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# BrewYour Own

THE HOW-TO HOMEBREW BEER MAGAZINE

JANUARY-FEBRUARY 2022, VOL.28, NO.1

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JANUARY-FEBRUARY 2022, VOL.28, NO.1






# features



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# departments




# where to find it



## RECIPE INDEX



## RECIPE STANDARDIZATION

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

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

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

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

**Gallons:**
We use US gallons whenever gallons are mentioned.

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Cover Photo:
**Charles A. Parker/Images Plus**

## Q What style(s) of beer would you like to brew more of in the New Year?

**This year I want to get back to always having a fresh, spicy, low-alcohol saison in my homebrew offerings. It's a style I fell in love with early on and it provides a refreshing break from all the commercial hazy NEIPAs and malt-forward stouts that populate the beer shelf in my fridge year-round.**

**All of them! Things got really busy in 2021 and I hope to more than double the half-dozen brew days from this past year. But, specifically, late spring and into summer I hope to get a few kettle sours brewed, which should be easier thanks to some new electric brewing equipment!**

**Ten years ago, I created what I consider to be my greatest brewing achievement ever, a Belgian dark strong ale that I called SerenAle. Named after my wife Serena, this rich beer checked in at 11.2% ABV, packed with flavors of raisin, plum, candi sugar, and other Belgian goodness, all with a clean and non-heavy finish. The best part of this beer is how well it aged. We drank the last bottle seven years later and it was at its absolute peak! I plan to rebrew this batch, with the intent of aging it at least two years before tapping it.**




Volume 28, Number 1: January-February 2022

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## suggested pairings at BYO.COM

### The Trap Door Keezer

While we can all dream, not everyone has the space or resources to build their own cold room. Here is a favorite keezer design of ours with an inventive way to keep the tap tower stationary while still offering access into the chest freezer. https://byo.com/project/the-trap-door-keezer/

**MEMBERS ONLY**

### Pastry Beers

Often brewed with adjunct culinary ingredients and featuring flavor profiles of baked goods and desserts, pastry beers push the boundary of what beer is. Get tips to brew your own pastry beer, plus four clone recipes. https://byo.com/article/pastry-beers/

### Counting Calories

Calorie estimation of beer is easy if you know the alcohol and carbohydrate content of the beer in question. The challenge is calculating these values because there is not a direct relationship between the change in gravity during fermentation and the alcohol and carbohydrate in the finished beer. But there are ways to estimate. https://byo.com/mr-wizard/counting-calories-pastry-stouts/

**MEMBERS ONLY**

### Cold Steeping Specialty Grains

The advantage of cold steeping is not just for coffee lovers. Homebrewers can take advantage of similar benefits by performing an overnight cold steep of their specialty steeping grains. Learn why along with a few recipes to start with. https://byo.com/article/cold-steeping/

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# MAIL


## BEER BURPS

In the November 2021 *BYO*, Noelle Green asked Mr. Wizard about burping to evaluate beer. I have another explanation:

While burping is not a judging technique, advanced judges do intentionally exhale through their nose to achieve a similar effect. Look up "retronasal" for a more complete description. Basically, it allows taste and aroma receptors to work together to better assess a flavor.

To perform this technique, drink a sample of beer, keep your lips closed during and after swallowing, then exhale through your nose. This forces the now-warmed aroma of the beer through your nasal cavity where it is smelled again. Burping, in a polite way with your mouth closed, would also force warmed air carrying aroma from beer (and whatever else you recently ate) through the same pathway.

I find it to be a good technique to detect some off-flavors in beer that may be temperature-dependent, or that are at near sensory threshold concentrations.

**Gordon Strong (BJCP President Emeritus)** • *Beavercreek, Ohio*

## HOP BREEDING

After reading "A Decade in the Making" about how new hop varieties are created in the October 2020 issue I began wondering if I can cross-pollinate the two types of hops I grow in my garden. I live in Wales, UK, and have been provided with Fuggle and Northern Brewer hops for the past four years from just two plants. It interests me to know if I can successfully cross-pollinate from two plants, and when in the growing cycle would be the best time for me to experiment?

I have noticed the Fuggle are usually pickable around the middle of August while Northern Brewer usually reaches the same state at the beginning of September.

**Bob Cypher** • *Via email*

*We passed this request along to Kaleb Schwecke, the author of the article you mentioned. Here's what he had to say about your question: "If you want to cross-pollinate the hops you are growing then you will need both a male and a female plant. The females are the ones that produce the cones, so that's what it sounds like you have*

# contributors

**John Nanci**, aka Alchemist John, aka The Alchemist, founded Chocolate Alchemy in 2004 supplying people with all the knowledge, equipment, and cocoa beans needed to make chocolate and igniting the current Bean-to-Bar Chocolate movement. He is 13 parts scientist, 8 parts teacher, 5 parts innovator, 3 parts brewer, baker, & chocolate maker, 2 parts puzzle solver, 1 part maths spotter, who loves a Fibonacci sequence and, last but not least, his daughter. John has been fermenting anything and everything he can for more than three decades. Two of his favorites are chocolate and beer.

John's love of chocolate and homebrewing makes him the perfect author for a story on brewing with chocolate, which he explores in his *BYO* writing debut beginning on page 36.

**Derek Dellinger** is a writer and brewer living in New York's Hudson Valley. Previously the Head Brewer for Kent Falls Brewing in Kent, Connecticut, Derek now works as a consultant to breweries and cideries in the region. His first book, *The Fermented Man*, explored the concept of living entirely off of fermented food and drink. Both with Kent Falls and elsewhere, Derek has brewed with many unique ingredients and written about those experiences. Articles he has written for *BYO* include topics of brewing with mushrooms, maple syrup, and grape/beer hybrids.

Derek sought out other brewers to pull together a collection of chocolate beer clone recipes, beginning on page 46, which illustrate a number of ways pros go about obtaining chocolate flavors in their beers.

**Greg Paterson** has been fermenting and brewing everything under the sun since 2001. His interest in brewing started from a gift beer kit and has evolved through several iterations. His growth in the hobby has included resistive element stovetop and mash-tun, induction with fly-sparge, outdoor propane brew-in-a-basket, to a recently commissioned 3-vessel, 21-gallon (80-L) electric system in his purpose-built brewery-garage. Greg is a Certified BJCP beer and mead judge. He has a Master's degree in Chemical and Biological Engineering from the University of Saskatchewan. In addition to his homebrewing hobby, Greg is an avid winter cyclist, photographer, cook, and board gamer. He lives in Saskatoon, Saskatchewan.

Beginning on page 54, Greg shares details about his cold room that he built from scratch in his garage.

# MAIL

*in your garden. To the right is a picture showing what the male hop plants look like. To complicate matters, hops are very gender fluid and can switch genders based on environmental stresses or even become hermaphrodites where they have both female cones and male parts. But in the case of the hermaphrodite hops, their pollen usually isn't viable.*

*"So if you are looking to cross-pollinate then you will need to grow a male plant or obtain pollen from somewhere. I'm not very familiar with the hop growing community in Wales, but if you are near some larger hop farms or there are wild hops growing in the area then you might get lucky and your plants might be pollinated by the stuff floating on the wind. There's usually only one seed per cone, and they can be hard to find because they are buried deep inside, but one sign that there's a seed in a cone is that the hop bract that covers the seed turns a pale white. Very subtle, but noticeable if you're looking for it. If you do find seeds then collect as many as you can, because it's hard to know which ones will be viable."*

Photo by Roger Barrett

## WRITE TO *BYO*

Have a question about something you've seen in *BYO*? Want to show off your latest DIY homebrewing gear or recipe? Write to us at: edit@byo.com, find us on Facebook: www.facebook.com/BrewYourOwn, Instagram: @brewyourownmag, or reach out to us on Twitter: @BrewYourOwn. BYO

## BEGINNER'S BLOCK

BY DAVE GREEN

# THE WIDE WORLD OF MEADS

Most all of the fermented, honey-based beverages fall into the larger category of meads. Given the history and ubiquity of these libations throughout the world, it's not surprising they are an amazingly diverse class. Different regions around the world have different specialties and different names for the various meads and honey wines, making for a fairly complex and often misunderstood beverage. Love them or not, it's an interesting study of both history and experimentation possibilities with a dizzying array of combinations and variations. Let's start off with the intricacies of honey before jumping into a few of the more popular variants.

Most folks know that the qualities of honey produced from bees is dependent upon the source flowers. Honey derived from orange blossoms when compared to honey from buckwheat is going to taste wildly different. And just as with malts and hops producing different tasting beers, these different honey types will also produce different tasting meads. Meadmakers may want to blend different honey types to produce a more complex flavor profile or keep the honey as a single varietal to highlight the qualities of a certain flower type or source region. For a first time meadmaker blending honey types may be a safe way to go or opting for a more neutral-tasting honey like clover is a good option.

### THE WORLD OF MEADS

A mead can be sweet, semi-sweet, or dry depending on the goal of the meadmaker (or the conditions provided to the yeast). Carbonation is also an option for meadmakers that may like to add some spritz. Carbonation can range from seemingly almost still to Champagne-level of bubbles.

**Standard Mead:** What most folks refer to as traditional mead, it's typically fermented from either a single honey type or a blend of two or more honey types. These will typically clock in between 7–14% ABV.

**Hydromel (Session) Mead:** At its core, this is a more watered-down version of standard mead, clocking in between 3.5–7% ABV. This requires some skill in order for the meadmaker to make the mead taste bigger and more full-bodied.

**Sack Mead:** On the other end of the spectrum, sack mead is a potent concoction in the 14%+ ABV realm. A clean fermentation where the yeast can properly finish while keeping the alcohols hidden is a challenge.

**Melomel:** To keep things simple, we can say melomel is a standard mead to which some sort of fruit is added. There are an abundant number of sub-categories of melomels based on what fruit is added, most notably cyser (apple mead) and pyment (grape mead). The sky is the limit as to what types of fruits (dried or fresh) a meadmaker can combine with the various honey varieties to create their own rendition of a melomel.

**Metheglin:** Also a very broad category, but generally this refers to meads that have been spiced. A meadmaker can use herbs, vegetables, or other spices to create their metheglin. Technically fruit can also be added and the mead will still be called a metheglin. Spices like vanilla, ginger, chamomile, and lavender are just a few that are popular among meadmakers.

**Braggot:** Just as pyment is a cross of wine and mead, braggot is a cross of beer and mead. Where a honey beer ends and braggot begins is a little blurry, but generally a braggot should have honey/mead notes come through in either the nose and/or flavor.

There is also a whole array of fermented honey beverages from around the world to explore. Ethiopian t'ej, Polish czworniak, Mexican acan, Nepalese dandaghare, and Finnish sima are just a small example of some of the regional honey beverages to research.

### FEEDING THE YEAST

One of the biggest challenges for meadmakers is the balance of yeast nutrients. Honey doesn't afford meadmakers the nutrients, most notably nitrogen, that yeast require for a proper and clean fermentation. This is why historically meadmakers needed to add things like unfermented beer or grape juice to the honey in order to provide some nutrients for yeast. But even with those additions, meadmakers are encouraged to add more nutrients. Too much though and the mead can be detrimentally affected. This is the fine line meadmakers need to walk. How much nutrients to add is highly dependent upon your starting material, but generally meadmakers will slowly "feed" the yeast over several weeks of fermentation.

### OTHER POSSIBLE ADDITIONS

If you're familiar with the additions grape winemakers may add, most all of them are possibly used in honey-based wines as well. Tannins, acids, oak, fortifying liquors, etc. are just a few examples of additions you'll find. The selection of yeast can also greatly affect the final product. Some meadmakers may purposefully add strains like *Brettanomyces* or bacterial strains to get a different profile.

If you would like to try your hand at making your own meads, I recommend either *The Compleat Meadmaker* by Ken Schramm or *The Complete Guide to Making Mead* by Steve Piatz. Or you can find several great articles at www.byo.com found under "Meadmaking."

BYO READER PROJECT

# HOMEBREW DROOL SETUP

JR RENNA • PEN ARGYL, PENNSYLVANIA

Many of us have fun names for our homebrew operation. My homebrewery name is "Pallet Fort Brewing," based on a fond childhood memory of a fort I constructed made out of pallets my father had lying around. So when I set out to build my keezer, I figured I should incorporate pallet wood/industrial aesthetic into the build. I drew inspiration from posts on Facebook groups Home Brew Network and Kegerators, Keezers, & Brewers Group. I learned that with the right combination of pipes, bushings, and flanges you could mount beer shanks and run lines through steel pipe mounted on the top of the lid. This not only looked cool, but solved for the challenge of curious toddlers pulling any lever within their reach (and then laughing at the mess).

