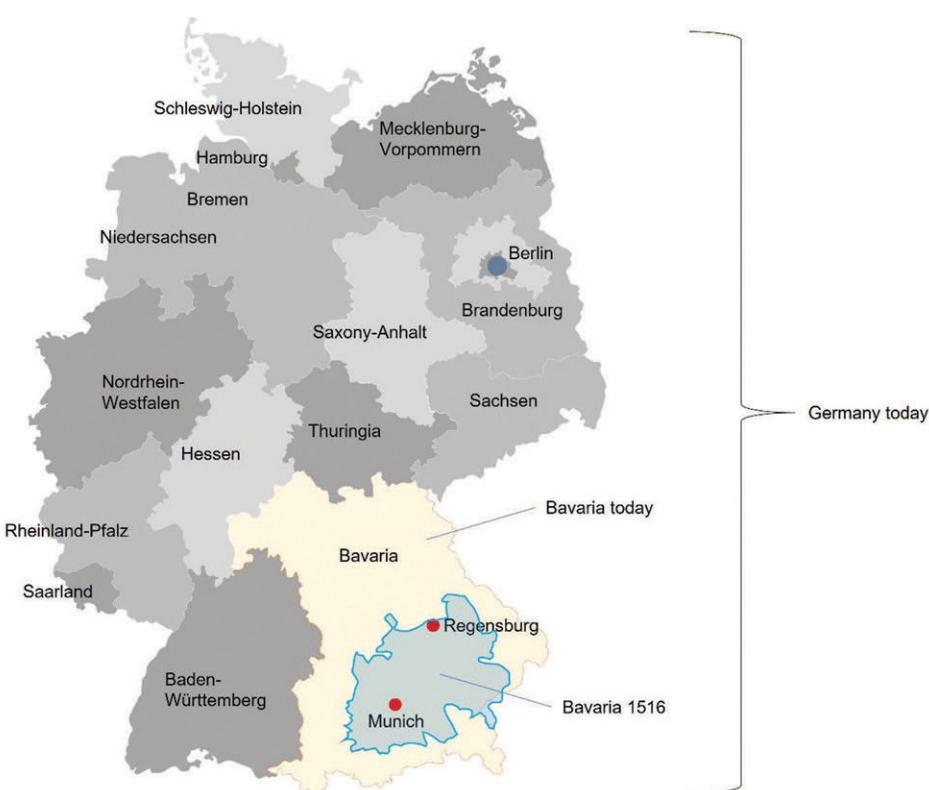
Fourth, parts of the law were changed only four years later after the original decree had been issued. In 1520, the very same Wilhelm IV changed the beer price in the law. True, he didn't change the allowable ingredients—that part of the law was changed by his son,

Albrecht V, in 1551, who allowed coriander and bay leaves in beer. Later, in 1616, Maximilian added salt, juniper, and caraway to the list.

As noted earlier, the Reinheitsgebot was proclaimed in the Duchy of Bavaria, which was a small part of today's modern state. But even when the law became binding in the entire state of Bavaria, the Kingdom of Bavaria at that time in 1806, it was not law in the rest of Germany as we know it today. This didn't happen until 1906, when Bavaria joined the German Empire. So, for the first 390 years of its existence, the Reinheitsgebot was not a German law; it was only binding in Bavaria.