I built a luon skirt around the front three sides of the chest freezer with a 1x4 board serving as an air gap between the wood and the keezer. The load of the skirt is supported with screws into the 2x10 collar, and liquid nails along the bottom. I painted the skirt black before attaching pallet boards to hide any gaps that show through. I used a metal grate panel near the compressor for airflow. The top of the lid is covered by vinyl plank flooring to make wiping up spills easy.

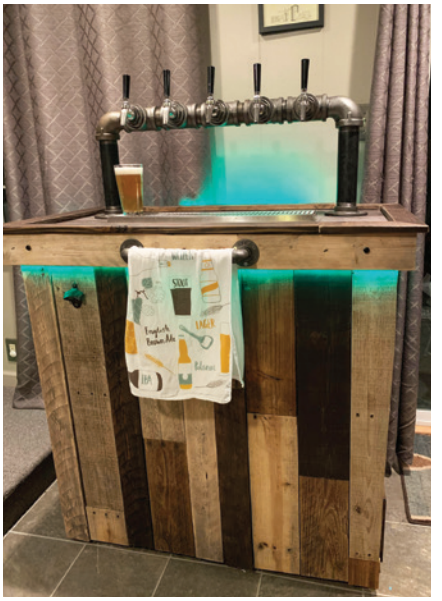
The pipe collar is 2-in. (5-cm) iron pipe. The part that interfaces to accept the beer shanks is a 2-in. (5-cm) to ¾-in. (2-cm) reducer bushing. I wiped the pipes clean and sprayed them with clear coat to protect against rust. You can use tower cooling fan kits with this much diameter, but without insulation inside the pipe you'll likely get condensation outside the pipe. If I built it again I would go the insulation route.

As you can see in the photos, I installed LED underlighting as well. Also, I'm planning to add hydraulic lifts because the lid is HEAVY!

More photos of the build can be found at: https://bit.ly/3mTWybQ

*In order to give the chest freezer ample ventilation to dissipate heat, an old-timey metal grate was used to create the necessary air flow. Lack of ventilation can kill the compressor if not properly addressed.*

*Here is a look at what the reducer bushing and beer shank look like on the back end.*



*While the industrial look is highly appealing, the weight of all that iron adds up!*

*Halloween offered a chance to give a more ominous feeling to the kegerator.*

Photos by JR Renna

# WHAT'S NEW

## OAST HOUSE OILS

If you're a big fan of hop-forward beers but cringe at the loss of all the precious beer during the dry hopping stage, a new line from Isolate Labs called Oast House Oils offers a solution. Using super-critical $CO_2$ processing to extract hop oils, the folks at Isolate have developed a range of hop products that are split into two groupings. One group is their Fusion Hop Terpenes line that is extracted oil from specific hop varietals. The other group is called the Citrus Terpenes, which at the time of production of this issue, offered an orange and a grapefruit. These oils dissolve quickly into beer and are meant to replace standard dry hops. These products are available for both homebrewers and commercial-scale. Learn more at https://oasthouseoils.com/


## NEW PACKAGING SIZE FROM FERMENTIS

For the small-scale professional brewers out there, this announcement is for you. Most dried yeast has traditionally come in three standard sizes: 11 g, 500 g, and 10 kg. The 11-g sachets are great for the 5-gal. (19-L) homebrewers while the 500-g bricks are perfect for the 10+ bbl mid-sized brewhouses. But Fermentis is now offering 100 g pouches aimed precisely at the nano-sized and pilot breweries (and over-sized homebreweries). While this new sizing may be ideal for the 2–3 bbl brewhouse, the opportunity it opens to many small- to mid-sized brew houses should not be overlooked, filling voids that previously led to over- or under-pitching certain batches of beer. https://fermentis.com/en/fermentation-solutions/beer/

Photo courtesy of Bell's Brewery

## A TOAST TO LARRY BELL AND HIS RETIREMENT

In early November 2021, the latest news item in the beer world rippled across social media, beer forums, and news sites with seismic proportions. Larry Bell announced his retirement and the sale of Bell's Brewery to Lion, a subsidiary of Kirin Brewery (Lion is also the owner of New Belgium Brewing). As those of us that have been in the industry or hobby for a number of years know, Larry Bell's impacts on the modern beer world have been huge and influential. With this in mind, we wanted to give a little recap about what he has done for beer lovers around the globe.

Starting as a homebrew shop under the name Kalamazoo Brewing Supplies in 1983, Bell was already deep into our hobby that only had been legalized in the U.S. five years prior. Bell was a highly experimental homebrewer who in 1985 made the difficult leap into the commercial beer world under the name Bell's Brewery. Operating on a nano-sized system for the first five years of existence and self-distributing their beers, Larry showed other aspiring homebrewers what was possible. Many of the beers originally featured in Bell's lineup are still found today like Kalamazoo Stout, Amber Ale, and Bell's Porter. Larry paved the way for what would become one of the epicenters of the modern U.S. craft beer movement based in Michigan, and the momentum he helped build has spread not only through the country, but around the globe as well.

So from everyone here at *Brew Your Own* magazine, let's all raise a toast to Larry Bell, what he has accomplished, and what he has done for the modern homebrewing and craft beer movements. Cheers!

# Upcoming Events

Brew Your Own — The How-To Homebrew Beer Magazine — Boot Camp

## BYO ONLINE BREWING WORKSHOPS

**January 14, 2022**
**1 pm to 5 pm (Eastern)**
Home Draft Systems
with Bill Jablonski

**January 28, 2022**
**1 pm to 5 pm (Eastern)**
Sour Beer Techniques with Michael Tonsmeire

**February 4, 2022**
**2 pm to 6 pm (Eastern)**
Distilling
with Aaron Hyde

**February 25, 2022**
**1 pm to 5 pm (Eastern)**
Home Hop Growing

Visit byo.com/bootcamps for more info and to reserve your spot!

# BYO REPLICATOR

BY DAVE CLARK

**DEAR REPLICATOR,** I feel like the description found on the can is fitting to get an idea of what I'm tasting here: "This beer is an ode to chocolate. For once, I was lost for words while describing it. But, after it won People's Choice at Beervana 2016, plenty of people helped me describe it. Here we go: Chocolate goodness. Pudding in a glass. Just like a chocolate milkshake only beery. Chocolate, Chocolate, Chocolate. Much chocolate wow! Chocolate as f*%k. Like drinking melted chocolate from a glass."

That is exactly the way I felt drinking Chocolate Fish Milk Stout from Behemoth Brewing Company. Now all I can think about is trying to create a masterpiece like this myself.

Jimmy Katsiouras
*Auckland, New Zealand*


Whether the name "Behemoth" refers to the brewery's owner, the 6-ft. 5-in. (2-m) tall Andrew Childs or the seven-year-old brewery's huge beer list (more than 240 beers and counting), one thing is for certain: Behemoth Brewing located in the Mt. Eden district of Auckland is a force in the New Zealand brewing scene. It all started with one man and an idea.

Andrew Childs took the path less traveled on his way to brewery ownership. He began by studying to be a lawyer, eventually attaining his degree and working government jobs. Quickly becoming disillusioned, he decided a life in law was not suitable for him. At a party one New Year's Eve, he asked friends to give him a New Year's resolution that he'd be obligated to keep. One friend suggested he pursue homebrewing, something in which Childs had expressed an interest.

In less than a year, Childs moved on from "legal life" and went to work in the hospitality industry, learning valuable lessons that would later be hugely beneficial. While the income was but a fraction of that in the legal profession, Childs was now professionally "in his element."

With his homebrewing skills ever improving, Childs entered a popular brewing competition known as *Wellington in a Pint,* with his coffee brown ale taking Best Of Show. In the wake of his big win, Childs was offered a job in Auckland as "The Beer Man" for imake Ltd., a homebrew supplies manufacturer (which has since become part of Bevie). His job involved marketing, product development, and beer recipe creation, as well as connecting with some of his favorite breweries around New Zealand. Childs was now entrenched in the growing craft brewing scene.

## ENTER BEHEMOTH BREWING

Saving money while learning all he could, Childs eventually took the leap to professional brewing by opening Behemoth Brewing in 2013. Initially contract brewing the beers at local breweries, Behemoth partnered with nine local breweries to brew their beers in the first seven years in business. Behemoth finally opened its own production brewing facility in 2020 with the help of a successful crowd-funding campaign including 635 "chur" holders. (Incidentally, "chur" is New Zealand slang for "sweet," "cheers," or "cool.")

"We were tiny so we used the name Behemoth in jest, but it's becoming more and more real by the day since we continue to grow so quickly," said Childs.

Behemoth Brewing's focus is on brewing big and bold beers that are meant to be fun and enticing. While IPAs are their main driver for brewing production, a quick look at their long list of beers shows just how much they derive pleasure from exploring the greater beer world like homebrewers: The Dude Abides (a white Russian imperial stout), C's Get Degrees (C-hopped West Coast IPA), and Scotchy Scotch, Scotch Ale.

While the production company operates as Behemoth Brewing, Churly's is Childs' 24-tap brewpub where Behemoth brews can be enjoyed. Also, a new taproom has recently opened in Titirangi, a suburb of Auckland, named Churly's Rise.

## CHOCOLATE FISH MILK STOUT

Chocolate Fish is a name for a chocolate bar, popular in New Zealand, made in the shape of a fish containing marshmallow covered in a layer of chocolate. It's tradition to give someone a chocolate fish to signify a job well done.

Chocolate Fish Milk Stout is a three-headed chocolate monster consisting of chocolate malt, cocoa powder, and cocoa nibs. Raspberry puree is added, producing a beautifully tart counterpoint to the chocolate. A hearty addition of lactose and vanilla extract provides the body, creaminess, and additional sweetness. The vanilla also helps bolster the chocolaty-ness.

The end result is a flavorful beer led by chocolate with notes of raspberry supporting. The beer drinks like a chocolate raspberry dessert while retaining all the character and drinkability of a traditional milk stout.

Whether you're craving something chocolaty, want to brew a taste of the Southern Hemisphere, or just feel like making a Behemoth of a beer, now you can brew your own version of Chocolate Fish Milk Stout and enjoy it wherever you happen to be.

## BEHEMOTH BREWING CO.'S CHOCOLATE FISH MILK STOUT CLONE

(5 gallons/19 L, all-grain)
OG = 1.072 FG = 1.023
IBU = 20 SRM = 41 ABV = 6.6%

### INGREDIENTS

7.7 lbs. (3.5 kg) 2-row pale ale malt
1.3 lbs. (0.6 kg) medium crystal malt (65 °L)
1.1 lbs. (0.5 kg) Munich 2 malt (9 °L)
1.1 lbs. (0.5 kg) malted oats
0.66 lb. (0.3 kg) pale caramalt (10 °L)
0.66 lb. (0.3 kg) pale chocolate malt
0.33 lb. (0.15 kg) Bairds chocolate malt (500 °L)
0.33 lb. (0.15 kg) black barley (500 °L)
0.22 lb. (100 g) cocoa powder (0 min.)
1.1 lbs. (0.5 kg) lactose sugar (0 min.)
4.4 lbs. (2 kg) raspberry puree (primary)
1.8 oz. (50 g) vanilla extract (primary)
3.5 oz. (100 g) cocoa nibs (primary)
8 AAU Columbus hops (60 min.) (0.6 oz./17g at 15% alpha acids)
Wyeast 1028 (London Ale), White Labs WLP013 (London Ale), LalBrew Nottingham, or an equivalent yeast
⅔ cup corn sugar (if priming)

### STEP BY STEP

Mashing at a temperature of 154 °F (68 °C) produces a reasonably full body but not so full that it takes away from the drinkability of the beer. Mash for 60 minutes or until converted. Recirculate and sparge with 170 °F (77 °C) water. Boil wort for 60 minutes, adding hops at start of boil and the cocoa powder and lactose in whirlpool.

Chill quickly to 66 °F (19 °C). Be sure that you have plenty of headspace in your fermenter for the raspberry addition. Ferment at 66 °F (19 °C) during active fermentation. When fermentation is about 80% complete, add the raspberry puree, cocoa nibs, and vanilla extract. Raise temperature to 68 °F (20 °C) to ensure raspberry puree ferments out and diacetyl is eliminated. Recommend two weeks at this temperature to ensure yeast are properly finished and flocculated. Bottle or keg and carbonate to 2.4 v/v.

## BEHEMOTH BREWING CO.'S CHOCOLATE FISH MILK STOUT CLONE

(5 gallons/19 L, partial mash)
OG = 1.072 FG = 1.023
IBU = 20 SRM = 41 ABV = 6.6%

### INGREDIENTS

4.37 lbs. (2 kg) extra light dried malt extract
1.3 lbs. (0.6 kg) medium crystal malt (65 °L)
1.1 lbs. (0.5 kg) Munich 2 malt (9 °L)
1.1 lbs. (0.5 kg) malted oats
0.66 lb. (0.3 kg) pale caramalt (10 °L)
0.66 lb. (0.3 kg) pale chocolate malt
0.33 lb. (0.15 kg) Bairds chocolate malt (500 °L)
0.33 lb. (0.15 kg) black barley (500 °L)
0.22 lb. (100 g) cocoa powder (0 min.)
1.1 lbs. (0.5 kg) lactose sugar (0 min.)
4.4 lbs. (2 kg) raspberry puree (primary)
1.8 oz. (50 g) vanilla extract (primary)
3.5 oz. (100 g) cocoa nibs (primary)
8 AAU Columbus hops (60 min.) (0.6 oz./17g at 15% alpha acids)
Wyeast 1028 (London Ale), White Labs WLP013 (London Ale), LalBrew Nottingham, or an equivalent yeast
⅔ cup corn sugar (if priming)

### STEP BY STEP

Use muslin bags for easy removal of the grain. Put the Munich malt and oats in one bag and the rest of the grains in another. Mash the Munich and malted oats in 3 gallons (11.4 L) of water at 154 °F (68 °C) until converted. During the last 10 or so minutes of the mash, add the second bag containing the rest of the crushed grains. Adding this bag later will still deliver all the flavors without risking too much unneeded astringency from the darker malts. Once the mash is complete, remove the bags, draining the liquid without squeezing the bags. Raise temperature to near boiling and slowly stir in half of the dried malt extract (DME). Return to the heat source and raise to boil. Boil for 60 minutes, adding hops at the beginning, the rest of the DME with 5 minutes remaining, and the cocoa powder and lactose at the end.

Meanwhile, boil and chill about 2.5 gallons (9.5 L) of water so you can add it to the rest of your wort after the boil.

Chill wort quickly to 66 °F (19 °C). Add pre-boiled and chilled water to top up to 5 gallons (19 L). Ferment at 66 °F (19 °C). When fermentation is about 80% complete, add raspberry puree, cocoa nibs, and vanilla extract. While primary will only take a few days, let the beer sit for two full weeks to condition. Raise temperature to 68 °F (20 °C) to ensure raspberry puree ferments out and diacetyl is eliminated. Bottle or keg and carbonate to 2.4 v/v.

### TIPS FOR SUCCESS:

To create a water chemistry profile similar to that used by Behemoth Brewing, start with a base of reverse osmosis water and make the following additions: 5 g $CaCl_2$, 2.5 g $CaSO_4$, and 4 g $CaCO_3$. For the vanilla addition, feel free to substitute chopped up whole beans; 2–3 beans should be plenty. If using extract, just be sure to use real vanilla and not imitation extract. BYO

BY DAWSON RASPUZZI

# BASE MALTS

## Considerations for choosing a recipe base

*They don't get all the hype that specialty grains receive, but base grains are the foundation for every beer recipe. Learn what three pros with experience brewing at breweries of vastly different sizes consider when choosing and handling base grains.*

As a homebrewer, choosing a base malt is mostly about how it's going to translate in the beer you want to make. Unfortunately, things like price, extract, beta-glucan content, current malt contracts, and availability are also big factors for a production brewery. Finding that middle ground, as well as being able to test batch and analyze the options help me to choose base malts.

Having certificates of analysis (COAs) of our malt lots, and the ability to understand them, are crucial to a production brewery, especially when brewing high-gravity wort. Even with a great malting company there will be variances from lot-to-lot, and the more you know about each will help you better prepare yourself for any adjustments that might need to be made. As a homebrewer, I wouldn't say it's any less important. I feel the more you know about the raw materials you're brewing with, the more likely it is that you'll make better wort. So yeah, nerd-out on all that you can.

COAs are also important whenever I'm comparing one malt type or variety from one maltster to another; I'm basically just looking for as much information available as possible. Any available COA along with other technical and sensory information provided on the maltster's website are definitely helpful and pretty common to find. Physical samples are also great in order to run side-by-side sensory analysis. But of course, the real test is always in the brew. Small-scale pilot or test batches (or traditional batches for homebrewers), and even congress mashing, are the best ways to test out new malts without having to invest in a full-scale brew with crossed fingers. I'm lucky enough to have a maltster (Proximity Malt) that went above-and-beyond to the extent of sending us enough for a 40-barrel batch and run a full-scale comparison. Their confidence was well placed and we now use that malting company for most of our malt-related needs.

For the most part, we don't really have the luxury of changing up base malts for each style unless it's a specialty one-off or some small-scale tap room exclusive brew. Still, matching regional malts to regional styles is something we like to do when we can. The mix of terroir and malting methods I think is what really makes the difference. Heirloom variety malts, floor malting, equipment, and methods esoteric to individual maltsters all have an impact on the outcome of the malt and the outcome of the beer.

Different barley varieties also make a difference. One of my favorites is Violetta — it has some serious versatility, sustainability, and agronomic value. Proximity uses and grows a lot of that variety along the East Coast, and we are very happy with it.

Let's talk a little about handling malts, too. When it comes to the crush, we mostly will consider the type and extent of modification of each malt. Our mill is a 4-roller Buhler MiniCompact that has two different mill settings; fine and rough. Fine, which gives us a (you guessed it) finer grind, as well as great husk separation, is for all of the base malt. Rough is a wider setting used for the more heavily kilned malts that would basically turn to dust and potentially cause lautering issues. No special treatment prior to the mill and no hull separation. The only fermentables that go directly from their bags into the mash tun are flaked grains, which do not need to be milled and could get stuck to the rollers.

I feel the more you know about the raw materials you're brewing with, the more likely it is that you'll make better wort.

*Matty Snyder is the Head Brewer at Weyerbacher Brewing Co. in Easton, Pennsylvania where he began brewing as an apprentice after graduating from the American Brewers Guild in 2013. When not brewing beer, Matty fancies himself as an amateur chef, barista, and taxidermist.*


*Pete Brooks is Co-Owner and Head Brewer at Red Clover Ale Co., a three-barrel brewery that opened in Brandon, Vermont in 2018. His background is in small-scale dairy farming, from which he still draws inspiration in terms of seeing beer as an agricultural product and appreciating the differences in crop years and growing regions.*

I honestly don't pay a whole lot of attention to COAs. I just make sure I'm getting malt from a reputable maltster and look more at SRM and consider flavor for the recipe I'm making. We are a small brewery and, similar to most homebrewers, have an always rotating selection of beers so I am not as worried about the small details that bigger breweries making the same beers over and over might be concerned with.

For me, when it comes to evaluating base malts from different maltsters, it's just about using them and figuring out what I like most for each style. It's fun to brew simple grain bill beers with only base malt (like a Pilsner) and see how they differ.

Matching regional malts with styles is something we do, but not always. It's fun to brew a traditional Pilsner with Pilsner malt from Germany rather than malt from North America. That said, I have made lots of great Pilsners with North American malt. For other styles, it's all about layering base malts. Pilsners are basically the only beers I ever brew that only have one base malt. I love using at least a couple in most beers. I think it just helps the beer to be multi-dimensional and have less "gaps." There are so many great maltsters and great base malts, so it makes sense to me to not limit beers to only one.

I don't believe too much thought needs to go into crushing grains. We don't do anything differently when crushing one malt versus another. I'm a big fan of keeping things simple and crushing all our grains the same way is one way to do that.

My advice for homebrewers is just to try lots of different things and see what you like! Flavor is all subjective and the best way to get to know the malts is to use them. I always feel like making beer recipes is like cooking — once you know the ingredients and what flavors you'll get from different malts it's easy to think up a beer and figure out which malts will work best. Even though there are lots of great recipes in the world, I definitely encourage people to make their own recipes once they are confident in their brewing ability — it's way more fun and you learn a lot more about the malts you're using that way, in my opinion.

*Ashton Lewis is the Technical Support Manager for BSG. He is also a former Brewmaster of Springfield Brewing Co. in Springfield, Missouri and* Brew Your Own*'s Technical Editor and "Mr. Wizard" columnist.*

Flavor, extract, color, enzymes, and modification are all important factors when selecting a base malt. Most brewers generally start by seeking malts of a particular type and color. This narrows down the field of candidates. A second cut can be made based on modification. Most malts can be categorized into poorly-modified, well-modified, and over-modified buckets. Friability and Kolbach Index, aka S/T or "soluble over total nitrogen," are the most common indices of modification.

Once the general type of base malt is defined and the candidates are assembled, flavor reigns supreme. Base malt makes up over 75% of the malt bill for most beers and has a significant influence on beer flavor. All other selection criteria, such as enzymatic power, malt aesthetics, size assortment, and price fall into an additional category.

When it comes to analyzing the flavor, I find chewing on the kernels helpful. You can also do hot steeps using a standard method to produce malt teas. There is no question that terroir affects malt flavor and brewers should be mindful of grain source. To my palate, North American barley malts produce clean, bread-like, and slightly sweet flavors in beer. Maritime barley malts have a bit more depth of flavor, and European barley malts from inland regions lend nutty and biscuit aromas to beers. However, excellent and sub-par grain can come from the same growing regions, and brewers should not associate growing region alone with malt flavor or quality.

Most whole-kernel malts (unmilled) are good for at least 12 months of storage in a dry, temperature-controlled environment. Crushed malts are a different story because these malts pick up moisture more rapidly and, depending on the type of the malt, may age more rapidly with increased moisture content. The commercial rule for milled malt is to use these ingredients as soon as possible, with a practical maximum storage period of about six months under ideal conditions. BYO

BY ASHTON LEWIS

# DO ADJUNCTS "DRY OUT" BEER?

## Also: Fining beer, smoky off-flavor, and pH 7

**Q** I HEAR A LOT ABOUT CORN AND RICE "DRYING" OUT A LAGER. WHAT IS IT ABOUT THESE ADJUNCTS IN PARTICULAR THAT MAKES THEM FERMENT OUT MORE?

ROBERT DEAL
PALO ALTO, CALIFORNIA

**A** Dryness is a perception when used as a sensory term and as an analytical/numerical thing when used to describe fermentation. When wort is "fermented to dryness," all fermentable sugars have been fermented by the yeast strain being used. Because of differences among yeast strains some yeasts can ferment sugars that others cannot, and some strains secrete enzymes that convert dextrins, which are unfermentable by all brewing yeasts, into glucose, which is fermentable by all brewing yeast strains. In other words, "fermented to dryness" is influenced by wort carbohydrate profile and by the brewer's yeast strain selection.

Rich and malty beers, like doppelbocks and Scotch ale, can be both dry from an analytical perspective, i.e., no fermentable sugars are left in the beer, and have residual sweetness when described in sensory terms. That's because these beers contain unfermentable, sweet-tasting compounds from malt and because salivary amylases in the mouth can convert unfermentable carbohydrates, which are not particularly sweet, into glucose, which is sweet.

OK, so let's focus on beers brewed with rice and corn adjuncts. In the early 1900s, these adjuncts represented about 10–15% of the total extract in North American lagers. Over the past century, the adjunct ratio in these beers has increased to where some mainstream lagers derive up to about 55% of the carbohydrate extract from adjuncts. Adjuncts are used for a variety of reasons, including how they influence beer flavor. Here is a fun question: Do beers like Budweiser have a lower apparent extract (finish gravity) than all-malt Pilsner beers with similar original gravity (OG) and ABV? Before answering the question, let's add in that almost all trained beer tasters will agree that beers like Budweiser have a lighter mouthfeel than their all-malt cousins. In the vernacular of the consumer, these types of beers are described as thin, light, crisp, and watery. But the interesting thing is that these beers have apparent extracts that are aligned with their all-malt cousins, with the caloric values to prove their heft.

What's going on here? It seems that thin mouthfeel would go hand-in-hand with a lower finish gravity, right? The main differences between malted barley and adjuncts, like rice and corn, are that malt contains hydrolyzed carbohydrates and proteins going into the kiln for the final step in the malting process. As malt is dried in the kiln, so-called reducing sugars react with free amino groups of amino acids and proteins to form Maillard reaction products (MRPs).

MRPs contribute a wide range of aromas, tastes, and colors to beer and foods. In addition to MRPs, malt contains proteins that don't participate in the Maillard reaction, beta-glucans, and arabinoxylans. These large molecules contribute mouthfeel, body, and foam stability to beer. And this is really

When wort is "fermented to dryness," all fermentable sugars have been fermented by the yeast strain being used.

Photo courtesy of Adventures in Homebrewing

*Flaked rice, as seen up close, is often used by brewers to thin out the body of a beer.*

why beers brewed using adjuncts are generally perceived as being dryer than all-malt beers. The same explanation is true for how brewing sugars, like sucrose and dextrose/glucose, lighten the body of weighty styles like double IPAs and Belgian golden ales.