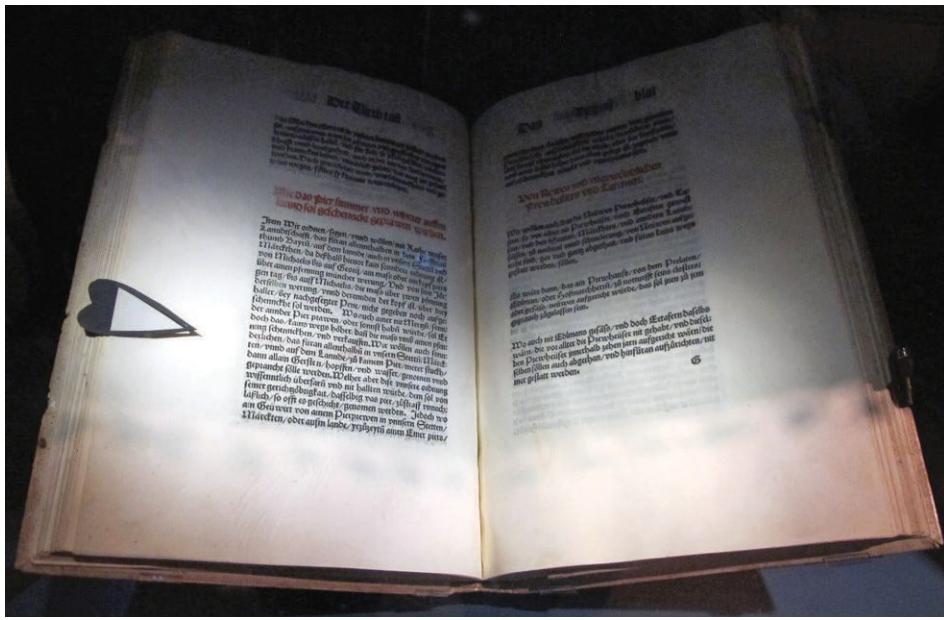
After the Second World War ended, the regulation was only valid for West Germany. East Germany, the German Democratic Republic (*Deutsche Demokratische Republik* or DDR), had different laws that allowed such ingredients as sugar, rice, corn, and enzymes. There, the Reinheitsgebot was called the TGL 7764. The "German" purity law was not binding for Germany in its entirety for 431 out of 506 years.

Fifth, it was never called the Reinheitsgebot when it was first proclaimed. The term was probably first used in 1909 in the petition committee in Berlin by treasury senior civil servant Joseph Rheinboldt during a discussion about



Bavaria, 1516.

Credit: Jan Brücklmeier, 2022



*Bayrische Landesordnung.*

Credit: Wikimedia Commons

brewing processes. The first documented use of the term is from 1918 in a transcript of the Bavarian Parliament.

Last, there are much older brewing laws and regulations. When the *Landesordnung* was proclaimed, the first known regulation had already been in place for more than 350 years. Even the limitation of the grist to barley is much older—the oldest known, still-existing source dates to 1302 in Nuremberg. The brewing law of Weimar from 1348 made hops mandatory. Towards the end of the 1400s, most brewing regulations included the absolute same ingredients as the so-called Reinheitsgebot: barley, water, and hops.

### THE WRITING ON THE WALL

I apologize for destroying your imagination, but I'm not done. Sorry.

You might argue now that you have seen a copy with the signature and seal of duke Wilhelm on so many walls around the globe. There must be a grain of truth to the story—you saw it with your own eyes.

You must be strong now. Even these copies are a total fake. The seal is not the seal of Duke Wilhelm IV, the signature is not his, and the original document is a page out of a book. There is no single document entitled *Reinheitsgebot*.

One final comment. It is often said that yeast is not part of the regulation since it was not known at the time it was written. Again, sorry, this is not true. Much older regulations, such as the *Bamberger Ungeldordnung*, a brewing regulation from 1489, mentions barley, hops, water, and yeast.

It may sound like I have a problem with the Reinheitsgebot, but this is not the case. I think it helped make Bavarian beer, the foundation of our culture, famous around the world. It also lay the fertile ground for the number of breweries that still produce beer. As an example, the lowest number of breweries in the USA was 89 active breweries in 1978, compared to 1,275 in Germany in 2003, nearly 40 times as many per capita.

But I think it should be seen as what it is and was—not a law to ensure the purity of beer, but a law to ensure the competitiveness of Bavarian beer and Bavarian breweries. Wine was the preferred drink in Bavaria for a very long time. That changed in the late 1400s as the climate began to cool in the so-called Little Ice Age. Temperatures in Bavaria, once famous for wine, fell below what was needed to grow wine grapes. Thus began Bavarians' ever-lasting love for beer.

Northern German cities, in particular the cities of the Hanseatic League, were famous for their beer, which they produced en masse. Hamburg, for example, produced close to 315,000 barrels at the end of the 1400s, with only one-sixth consumed within the city. The rest was exported.

The issue the Bavarian monarch had with this was that taxation of beer was indirect at that time. Beer itself wasn't taxed, but its production was. This meant that if more beer were imported, less tax could be collected. Bavarian beer was already well-known, unfortunately for its bad quality. Hence, Bavarian sovereigns had an interest in increasing quality so



The Reinheitsgebot as a marketing tool: Label of wheat beer, claiming to be brewed according to the purity law of 1516 even though the original regulation excluded the use of wheat.

Credit: Tom Tiburon

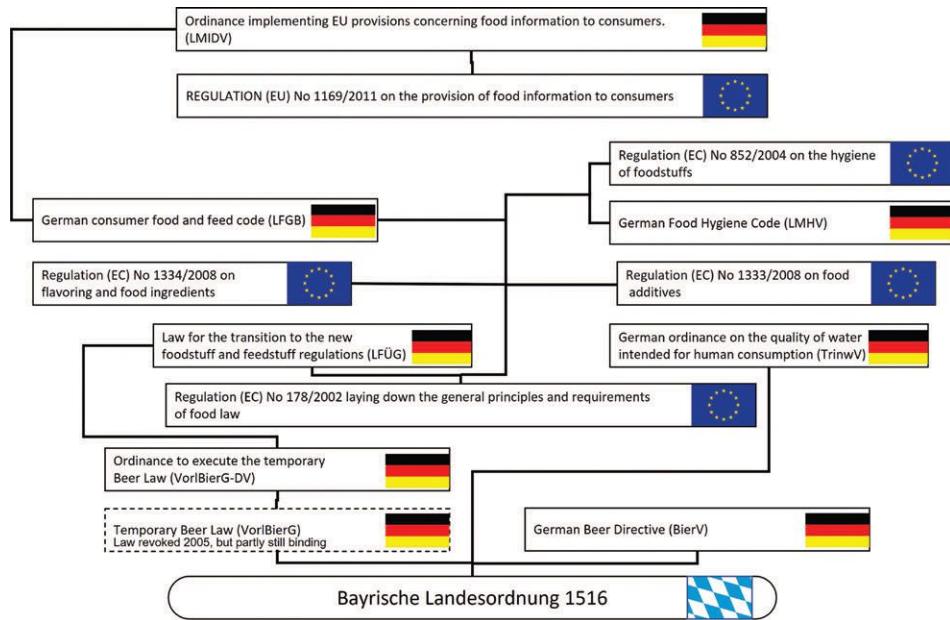
that their subjects would import less beer and drink more Bavarian beer, thus increasing tax revenue. This might also have been one of the reasons why the regulation only mentions malt, hops, and water, but not yeast. Malt and hops were taxed, but yeast was not. Also, hops were farmed in Bavaria, unlike the gruit that was used in other beers.

### 1516 TO PRESENT

But what about the "Reinheitsgebot" today?

The initial regulation from 1516 was adapted several times. In 1806, the Electorate of Bavaria, together with Tyrol and Vorarlberg (today part of Austria), became the Kingdom of Bavaria, and the influence of the regulation was expanded to the entire national territory. In the same year, the mode for taxation changed as well. Now tax was calculated based on the amount of malt used to brew. It seems logical that the monarch of this time wasn't interested in any beer ingredient except (taxable) malt.

In 1861, the regulation became part of Bavarian law as the so-called *Surrogatsverbot* (surrogate ban). Surrogate, in the spirit and purpose of the law, meant replacements for barley malt and hops. In 1870, Bavaria became part of the *Norddeutscher Bund* (North German Confederation), but only on the condition that Bavaria retain its sovereignty to tax beer, a condition that was accepted. It's not surprising that the king insisted on this condition, since between 25 and 35 percent of Bavaria's tax revenue came from this source.



The modern “purity” law: Law and regulation concerning beer.

Credit: Jan Brücklmeier

In 1906, the entire German Reich adopted the Bavarian law. For lager beer, the law still dictated barley malt, hops, yeast, and water as the only allowed ingredients, but other malts and sugars were permitted for ales. If the beer was brewed for export, it could deviate from the law. But Bavaria, making use of its veto right, outlawed the use of sugar within its borders.

In 1923, the same rules were absorbed into the new *Biersteuergesetz* (beer taxation law), which was renewed in 1952 as law in the newly founded Federal Republic of Germany, again with stricter rules for Bavaria.

In 1958, Germany became part of the European Union. Until 1987, by law, only beer that was brewed according to this law was allowed to be imported

into Germany. This law was repealed by the European Union in 1987. In 1993, after West Germany had been reunited with East Germany, a new version of the *Biersteuergesetz* took effect.

In modern Germany, as part of the European Union, beer laws are everything but simple. I don’t want to overwhelm you, but if you’d like to dive into the mystery of the *Reinheitsgebot*, you can use the accompanying diagram to find all the applicable laws and regulations.