I am certainly not arguing that beers brewed with rice and corn always have the same final gravity as all-malt beers with similar OGs, but I am stating that many do. When brewers want to boost wort fermentability, changes to mash profile and mash time can be made, exogenous enzymes can be added, or different yeast strains may be chosen. And with what we now know about hop creep, dry hopping with hops known to cause creepin' is another tool we can use.

In practical terms, worts made from starchy adjuncts are often produced using more intensive mashing methods that result in more fermentable wort compared to single-temperature mashing. The typical adjunct brew employs the double-mash method where one part of the mash goes through a cooking process to gelatinize adjunct starches while the second part of the mash, known as the rest mash, is started in a mash mixer. The rest mash cools the hot mash from the cooker, resulting in a blended mash temperature in the 154–158 °F (68–70 °C) range. As the two parts of the mash are blended, there is interplay between beta and alpha amylase; depending on how quickly the two parts are mixed, wort fermentability can be pushed up or down. The same basic process is used in decoction mashing and explains why some brews made from decoction and double mashes have a lower final gravity than beers made from a less intensive mashing like a single-infusion.

## Q WHAT IS YOUR PREFERRED METHOD OF CLARIFYING BEER, INCLUDING REMOVING CHILL HAZE? I'VE TRIED FININGS (ISINGLASS, SILICA-BASED, AND GELATIN), AND FILTERING DOWN TO 1 MICRON BUT NEVER HAD RESULTS AS GOOD AS JUST LEAVING THE BEER CHILLED FOR A MONTH OR TWO.

DON HARWOOD
OXFORDSHIRE, ENGLAND

A My preference of clarification method is based more on process constraints than any true affinity for a particular method. Gravity plus time, finings plus time, filtration, centrifugation, and combinations of these can all be used to produce clear beer. From a commercial perspective, I prefer methods that are fast and effective while consuming as little energy and producing as little effluent as possible. This column is geared towards homebrewers and I am going to steer my answer in the direction of ease and reliability.

As you point out, gravity never takes a day off and works well to clarify beer. Nothing really beats the simplicity of cold-aging, a.k.a. lagering, for beer clarification. The primary downsides to this method include failure to remove chill haze, beer damage during lagering, space and equipment requirements, and the relatively long waiting time for something that can be conducted in a much shorter timeframe. Let's dig into a couple of these points in more detail.

Chill haze is formed when proteins and polyphenols/tannins react at cool temperatures to produce beer haze. Beer clarification at cool temperatures works well, but if the clarified beer is packaged and chilled to lower temperatures, chill haze forms. The best temperature range for cold, gravity clarification is between 30–34 °F (-1 to 1 °C). Chill haze can also be prevented by adding silica gels or PVPP to adsorb chill haze reactants. One practical challenge with using these stabilizers is that they are not completely removed by gravity sedimentation and require filtration for complete removal . . . this comment is really intended for commercial brewers who are reading this. The bottom line is that cold-aging works great for both ales and lagers as long as the aging temperature is less than the serving temperature.

Beer damage can occur during lagering if oxygen pick-up occurs during racking or if microbes start to slowly grow and produce off-flavors. Both of these problems are easy to avoid by using good brewing techniques when handling beer and keeping a clean environment that helps minimize microbiological headaches.

Personally, I do like fining for homebrewing because fining agents speed up the rate of clarification. It also minimizes storage time and the equipment that is tied up with aging beer. I am not a vegan and have no issue using isinglass. Of all of the beer finings used, isinglass is the winner when it comes to overall effectiveness. And when so-called auxiliary finings, for example acidic polysaccharides and alginates, are added to beer before isinglass, the combined fining action produces very clear beer with a compact sediment in a short timeframe. This method of fining is best exemplified by brewers of cask-conditioned ales. Gelatin is another source of collagen, but instead of coming from the swim bladders of fish (isinglass), gelatin is usually rendered from pig and cattle skin. Not all collagen proteins are the same and the collagen from gelatin is not as effective a fining as isinglass (also called piscine collagen).

For those brewers who don't want to use porcine, bovine, or piscine collagen for beer fining, silicic acid sols are a great alternate. These products are added to beer after fermentation and rather quickly settle yeast, although the sediment is usually not as compact as the sediment from isinglass fining.

Filtration is definitely an effective method of beer clarification and is a method that I personally favor for many beverage clarification applications. However, I don't think most homebrewed beer should be filtered because beer haze generally has zero effect on beer flavor, provided that beer is not overly yeasty. And when filters as tight as 1 micron are used, flavor stripping can occur.

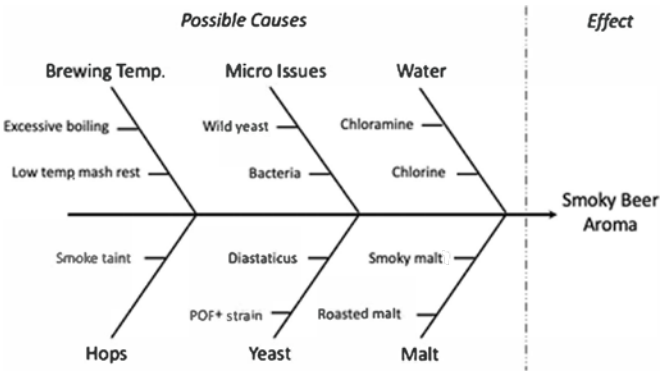
Your question asked for my opinion, so here it is. Homebrewers should focus on brewing the best tasting beers as possible. Once that goal is accomplished and the brewing of great beer becomes normal, then cosmetic methods can be pursued. But even then, I question the objectives. Is it to produce Pilsner that looks like something from a bottle? Or is the goal to brew great beer with minimal special tools? For me homebrewing is not trying to emulate commonly available commercial beer at home. Why? Because it's much easier to buy a six-pack of great beer if your goal is simply to drink laudable beer. Homebrewing to me is about brewing what I cannot buy at my local grocery store/beer store. My jam is playing with raw materials and technique so that I am tasting what I did to brew my beer. I wear wrinkled clothes and don't polish my shoes, and I don't need a filter at home to produce aesthetically pleasing beer.

**Q** WHERE DO YOU THINK A SMOKED OFF-FLAVOR (AROMA AND FLAVOR) MAY BE COMING FROM IN A 100% MARIS OTTER AMERICAN PALE ALE, WITH COLUMBUS, MOSAIC®, AND CITRA® HOPS? THE BEER WAS FERMENTED WITH VOSS KVEIK YEAST AT 86 °F (30 °C), UNDER 10 PSI OF PRESSURE, AND STARTED CLARIFICATION YESTERDAY. IT CLEARLY DID NOT TASTE CLOSE TO WHAT I EXPECTED.

ARTHUR DAVILA
SAO PAULO, BRAZIL

**A** I like to troubleshoot off-flavors by thinking through the brewing process as a way of brainstorming. Plugging these thoughts into a visual aid like a fishbone diagram really helps to identify possible causes of the problem in question. Figure 1 illustrates the possible causes of smoky beer aroma that I can think of. I will dig into each of these and hopefully shed some light that may help better understand this problem.

**Figure 1**




Let's start with yeast because certain yeast strains are able to convert ferulic acid from malt into 4-vinyl guaiacol (4VG). Although this compound is typically described as clove-like, it can also be perceived as smoky. Low temperature mash rests around 113 °F (45 °C) can increase ferulic acid levels in wort. So-called POF+ yeast strains convert ferulic acid into 4VG. Examples of POF+ (phenolic off-flavor positive) strains include Belgian wit, German weizen, some English ales, all *Saccharomyces cerevisae var. diastaticus,* and wild yeast. And wort spoilage bacteria, such as *Hafnia* and, *Klebsiella,* can also produce 4VG. Yeast is probably the most common cause of phenolic aromas in beer.

Another common source of smoky/phenolic aromas in beer is from chlorine or chloramine in water reacting to phenols produced by yeast during fermentation. Chlorophenols are potently aromatic and are often described as medicinal because some medicinal products, like Chloraseptic®, contain chlorophenols. Campden tablets, aka potassium metabisulfite, can be added to water to remove chlorine and chlorophenols. Activated carbon filtration is another useful method used to dechlorinate brewing water. The idea here is to remove compounds that may react with beer to form smoky aromas.

The last major source of smoky flavors in beer comes directly from malt and/or hops. Malt is smoky when wood smoke or peat reek, i.e., smoke from a peat fire, infuses malt. Smoked malts can contaminate regular malt in mills and grain handling equipment that are not properly cleaned after use and can even taint regular malt when bags of smoked and unsmoked malts are stacked together. Smoke aromas from hops are extremely rare, but wildfires in Oregon and Washington in 2020 and 2021 did damage some hops. Hop processors kept a very keen nose on bales to prevent smoke-tainted hops from being processed, but there have been a few reports from commercial brewers who have run into the odd lot of smoke-tainted hops. The takeaway from this discussion is to smell malt and hops prior to brewing.

OK, so here are my thoughts on your general problem. Voss kveik is not diastatic and is not reported to be POF+. Your hops were most likely not the source given the quality control on them. So that leaves us with water, excessive boiling (this leads to thermal degradation of ferulic acid into 4VG), microbes, and malt contamination as possible causes. Any of these are possible. There is nothing you can do about this brew, but you may want to review your water and how you are boiling before your next brew.

If you have any malt left, consider doing a hot steep and using your nose to determine if there are any smoky aromas that may come from the malt. Maris Otter is definitely not a malt associated with smoke, but several English maltsters produce both Maris Otter malts and peated malts. Contamination can occur during shipping and storage because of the intensity of peat smoke; it's called reek for a reason! And microbial contamination is always a possibility. Hopefully this gives you some insight into this foggy topic.

Q I RECENTLY BOUGHT A pH METER AND GOT SOME CALIBRATION REAGENTS WITH IT. I'M JUST ABOUT FINISHED WITH MY FIRST BOTTLES SO I WAS ABOUT TO SHOP AROUND FOR SOME NEW REAGENTS WHEN IT HIT ME . . . DO I REALLY NEED TO BUY A 7.0 REAGENT? IF I REMEMBER FROM HIGH SCHOOL CHEMISTRY CLASS CORRECTLY (IT'S BEEN 40 YEARS!), CAN'T I JUST USE DISTILLED WATER TO CALIBRATE FOR 7.0?

JEFF CUTLER
REDMOND, OREGON

A On paper, using distilled water as a pH 7.0 makes sense because the ionization constant is $1 \times 10^{-14}$ and the concentration of hydrogen ions is $1 \times 10^{-7}$ molar at 77 °F (25 °C). Converting this to pH by poking $1 \times 10^{-7}$ into the old calculator and hitting the log key results in -7, and multiplying this by -1 gives us 7; that should be the pH of pure water. I am impressed you remembered that from high school chemistry class. The problem is that water is rarely pure because it is the universal solvent and dissolves all sorts of things, including gases. And even if you were able to keep pure water pure in an environment without $CO_2$, the ionic strength of pure water is too weak for a pH probe to properly function. A pinch of salt could be used to solve that problem.

Although the concentration of carbon dioxide in the atmosphere is only 400 ppm, that's plenty to affect the pH of water because carbon dioxide sets up a powerful buffer system in water. This same buffering system is present in blood. In the case of water, the carbonate buffer system raises pure water pH up to about 8.2. The takeaway is that you need to buy two buffers to calibrate your pH meter. When you go shopping for pH buffers, you will discover that there are several options, with the most common being pH 4.01, 7.00, and 10.01. Brewers should calibrate their meters using pH 4.01 and 7.00 buffers because brewing biochemistry occurs in the acidic world.

You might be wondering why these pH standards are not affected by carbon dioxide in the atmosphere like water. The answer is because they are buffers themselves. Just in case you were not paying attention during this chapter in chemistry class, buffers are solutions containing a conjugate acid-base pair that are able to resist, or buffer, pH changes. Buffering capacity is directly related to the concentration of these compounds and is limited by how much acid or base can be added before the pH changes. This is why buffers need to be periodically replaced and why they should be stored in closed containers that prevent evaporation. One final point: Don't ever store your pH meter's probe in distilled water! BYO

BY GORDON STRONG

# PRE-PROHIBITION LAGER

## A classic American Pilsner-type beer

Germans, of course, brought their brewing knowledge and traditions with them and by 1870 lagers had achieved a dominant market position in the U.S.

**PRE-PROHIBITION LAGER**
**BY THE NUMBERS**

| | |
|---|---|
| OG: | 1.044–1.060 |
| FG: | 1.010–1.015 |
| SRM: | 3–6 |
| IBU: | 25–40 |
| ABV: | 4.5–6.0% |

Photo by Charles A. Parker/Images Plus

Pre-Prohibition lager is an old beer style with a recent history. It is a rediscovery, recreation, or reinterpretation of a type of beer once made in the United States before Prohibition that became popular about 25 years ago through the work of homebrewers. It was actually somewhat of a radical idea at the time since many in the nascent craft brewing industry were strongly against using adjuncts in beer. Ah, how times have changed . . .