I must admit—those copies of the “*Reinheitsgebot*,” contrived though they may be, look considerably better on the wall of a brewhouse or pub than this chart does!

*Born and raised in Munich, half a mile away from Oktoberfest and the Augustiner brewery, and with one grandmother in the beer business and the other a former pub owner, Jan Brücklmeier’s destiny was almost predetermined. He brewed his first batch of beer in the late 1980s and made his passion a profession when he studied brewing sciences and beverage technologies at the world-famous beer university, Weihenstephan, from which he holds a master’s degree. Jan has written two books about homebrewing and beer.*

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# Customize Your Hops

**T**ime really flies when you've having fun—and, at my age, even when you're not. Back in the March/April 2015 issue of *Zymurgy*, I explored brewing options in the event of another hop shortage ("Preparing for the Hopocalypse"). If you remember the hop shortage that occurred way back then, raise your hand.

I was taken back to that time when I ran across the notes from an experiment I did after that piece was published, notes that were tucked away and rediscovered two major moves later. In 2015, I was growing two varieties of hops in the backyard: U.S. Goldings, with their subtle bitterness and mild, pleasant English flavor and aroma; and Sterling, which was herbal and spicy with a pleasant floral hint. I'd brewed some pretty good bitters with the Goldings and some great Pilsners with the Sterling, but I didn't want to limit myself to just those styles.

While browsing the web, I ran across an interesting experiment to try with kids. If you cut white flowers, such as daisies, and put food coloring into their water, the color will migrate to the petals as it's transported along with the water.

I also discovered several websites detailing how to add flavor to cannabis. To do so, you stop watering the plants three to four days before harvesting to dry out the soil. Then, mix half an ounce (15 mL) of essential oil or food-grade extract in 2 quarts (2 L) of water, and slowly water the plants with the solution. Certain nutrients added to the plant over the last three or four weeks of the flowering stage will also add flavors.

Hmmm, hops and cannabis are related.

Movement of fluid in plants occurs via osmosis, which starts when the root hair cells absorb water and/or flavoring from the soil. Plant tissue cells called xylem are arranged in long, thin tubes that travel from



Steve Ruch tending his hops and "watering" with bottled fruit juice.

the roots to the leaves and, in this case, hop cones. Water is transported through the xylem by capillary action, in which molecules of water are pulled upwards through surface adhesion and surface tension. Water travels through the xylem until it reaches mesophyll cells that release the water through stomata pores, which are triggered by daylight to open, also signaling the plant to draw in more water.

My first consideration was to decide what flavors and aromas I wanted to add to the hops I was growing. The decision was a no brainer, at least to me: something to allow me to brew American pale ales and West Coast IPAs. That meant grapefruit for the Goldings and cherry for the Sterlings (some of today's newest hops feature stone fruit flavors and aroma, which I suppose means I was ahead of my time).

I then had to decide just how to add the grapefruit and cherry: artificially flavored extract, fresh fruit, concentrate, fresh-squeezed juice, or bottled juice with no additives. As a semi-retired freelance layabout, I, of course, chose the form that offered the most natural flavor for the least amount of effort: bottled juice. When the hop buds began to appear, I started to substitute grapefruit juice for some of the water used to irrigate the Goldings and cherry juice for the Sterlings. I also added a bit of black food coloring to trace the progress of the juice up the bines. Once black appeared in the leaves closest to the hop buds, I discontinued the coloring.

When it came time to harvest the hops, there was a definite grapefruit aroma to the Goldings, while the cherry aroma was subtle in the Sterlings. When the Goldings were in the dehydrator, their grapefruit smell filled my brew room. The Sterlings' cherry aroma was there, but it was subdued.

The real test came on brew day. See the recipes for Captain Clutterbuck's Best Bitter and Cherryish Wheat in this issue of *Zymurgy*. As they say, "The proof is in the pudding," or, in this case, in the beer. Had I not known better, I would have sworn that Captain Clutterbuck's Best Bitter was brewed with Cascade hops. On the other hand, the Cherryish Wheat beer had only slight cherry flavor and aroma. I discovered one thing that worked great and one that sort of worked and considered this experiment a success.

I'd encourage anyone reading this to give it a try with any flavor or aroma addition that sounds good to them. And while this experiment was a success, it's not one I'll be doing again. It ended up being kind of expensive!

**Steve Ruch lives in Fort Wayne, Ind., and is a regular contributor to *Zymurgy*.**



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