The 2015 and 2021 Beer Judge Certification Program (BJCP) Style Guidelines include pre-Prohibition lager in the Historical Beer style category, category 27. It was introduced in the 1998 BJCP Guidelines as classic (pre-Prohibition) within the American Light Lager category. In the 1999, 2004, and 2008 BJCP Guidelines, it was known as Classic American Pilsner (shorthand as CAP), first in the American Lager category and later in the Pilsner category. These style names are not typically used for commercial products, which are often called Pilsner, lager, or simply beer. The choice of name is mostly to differentiate it from other products such as modern American light lagers or European Pilsner-type beers.

### HISTORY

This is the story of mainstream American beer for much of the second half of the 1800s and first half of the 1900s. There are two parts to the history of this style. First, the creation of the original style. Second, its recreation in the modern craft beer era. It's a bit easier to tell the story backwards since the second phase is much better documented.

Between 1994 and 1997, several influential articles were published in multiple homebrewing magazines by the late Dr. George Fix, Ben Jankowski, and Jeff Renner. Fix laid out much of the historical foundation for the style in his article "Explorations in Pre-Prohibition American Lagers," where he cited historical references by Wahl & Henius, Nugey, MBAA, and others. Jankowski wrote a nice story about Bushwick Pilsners describing famous beers from now-defunct breweries in that Brooklyn neighborhood. Renner wrote the "Reviving the Classic American Pilsner" article in 1995 that influenced many homebrewers, along with his subsequent talks at multiple homebrewer conferences.

As far as the roots of the style, the context is that large numbers of Germans immigrated to the U.S. in the 1840s. Between the 1820s and 1840s, about 90% of immigration to the U.S. was from Ireland, Germany, and England. Many Germans settled in the Midwest — some of the largest settlements being in Cincinnati, Milwaukee, and St. Louis — part of the corn belt. Germans, of course, brought their brewing knowledge and traditions with them and by 1870 lagers had achieved a dominant market position here in the U.S.

The ingredients available in the U.S. needed adaptation to produce European-style beers, though. The local 6-row barley had a higher protein content and needed to be diluted with adjuncts such as corn, rice, or sugar in order to produce clear beer. Beers were bittered with domestic hops like Cluster, but finished with imported German noble-type hops.

The Prohibition era of 1920–1933, the Great Depression, and World War II ruined much of the American brewing industry and led to the growth of a few industrial brewers who pushed increasingly bland pale lagers. Pilsner-type beers survived Prohibition but at lower gravities and bitterness levels, similar to what was taking place in the British Empire at the same time.

Consolidation in the brewing in-

dustry continued as more and more regional breweries that made these styles disappeared. This was the situation at the dawn of the craft beer era, which was a revolt against the bland, adjunct lagers being pushed as the only option of beer. Homebrewers would pick up on this theme of a "prevailing antipathy towards corn with little historical sense," according to Dr. Fix. Yet despite adjunct use, this style was not what we think of as a modern lawnmower beer.

## SENSORY PROFILE

The style shares more similarity with the original Czech Pilsners (Czech premium pale lager style) than modern standard American lagers. It has the robust bitterness and hoppy character of the original, while bringing in a corn-y American adjunct quality. As an older style, it has more strength and bitterness than modern American lagers — up to 6% ABV and up to 40 IBUs.

Historical versions can be up to moderately grainy, but modern versions can be more neutral. The corn flavor can be noticeable and may add a rounded flavor with the impression of sweetness on the palate. Versions using rice can be neutral tasting and crisper. The body can be medium to medium-full, but fully attenuated and not sweet in the finish. It should drink easily, but give some weight on the palate.

The beers tend to be a little darker in color than modern American lagers, yellow to deep gold. Clarity is typically bright and the beer is often topped with a creamy white head with excellent retention.

The late-hop character is typically refined and elegant — floral, spicy, herbal — and moderate to moderately high in intensity. Noble-type hops are commonly used as finishing hops. The bitterness can be clean to slightly rustic, and at a medium to high level. The hops should definitely stand up to the malt in the balance, but the beer should not seem as intense as an IPA in hoppiness.

The yeast character tends to be neutral to showing a light fermentation by-product character typical of many modern standard American lagers. As a lager, the beer will have a smooth

## PRE-PROHIBITION LAGER

(5 gallons/19 L, all-grain)
OG = 1.053 FG = 1.012
IBU = 32 SRM = 3 ABV = 5.4%

### INGREDIENTS

7.75 lbs. (3.5 kg) Pilsner malt
8 oz. (227 g) Munich malt
2.5 lbs. (1.1 kg) flaked maize
2 AAU Hallertauer hops (first wort hop) (0.5 oz./14 g at 4% alpha acids)
6.5 AAU Magnum hops (60 min.) (0.5 oz./14 g at 13% alpha acids)
2 AAU Hallertauer hops (10 min.) (0.5 oz./14 g at 4% alpha acids)
1 oz. (28 g) Hallertauer hops (2 min.)
Wyeast 2035 (American Lager), White Labs WLP833 (German Bock), or SafLager W-34/70 yeast
¾ cup corn sugar (if priming)

### STEP BY STEP

This recipe uses reverse osmosis (RO) water. Adjust all brewing water to a pH of 5.5 using phosphoric acid. Add 1 tsp. of calcium chloride to the mash for mouthfeel.

This recipe uses a step mash. Use enough water to have a moderately thick mash (1.5 qts./lb or 3.1 L/kg). Mash in the malts and corn at 131 °F (55 °C) and hold for 15 minutes. Raise the temperature to 145 °F (63 °C) and hold for 45 minutes. Raise the temperature to 158 °F (70 °C) and hold for 15 minutes. Begin recirculating, raise the mash temperature to 169 °F (76 °C), and recirculate for 15 minutes.

Put the first wort hops in the boil kettle, then sparge slowly and collect 6.5 gallons (24.5 L) of wort.

Boil the wort for 90 minutes, adding hops at the times indicated in the recipe.

Chill the wort to 54 °F (12 °C), pitch the yeast, and ferment until complete. Rack to secondary and lager for two months at 32 °F (0 °C).

Rack the beer, prime and bottle condition, or keg and force carbonate to 2.6 volumes $CO_2$.

## PRE-PROHIBITION LAGER

(5 gallons/19 L, extract only)
OG = 1.053 FG = 1.012
IBU = 32 SRM = 4 ABV = 5.4%

### INGREDIENTS

4.4 lbs. (1.9 kg) extra light or Pilsen dried malt extract
4 oz. (113 g) Munich dried malt extract
1.6 lbs. (726 g) rice syrup
2 AAU Hallertauer hops (first wort hop) (0.5 oz./14 g at 4% alpha acids)
6.5 AAU Magnum hops (60 min.) (0.5 oz./14 g at 13% alpha acids)
2 AAU Hallertauer hops (10 min.) (0.5 oz./14 g at 4% alpha acids)
1 oz. (28 g) Hallertauer hops (2 min.)
Wyeast 2035 (American Lager), White Labs WLP833 (German Bock), or SafLager W-34/70 yeast
¾ cup corn sugar (if priming)

### STEP BY STEP

This version uses rice instead of corn but a corn syrup could also be used.

Use 6.5 gallons (24.5 L) of water in the brew kettle; heat to 158 °F (70 °C). Turn off the heat. Add the malt extracts and rice syrup and stir thoroughly to dissolve completely. Add the first wort hops to the kettle. Turn the heat back on and bring to a boil.

Boil the wort for 60 minutes, adding hops at the times indicated.

Chill the wort to 54 °F (12 °C), pitch the yeast, and ferment until complete. Rack to secondary and lager for two months at 32 °F (0 °C).

Rack the beer, prime and bottle condition, or keg and force carbonate to 2.6 volumes $CO_2$.

### TIPS FOR SUCCESS:

Be sure to give a little sniff and taste of the beer pre-lagering to make sure the diacetyl has been cleaned up. If not, give the yeast a couple days at slightly warmer temperatures to correct this.

mouthfeel and fermentation profile. It should be more robust than an international pale lager, not as crisp and dry as a German Pils, with a similar balance as Czech premium pale lagers.

## BREWING INGREDIENTS AND METHODS

There is no standard way of producing this style and there are many options that will yield good results. I'll talk about the traditional and modern approaches, and provide some alternatives along the way. Choose what appeals to you and what you can execute on your brewing system.

As originally brewed by German immigrants in the 1800s, domestic American six-row pale brewing malt would have been used as well as indigenous hops for bittering. Imported hops were used for flavor and aroma, with German noble-type varieties common. American six-row malt is traditional as the base grain, but George Fix preferred the flavor of two-row malt and would use that (either German or American). I tend to use German Pilsner malt as an "upgrade" to this style. Some authors mention using up to 5% Munich or Carapils® malts in the grist, especially when using flaked corn, to increase body. I would avoid crystal-type malts because I don't want that kind of sugary sweetness.

When the style was rediscovered in the 1990s, all the authors talked about brewing with flaked maize. Most seemed to use between 20–25%, although some historic references say up to 33% could be used. Rice is an alternative, which can produce a lighter, crisper beer with less flavor — I have judged these in competition and they rarely do as well as corn-based versions. Using flaked maize is a modern alternative technique that avoids the use of a double mash, at the possible expense of some corn flavor.

Cereal grains (most typically corn, as it was grown in most regions with major brewing centers in the U.S.) would have been used in a cereal (or double) mash. Mix a small portion of barley malt (perhaps 25% of the weight of maize) with cornmeal or grits, then heat to saccharification temperature before bringing to a boil for about half an hour. Then remix with the main mash (similar to how a decoction is combined) to raise from a beta amylase rest temperature (144–146 °F/62–63 °C) to an alpha amylase rest (158 °F/70 °C).

In later writings, Jeff Renner offered a pressure cooker alternative for maize. Process the maize along with the same amount of barley malt as used in the double mash, first cooking for 15 minutes at 150 °F (65 °C), and then 20 minutes at 15 psi (250 °F/121 °C). Those with an Instant Pot or other pressure cooker may consider this method.

George Fix liked to use a 50/60/70 step mash (30 minutes at 122 °F/50 °C; 15 minutes at 140 °F/60 °C; 30 minutes at 158 °F/70 °C) but his recipes used flaked maize. Jeff Renner liked to use the American double mash with cornmeal, particularly later in his career. My friend Curt Stock had a lot of success with flaked maize and a single infusion mash at 152 °F (67 °C). I tasted all of these versions, and I can state they were all memorable and delicious. Jeff Renner's methods tended to emphasize the corn flavor, which may not be every brewer's objective.

George Fix preferred the modern take on the style, which was to use German Pilsner malt, flaked maize, and German yeast. He would also make the style on the high end of bitterness and alcohol, and then dry hop it for good measure. Curt Stock took a similar approach, but didn't dry hop it and used Czech yeast instead. Jeff Renner and Ben Jankowski used various American lager yeast strains, but sometimes Renner liked to use the German Bock yeast (as do I). So I think any of these yeast strains would work in this style.

Cluster is often mentioned as the bittering hop, but I've had good results with Magnum instead. I think Northern Brewer would also work. Classic continental European finishing hops seem to be the best choice for flavor and aroma, such as Hallertauer, Saaz, Tettnanger, Styrian Goldings, and Strisselspalt, or their American equivalents.

Hops are typically added in bittering, flavor, and aroma additions. George Fix liked to use first wort hopping in this style, but he was one of the people who helped re-introduce the technique. I don't believe it is traditional, but it does produce great results in this beer.

Water gets little mention other than Renner saying it should be low in sulfate and low in alkalinity. A water profile suitable for brewing a pale lager, in other words. Personally, I use RO water with calcium chloride, but you probably know that by now.

## HOMEBREW EXAMPLE

I'm presenting a modern homebrew version of this recipe that uses flaked maize rather than a cereal mash, and has some upgraded malt and hops. I'm keeping the gravity and bitterness at moderate levels as well.

The base malt is mostly German Pils with a little Munich for extra flavor and body. Flaked maize means that we can mash the corn along with the rest of the grist. I'm using a step mash for a little extra dryness. If you want to brew this with a single infusion mash, use 152 °F (67 °C) for an hour.

The hop character is German, and I'm going straight Hallertauer for aroma and flavor. First wort hopping will give additional hop flavor with a smooth bitterness. Magnum hops for bittering will give a clean bitterness.

My yeast choice is American . . . Wyeast 2035 that is said to be descended from the Schaefer strain. Schell uses it in some of their beers, and has commented that it likes a slightly warmer fermentation temperature, so I've bumped up my typical temperature by a few degrees. If you use a different strain, drop back to 50 °F (10 °C) or whatever you typically use for your lagers.

If you want to explore variations of this recipe, here are my suggestions: Use American six-row as the base malt instead of Pils. Try a cereal mash or a pressure cooker mash with milled corn grits instead of the flaked maize. Use Cluster hops for bittering instead of Magnum. Any other noble-type hops would work instead of Hallertauer. Swap any American, German, or Czech lager yeast; it works well with the W-34/70 strain and also White Labs WLP833 German Bock yeast.

If you want a more robust version, raise the starting gravity to 1.060 and boost the bittering to 40 IBUs. Dry hop the beer with between a half-ounce and an ounce (14–28 g) of German noble hops. That version would be close to the way George Fix used to make it. I hope he would approve. BYO

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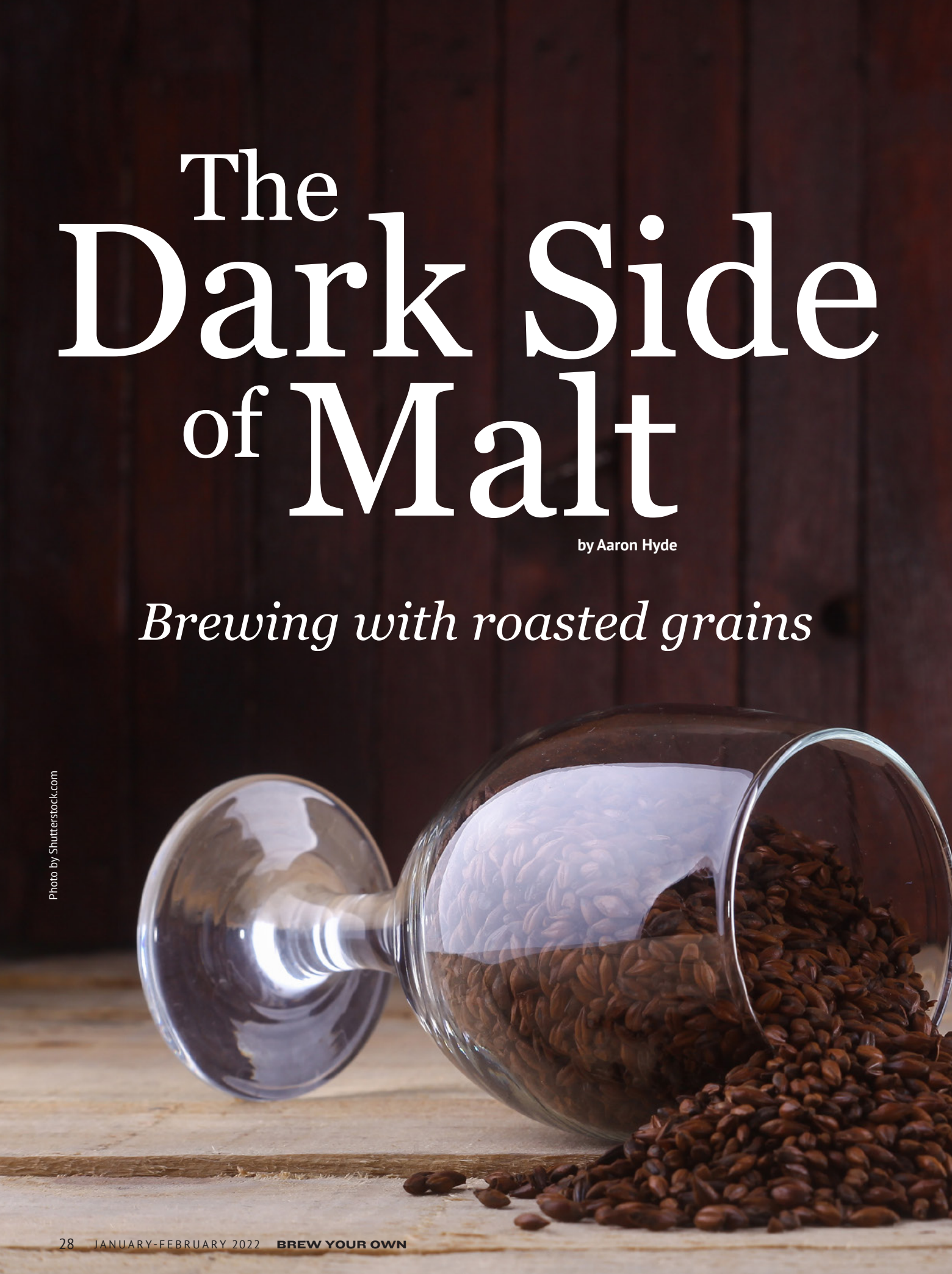
# The Dark Side of Malt

by Aaron Hyde

## *Brewing with roasted grains*



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Hops may be having their day, and the library of yeast we have access to as homebrewers continues to grow. So, where does that leave malt?

It's the backbone, the soul, and the purveyor of flavor it's always been! The trick to much of malt's flavor is in the malting process itself, as there are numerous ways maltsters manipulate its flavor. One way is in a roaster, delivering us delicious dark malts. Those lightly darkened brown and light chocolate malts up to raven-colored roasted barleys and black malts. The variety of dark roasted malt out there is an adventure for every brewer to explore.

As a brewer looking to brew with dark malts there are decisions to make. Quantity, specific malt type, and process decisions all factor into the resulting flavor that goes in your beer. You can subtly add some color or dryness to your beer's finish through a small percentage — just a handful sometimes — or you can dive right in to big, rich, dark roasted flavors. It can all be provided in the small package of dark roasted malt. Let's try to better understand these malts and how to use them by looking at how they are made, what malts are available, and how best to use them both subtly and aggressively.

## MAKING DARK MALT

Most dark roasted malts go through the typical malting process prior to ending up in a roaster. The malting process involves:

- **Steeping:** The grain hydrates in large tanks, water completely covering the grain bed. These are aerated so the grain doesn't die (it's still a living seed at this point). Water might be changed over 1–2 days. This hydrates the grain to over 40% water.

- **Germination:** The grain is now laid in beds that allow the grain to grow between 4–6 days. The grain must be turned so rootlets don't grow into each other, leaving the maltster with one big clump of grain. "Green malt," as it's now known, may make its way to a roaster wet from this stage. This is most popular with caramel malts.

- **Kilning:** Gentle drying for 12–36 hours is the final stage in the malting process. This solidifies the seed as malt as it halts germination.

Malt meant for a life other than as a type of base malt is sent to the roaster. This is typically a large cylinder shaped "drum roaster" designed to keep the malt moving. This aids in even heating so there isn't a big lump of scorched malt at the bottom. Many are directly gas-fired, as a significant amount of heat is needed. It's not uncommon for roaster temperatures to be in the 500–600 °F (260–315 °C) range. Over a carefully monitored 2–4 hour period of roasting, malt colors and flavors develop.

Most roasting drums are equipped with a way to "quench" or lightly wet the malt, which keeps it from smoking too much or starting on fire. Some dark malt is essentially burnt to a crisp, in a controlled fashion, effectively becoming completely charred and carbonized.

## TYPES OF DARK MALT

There's a large variety of roasted dark malts on the market. They all share some common traits:

- They can be used in small amounts for color adjustment, though some may lend a small amount flavor.

- Most will aid in head retention.

- Flavor varies, but most fall close together on a flavor wheel with notes of dark chocolate, coffee, and dark roasted malt/grain flavor present in some varying amount.

- Many will help dry your beer, cutting sweetness and creating a clean malt finish.

- Many will also enhance other malt flavors present in your beer when well balanced.

Depending on the maltster there are several names given to dark malts. Some might be unique, trademarked, or used in specific countries. Let's look at some of the most popular types available:

### PALE CHOCOLATE MALTS (190–260 °L)

Pale chocolate malts have their own very specific flavor palate. They can range from milk chocolate to a nutty coffee flavor depending on the usage and the color the maltster decides to roast it to. Pale chocolate malt is a fun tool in your dark malt arsenal that is very at home in porter and brown styles, but it can also be fun to experiment with in other styles.

### ROASTED BARLEYS (300–600 °L)

The most common non-malted dark grain that gets roasted. Very straightforward coffee notes come through in most roasted barleys. They add the classic Irish stout flavor but find their way into more complex dark beers as well. Known for creating a dry finish, roasted barley also enhances aroma, head retention, and mouthfeel.

### CHOCOLATE MALTS (330–460 °L)

Chocolate malts can be somewhat of a surprise when first used, as most have quite intense flavors when used in larger quantities. Think super rich dark cocoa, as well as coffee notes. Chocolate malts can be quite complex compared to darker roasted malts, as not all of the malt character is lost in the roasting process. Chocolate malts can vary in color and flavor by malthouse, based on roasting technique and malt used.

### DEHULLED, DEHUSKED, AND HULL-LESS ROASTED MALTS AND ROASTED BARLEYS (400–550 °L)

Maltsters may remove the hull, a source of astringency, from barley to create a much less bitter finished product. Maltsters may also choose to use a hull-less grain, such as wheat or rye, for similar reasons. Dehulled, dehusked, and hull-less dark malts have seen a surge in usage through their versatility to color beer without adding astringency, but also in styles like Cascadian dark ale (black IPA), American stouts, and other black beers where acidic notes and bitterness are not welcome.

### BLACK MALTS (470–630 °L)

Sometimes referred to as "Black Patent," black malts are used to add an inky black color and complex notes of licorice, dark chocolate, coffee, acid, and char to stouts and porters. They can also be sparingly used to boost color without contributing much flavor in a range of styles. But when used in excess or without properly balancing brew water chemistry, black malts can result in horribly bitter and acidic flavors.

### OTHER DARK MALTS (60–650 °L)

You'll find a variety of other dark malts from the aptly named brown malt, which marks our entry into dark roasted malts at around 200 Lovibond. Don't let the light color fool you: It's rich in roast and coffee flavor (in fact, it's been called "coffee malt"). Roasted wheats can be almost bitterless in higher quantities. Besides pale chocolate malt, you might also find dark chocolate, falling between chocolate and black malt. Maltsters have made sure to give you plenty of tools to add roasty goodness to your next

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*The color contribution as well as flavor and aroma of roasted malts is directly related to the time and temperature the maltster roasts them.*

beer — the hardest part is finding time to use them all.

## THE MALT MISNOMER

There are also plenty of grains that end up in roasters that have not been malted. These are often referred to by their grain name followed by "Roasted Barley." Although black malt or chocolate malt are barley, they've been through the malting process. You'll also find roasted wheat, roasted oats, and other varieties of roasted products that may be less clear whether they've been malted or not. Either way, dark roasted malts and dark roasted grains shouldn't be relied on for too much starch (sugar contribution) as it's likely been fried away in the roasting process.

## STYLES & USAGE

The most common styles for dark malts, as you might suspect, are stouts and porters. This ranges from brown porters to obsidian black Russian imperial stouts. Other common styles that highlight dark malts are brown ales, dunkels, and some specialty Belgian beers. Copper and orange beer styles like Mexican lager, California common, and ambers may see the tiniest amount added. A medium-colored style like Irish red ale traditionally relies on dark malt for the intense red hue. In fact, even Miller Lite is made with roasted malt for color adjustment.

Most maltsters will list the max usage of these malts in a beer at 5–10%. This doesn't mean you can't use more, but be cautious. Almost all of the previously mentioned examples do typically max out at around 5 or 10%, even in big dark beers.

On pages 32–33 is a chart showing a sampling of dark malt options. This list is by no means comprehensive, but provides some of the most popular types. Some of these are unique, but most will fall into one of the major categories. Take note how malts of a similar name can vary by maltster in color. There are no true guidelines for

malt styles.

So what's the best way to jump into dark malt? Probably with the most classic and popular dark style of them all — the Irish dry stout. Typically brewed with roasted barley as the only dark malt, below is a favorite recipe of mine that adds some black malt and chocolate malt to make it a bit more dynamic. Feel free to play around with substitutions from the chart that follows the recipe!

## Irish Dry Stout – Enhanced!

(5 gallons/19 L, all-grain)
OG = 1.042 FG = 1.010
IBU = 41 SRM = 40
ABV = 4.2%

*No reason to reinvent the wheel, but maybe just give it some new rims? This recipe takes the traditional Irish dry stout and adds a small amount of both black malt and chocolate malt for a more complex dark malt flavor that will add intrigue at every sip.*

### INGREDIENTS

6.25 lbs. (2.8 kg) British pale ale malt
1.75 lbs. (0.8 kg g) flaked barley
8 oz. (400 g) roasted barley (500–600 °L)
3 oz. (85 g) black malt (450–625 °L)
3 oz. (85 g) chocolate malt (330–400 °L)
8.4 AAU Kent Golding hops (60 min.) (1.7 oz./48 g at 5% alpha acids)
White Labs WLP004 (Irish Ale), Wyeast 1084 (Irish Ale), or SafAle S-04 yeast

### STEP BY STEP

Crush the grains and mash in using 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a dough-in temperature of 120 °F (49 °C) if doing a step mash. Hold at 120 °F (49 °C) for 15 minutes. Raise the temperature to 150 °F (66 °C) and hold for 60 minutes before mashing out at 170 °F (76 °C). If you aren't able to step mash, dough in at 152 °F (67 °C) and hold there until mashing out. Sparge with 170 °F (77 °C) water, collecting wort until your pre-boil volume is around 6 gallons (23 L), or to whatever volume your brew system will allow you to collect 5.25 gallons (20 L) post 60-minute boil.

Add the bittering hops for the full 60-minute boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. When the boil is complete, chill to 65 °F (18 °C) and transfer to your fermenter. Pitch the yeast and aerate if using liquid yeast. Ferment at 65 °F (18 °C) for seven days and then raise the temperature to 72 °F (22 °C) and hold for three days. Carbonate the beer to approximately 1–1.5 volumes and serve at 52–55 °F (11–13 °C).

### PARTIAL MASH OPTION

Replace the British pale ale malt with 5.25 lbs. (2.38 kg) pale ale liquid malt extract. Steep 1 lb. (0.45 kg) British pale ale malt and all of the other grains at 150 °F (66 °C) for 60 minutes and squeeze the bag or rinse grains to remove all dark malt goodness before boiling. Follow the remainder of the all-grain recipe.

## Dark Malts Chart (listed alphabetically by maltster)

| Grain | Country | Manufacturer | Typical Color (°Lovibond) | Usage Max % | Maltster/Distributor Short Description |
|---|---|---|---|---|---|
| Black Malt | United Kingdom | Bairds | 500 | 5 | Strong burnt coffee, char, and astringent flavors. A very small quantity gives a deep red color to beer. |
| Brown Malt | United Kingdom | Bairds | 60 | 5 | Dry, mild coffee flavor, great for dark beers, stouts, and porters. |
| Chocolate Malt | United Kingdom | Bairds | 380 | 10 | A rich dark color and roasted, sharp, burnt or astringent flavors, and intense chocolate and coffee notes. |
| Black Malt | Germany | Bestmalz | 430 | 5 | Gives the beer greater depth of color and adds more intense nuances of chocolate or coffee aromas. |
| Black Malt Extra | Germany | Bestmalz | 510 | 5 | This malt is as black as great malt can be. It will enrich your brew with a wild spectrum of tastes. |
| Roasted Barley | Germany | Bestmalz | 490 | 5 | Can exhibit intense roasty notes and bitterness reminiscent of black coffee or Italian espresso. |
| Chocolate | Germany | Bestmalz | 340 | 10 | It adds fine nuances of chocolate, nut, and coffee aromas. Improves foam stability. |
| Black Barley | United States | Briess | 500 | 7 | Provides color and rich, sharp flavor which is a characteristic in stouts and some porters. |
| Roasted Barley | United States | Briess | 300 | 7 | Coffee, intense bitter, and dry. Contributes color and rich, distinct flavor characteristic to stouts. |
| Black Malt | United States | Briess | 500 | 10 | Use in dark beers for dry roasted flavor. Use in small quantities for color with little flavor adjustment. |
| Blackprinz® Malt | United States | Briess | 500 | 10 | Subtle, smooth malt flavor. Very delicate, clean, and mild roasted flavor. Can replace debittered black malt. |

| Grain | Country | Manufacturer | Typical Color (°Lovibond) | Usage Max % | Maltster/Distributor Short Description |
|---|---|---|---|---|---|
| Chocolate Malt | United States | Briess | 350 | 10 | Rich roasted coffee flavor. Brown hues. Can color adjust with minor flavor contribution. |
| Dark Chocolate Malt | United States | Briess | 430 | 10 | Rich smooth coffee flavor. Use in higher percentages in dark styles like porter, stout, and brown ale. |
| Midnight Wheat Malt | United States | Briess | 550 | 7 | Subtle, smooth, no bitter, astringent, dry flavors or aftertaste, starts slightly sweet, hints of roasted flavor. |
| Château Black® | Belgium | Castle malting | 475 | 5 | A more astringent flavor than other colored malts. Imparts a slight burnt or smoky flavor. |
| Château Chocolat® | Belgium | Castle malting | 380 | 7 | Imparts a nutty, toasted flavor. Suitable in brown ales, strong ales, darker styles, and black beers. |
| Chocolate Malt | United Kingdom | Crisp malting | 450 | 10 | It adds dark brown color and rich chocolate and coffee flavors. It has a smoke flavor and some bitterness. |
| Brown Malt | United Kingdom | Crisp malting | 55 | 5 | Toasted bread flavor. It lends a strong, dark-toasted grain flavor, slightly nutty with a hint of bitter chocolate. |
| Pale Chocolate Malt | United Kingdom | Crisp malting | 225 | 10 | Lighter in color and milder in taste than regular chocolate malt, it has a nutty malt flavor. |
| Black Malt | United Kingdom | Crisp malting | 580 | 3 | Flavor contributions are subtle when used in small amounts. Well suited for stouts, or to modify color. |
| Roast Barley | United Kingdom | Crisp malting | 580 | 5 | Flavor is similar to a dark, bitter roast coffee. Black opaque color. For stouts. |
| De-Bittered Black Malt | Belgium | Dingemans | 550 | 5 | Provides a deep red to black coloring. Use as you would black malt when bitterness should be kept low. |
| De-Husked Roasted Barley | Belgium | Dingemans | 450 | 5 | Gives a roasty aroma and dark color. High percentages provides a smoke/burnt flavor. Low astringency. |
| Chocolate | Belgium | Dingemans | 340 | 5 | Roasted at high temperatures, this malt lends rich aroma, deep red color, and a nutty/roasted taste. |
| Chocolate Malt | United Kingdom | Muntons | 400 | 10 | Rich coffee or dark cocoa flavor, as well as a slight bitterness. Use in milds, brown ales, porters, and stouts. |
| Black Malt | United Kingdom | Muntons | 555 | 10 | Sometimes described as bitter and astringent, it can also enhance rich fruit notes of currant and plum. |
| Roasted Barley | United Kingdom | Muntons | 525 | 10 | Classic malt for dry Irish stouts. Used to give Irish red ales their characteristic red color and dry finish. |
| Prox Brown Malt | United States | Proximity | 160 | 10 | Dark toast flavor and aroma. Good for brown ales, porters, and stouts. |
| Dark Chocolate | United States | Proximity | 400 | 7 | Provides a dry, dark cocoa flavor with hints of dark roasted coffee. |
| Black | United States | Proximity | 500 | 10 | Typically used to provide high color with minimal flavor impact. |
| Roasted Barley | United Kingdom | Simpson's | 600 | 5 | Malt used in typical dry styles like Irish-style stouts. Coffee flavor. |
| Black Malt | United Kingdom | Simpson's | 625 | 10 | Excellent for darkening beer color without imparting too much astringency or roast characteristics. |
| Brown Malt | United Kingdom | Simpson's | 190 | 10 | Imparts a rich coffee aroma ideal for stouts and porters. Increases foam stability. |
| Chocolate Malt | United Kingdom | Simpson's | 450 | 10 | Dark malt that gives a rich red to brown color and nutty flavor. Use in brown ales and porters. |
| Pale Chocolate Malt | United Kingdom | Thomas Fawcett | 215 | 10 | Adds color and a mild chocolate/coffee flavor to dark milds, stouts, and porters. |
| Chocolate Rye | Germany | Weyermann | 225 | 5 | Mild coffee, chocolate, nut, nougat, and bread flavor notes. Great for many dark styles. |
| Chocolate Wheat Malt | Germany | Weyermann | 400 | 5 | Intense dark chocolate notes, mild-roasted aromatic coffee, and bread notes. Great in porters. |
| Roasted Barley | Germany | Weyermann | 415 | 5 | Roasted, unmalted barley grain has a full, roasted aroma. Excellent for stouts and other dark beers. |
| Carafa® Special Type I | Germany | Weyermann | 340 | 5 | De-husked 'chocolate malt' style for a smoother flavor. |
| Carafa® Special Type 2 | Germany | Weyermann | 430 | 5 | De-husked 'chocolate malt' style for a smoother flavor. |
| Carafa® Special Type 3 | Germany | Weyermann | 525 | 5 | De-husked 'chocolate malt' style for a smoother flavor. |
| Carafa® Type 1 | Germany | Weyermann | 340 | 5 | Great for adding color and aroma to alts, bockbiers. |
| Carafa® Type 2 | Germany | Weyermann | 440 | 5 | Flavor notes of coffee, cocoa, dark chocolate, intense roastiness. |
| Carafa® Type 3 | Germany | Weyermann | 525 | 5 | Flavor notes of coffee, cocoa, dark chocolate, intense roastiness. BYO |

# FOLIAGE AND BREWS

## *BYO's Vermont Brewery, Bike & Hike Adventure*

*Brew Your Own* Publisher Brad Ring recently had the chance to show a group of readers some of his favorite spots to play and drink in *BYO's* home state of Vermont during the height of fall foliage colors. With stops at 14 breweries, the group was lucky to experience the incredible craft beer scene in the Green Mountain State firsthand during *BYO*'s Vermont Brewery, Bike & Hike Adventure tour in mid-October. We visited an amazingly broad spectrum of breweries from one of Vermont's largest, Von Trapp Brewing (yes, that same family from *The Sound of Music*) to the one of the smallest, nano brewery Red Clover Ale Co. All along the way we had the chance to experience the fall colors Vermont is famous for while sipping on local beers often only available in the state.

Plus, each day we took to scenic hiking trails or country roads and paths for great bike rides to earn that next flight of Vermont IPA.

Vermont brewers rolled out the red carpet for some truly special experiences. We spent two hours walking the brewery floor with John and Jen Kimmich at The Alchemist sampling not only their famous Heady




Topper (widely considered the first hazy IPA), but also rare beer offerings from their cellar and a super-fresh hoppy Focal Banger IPA right from the brite tank. Steve Parkes of the American Brewers Guild went through his teaching brewery's beers in detail in his classroom usually filled with aspiring pro brewers. We visited fan favorites like Lawson's Finest Liquids for a Triple IPA pulled from the brite tank just before bottling and detoured off the Lake Champlain bike path to meet up with Dan Ukolowicz who opened his doors just for the group for some mid-morning sampling and a tour of his Burlington neighborhood nano brewery Simple Roots.

And it was a week made all the more special by sharing it with fellow homebrewers passionate about brewing and exploring the beauty and craft beer in *BYO*'s backyard of Vermont.

We have two *BYO* trips planned for 2022 including a brewery and multi-sport adventure in Bend, Oregon July 17-21 and a Biking and Brewery Tour in the Wallonia region of Belgium September 9-15. Details on these two upcoming 2022 trips can be found at byo.com/trip. We hope you can join us on a future beer adventure. Cheers! BYO

# BREWING CHOCOLATE BEERS

## THE MANY PATHS TO CHOCOLATE

**by John Nanci**

I believe introductions are in order. I'm Alchemist John and I'm a maker, and I don't consider it a problem.

I've been having a blast with fermentation for over three decades at this point. I have done all sorts of fermentations — beer, wine, sake, mead, bochet, and concoctions and elixirs that don't quite fit into any category — like the smoked imperial elderberry braggot, or was that an imperial smoked stout with honey and elderberries, or was it an elderberry metheglin with smoked malt? See what I mean?

I also founded a company called Chocolate Alchemy some 18 years ago in case you were wondering why I call myself Alchemist John. There we teach people how to make chocolate from cocoa beans (more on that later) and recently we have been supplying a lot of small, medium, and large breweries with cocoa nibs to add to their various chocolate beers.

All this is to say I'm no stranger to combining things and seeing what you get. Today we are going to dig in and dive deep into several ways you can get chocolate flavor into your brews — what works, what doesn't, and why.

Personally, I find the why is very important and with that arrow in your proverbial quiver you can save yourself from going down a multitude of dead-end paths that are fraught with inherent issues. To that end, welcome to the lecture portion of our class.

# ATE

Photo by Charles A. Parker/Images Plus

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*Chocolate malts are one option to produce a chocolate beer, but there are many options that work very well with porters, stouts, and even styles of Belgian beers, bocks, Scotch ales, and brown ales.*

Did you know chocolate is a fermented food? It is. Chocolate as we think of it has only been around a few hundred years but cocoa has been consumed for thousands of years in various forms. Now some of you are already saying I should have said cacao, but I didn't on purpose as to my mind (and others will disagree, of course) they are the same thing and the only difference is language and given that languages evolve, a review of the origin of chocolate and cocoa and cacao are in order. See the sidebar "What's in a Name?" on page 39 for my more detailed opinions on the related terms.

When most people hear the word chocolate, they picture a sweet bar, a truffle, or maybe a cute hollow milk chocolate bunny. That, though, has only been the case for the last 10% of chocolate's long history. Before that it was strictly a drink, and sugar didn't have anything to do with it. I first discovered this in my teens when I tried making what was put out there as traditional Aztec hot chocolate as presented by Jeff Smith, The Frugal Gourmet. It combined (if my memory is right) chicken stock, cocoa powder, cinnamon, and Tabasco sauce. Sadly, it was truly horrific. In the decades since then I now can look back and know why it was so bad (my first fault was using low-grade cocoa powder).

## THE CHEMISTRY OF CHOCOLATE

Making chocolate is involved. In many ways it is as complex as brewing beer. I mentioned previously chocolate is fermented. More specifically, the fruit or pod from the cocoa tree *Theobroma cacao* is split open and the seeds (the cocoa beans) are scooped out and piled together until they start to naturally ferment, converting natural sugars to ethanol and then into acetic acid. Over the 3–8 days this takes, a bunch of chemical and physical changes occur in the cocoa bean. Generally speaking, pre-cursor chemicals are produced that, upon roasting, produce the signature flavor and aroma we think of as chocolate. Other compounds are broken down and bitterness and astringency are greatly reduced. The beans are then dried and made available to chocolate makers. The cocoa beans are then roasted to develop those chocolate flavors in addition to sterilizing them.

Unlike most beer fermentation, the fermentation of cocoa makes use of many different yeast and fungus strains, most of which would lead to horrible contamination in beer. I can't stress enough how important it is to use roasted beans or nibs for this reason. After the beans are roasted, they are winnowed to remove the husk. The cocoa nibs are then ground to release the natural cocoa butter present and reduce the particle size of both the cocoa solids and any sugar (plus milk powder for milk chocolate) until the chocolate is smooth to the tongue. It is also worth mentioning that in large industrial chocolate making, refining (particle size reduction) is a separate procedure from another process called conching. In the simplest terms, conching is stirring the heated chocolate so that undesirable compounds can be released. In small-batch chocolate making, melangers (a form of stone grinder) refine and conch at the same time over 1–3 days. After chocolate is made, it is tempered. For the purposes of this article, there is no reason to go into that further.

For those of you who like data, cocoa beans contain about 55% fat. The remainder is approximately 10% complex carbohydrate, no sugar (it has been all fermented out), 20% fiber, and 15% protein. That fat has re-

percussions in brewing that we will be dealing with in a bit.

## CHOCOLATE BEER STYLES

Even before the semi-recent craze of making chocolate beers or beers with cocoa, many styles have long been described as having chocolate notes. The use of various roasted and dark malts often gives porters and stouts those hints of chocolate. There are even two specialty malts specifically called chocolate malt and pale chocolate malt that lend the impression of chocolate to the finished beer. Those additions don't really give strong chocolate flavors though, and brewers in their heady drive to create a greater chocolate flavor started trying to use actual chocolate. Over the years I've seen and tasted the results of adding chocolate to the boil, nibs in the mash, powder in both, and various permutations in the secondary . . . and frankly it is kind of bewildering trying to determine what works, what doesn't, and what makes a horrific mess (spoiler — chocolate bars).

Before we jump into how to add chocolate to your beer, let's take a passing glance at what styles you can or may want to add them to. The most obvious are the entire host of darker beers — porters, stouts, Belgian darks and dubbels, doppelbocks, old ales, Scotch ales, and even brown ales and bocks. But oh, those are the low hanging fruit (low hanging cocoa pods?). Looking at other beverages, I have personally done chocolate mead (arguably a chocolate metheglin if you count cocoa as a spice), chocolate sake, and chocolate wine all to varying degrees of success.

What I have not seen but would love to see are some off the wall chocolate beers even if it pushes them outside their traditional parameters. I think a chocolate mild could be great as well as an amber or even a saison. Going out on a limb, a cocoa IPA or Pilsner could be really interesting. How about a cocoa wit?

"But the color," I hear you yelling . . . and I'll say I did give the caveat that it would be pushing style characteristics. I say let imagination be your guide and that there are no ta-

Photo by Shutterstock.com

## WHAT'S IN A NAME?

So what is it? Cocoa? Cacao? Cacoa? The terminology can be a little confusing but it really doesn't need to be. A lot of people try to be fancy and use cacao when referring to unprocessed cocoa and cocoa that comes after that. Others don't call it cacao if it is raw. I mainly want to clarify this so you don't think you have to pass on some cocoa nibs when they are labeled cacao nibs. For me, the terms go like this:

- **Cacao:** Short for *Theobroma cacao*, the scientific name for the plant that we eventually get chocolate from.
- **Cocoa:** The English term for the seeds that come from *Theobroma cacao*. It also can refer to any product up to chocolate, usually with an adjective, e.g. cocoa bean, cocoa powder, cocoa nib. Cocoa on its own is frankly ambiguous, so let's try not to use it. Similarly, lots of people like to say cacao nibs, which sounds a bit pompous and is incorrect unless of course your native tongue's word for cocoa is cacao (like Spanish) or you are speaking one of those languages. Let's also try not to say that either.
- **Cocoa bean:** The seed of the *Theobroma cacao*, whether it is raw, fermented, or roasted.
- **Cocoa nib:** The interior of a cocoa bean, broken along natural fissures, that has had the outer protective shell or husk removed. The process of removing the husk is called winnowing.
- **Chocolate (noun):** Etymologists have traced the origin of the word chocolate to the Aztec word *xocoatl*, which refers to a non-sweetened drink made from cocoa beans. The Latin name for the cocoa tree, *Theobroma cacao*, means "food of the gods." Many modern historians have estimated that chocolate has been around 1,500–2,000 years, but recent research indicates it could be even older, some pushing it out as far as 5,000 years. The modern product is produced from grinding up fermented, roasted cocoa nibs with sugar to produce a smooth (in most cases) and luscious delight (you know what chocolate is).
- **Chocolate (adj):** Anything that cocoa or chocolate (n) has been added to or has had things added to it that make it no longer chocolate (n). Examples are chocolate ganache (cream is added to chocolate), chocolate cake (chocolate is added to the cake), and of course chocolate beer.
- **Cocoa butter:** The fat that comprises 50–55% of the cocoa bean.
- **Cocoa powder:** The finely ground solids that remain after cocoa beans are pressed to remove the cocoa butter.

Photo by John Nanci

*Brewers have many ingredients to choose from when looking to impart chocolate character into beer, including extracts, chocolate, cocoa powder, chocolate malts, cocoa nibs, and ground roasted cocoa beans. Then there are the questions of when to add them, whether to combine them, and at what rates.*

boos. Before we jump into how you can start adding chocolate, I'll point out that it surprises many people that cocoa and chocolate don't contribute a lot of color. Unlike many adjuncts, due to cocoa's really high fat content, and the nature of the rest of the solids in it, there is surprisingly little that wants to extract with water. This is why a chocolate IPA could still end up pale. And that right there is a fine segue into the trials and tribulations of adding cocoa to your beer (or mead, wine, or sake).

## ADDING CHOCOLATE

There are five different times in which you can add chocolate while you are making beer and believe it or not, at least nine forms you can add to contribute chocolate flavor.

What forms do you have to work with?

- Cocoa nibs (roasted)
- Ground cocoa nibs (roasted)
- Brewing cocoa (ground roasted cocoa beans)
- Cocoa powder
- Chocolate
- Chocolate malt
- Pale chocolate malt
- Chocolate extracts (oil- or alcohol-based)
- Chocolate extracts (water-based)

You can add them to:

- The mash
- The boil
- Primary fermentation
- Secondary fermentation
- At bottling/kegging

If you were to build a matrix of permutations you would come up with 45 different options if tested individually, not even touching upon the source of the nibs you use (yes, that affects flavor as nibs from Ghana will taste different from those from Ecuador, etc.), how much to add, and whether you combine the techniques. For the math geeks out there, there are over 4 million combinations if you start mixing and matching. Lucky for us, many of them can be excluded as they just don't make any sense, like adding a piece of chocolate at bottling — or really, even adding a bar of chocolate to the secondary. It is just going to float there and not extract any of its decadent goodness. Truthfully, the only reasonable place to add a chocolate bar is in the boil (which still doesn't mean that you should).

So our guiding principles for chocolate additions are threefold:

- Is it safe to add a certain ingredient to a particular stage of brewing?
- Is it effective to add a certain ingredient at a particular stage of brewing?
- Does the addition actually deliver the chocolate character we want?

OK, so now let's break down these op-

tions with some more practical advice on when and how they can be used in your homebrews.

**COCOA NIBS**
Nibs behave pretty much anywhere except at bottling. They do fine in the mash, in the boil, and in the secondary. I'm not a fan of them in the primary as even cleaned and roasted nibs can have minor bacterial contamination. In the first two you are going to be sterilizing them and in the later, alcohol levels help significantly in warding off any minor bugs present. In all cases I find treating nibs as a minor adjunct just doesn't work well. To my taste, they just don't have enough water-soluble flavor if you add them at a rate of 2–4 oz. (56–112 g) per 5-gallon (19-L) batch. I like a dose rate of 8–12 oz. (225–340 g) per 5-gallon (19-L) batch.

**GROUND NIBS**
Generally speaking, I don't like doing this. When I've tried it the costs outweighed the benefits. Yes, you get more flavor by increasing the contact area, but often those flavors are not great and it can lead to issues most everywhere from stuck sparges, clogged chillers, or clogged siphon tubes.

**BREWING COCOA**
This is ground, whole-roasted cocoa beans. In contrast to the ground nibs, brewing cocoa is coarser and doesn't seem to lead to as many issues. I don't recommend it going into the secondary though. The husk just doesn't play well and you can get some funk there.

**COCOA POWDER**
Use it in the boil or at bottling (boiled with your priming sugar). Cocoa powder requires heat to get it to play well with water. This is the main reason it doesn't do well in the secondary. It is messy and tends to want to just float and clump. You can try incorporating it in some hot water but I find it doesn't contribute that much flavor.

**CHOCOLATE**
The only choice you have for chocolate is putting it in the boil. Everywhere else it will either clog your system or just sit there because it's cold. Unfortunately, the cocoa butter in the chocolate makes a horrible mess requiring chilling and skimming and even so can decimate head retention.

**CHOCOLATE MALT & PALE CHOCOLATE MALT**
Use in the mash, 4–16 oz. per 5-gallon (115–450 g/19-L) batch. Ten percent of a recipe's grain bill is generally the highest amount recommended by maltsters.

**CHOCOLATE EXTRACT (oil- and alcohol-based)**
These just don't want to play well in water when oil-based, and the alcohol-based options are either cost prohibitive or give a very distinct and unpleasant fake extract flavor, in my opinion and experience.

**CHOCOLATE EXTRACT/SLURRY (water-based)**
These are products like Amoretti and Cholaca. They are super easy to use and can go into the boil, primary, secondary, or even be added right at bottling. To me, these are similar to a cocoa nib slurry and they are catching on with commercial brewers of all sizes.

## ON TO THE EXPERIMENTS

Now, I know that is both a lot, and

Photo by John Nanci

*I conducted 17 test brews of the various products that will add a chocolate character to beer, added at the times I believed they would best thrive. The results, as they say, may shock you!*

## Chart 1: Ingredients and techniques tested to brew a chocolate brown ale.

| # | Addition Ingredient & Timing | Addition Amount |
|---|---|---|
| **1.** | Control | 0 |
| **2.** | Nibs* in secondary | 16 oz. (450 g) |
| **3.** | Cocoa powder^^ in secondary | 12 oz. (340 g) |
| **4.** | Water Slurry/Extract**** at bottling | 45 fl. oz. (1.3 L) |
| **5.** | Cocoa powder^^ at bottling | 12 oz. (340 g) |
| **6.** | Water Slurry/Extract**** in primary | 45 fl. oz. (1.3 L) |
| **7.** | Nibs* in boil | 16 oz. (450 g) |
| **8.** | Brewing cocoa*** in boil | 18 oz. (510 g) |
| **9.** | Chocolate^ in boil | 16 oz. (450 g) |
| **10.** | Cocoa powder^^ in boil | 12 oz. (340 g) |
| **11.** | Dark roasted nibs** in boil | 16 oz. (450 g) |
| **12.** | Nibs* in mash | 4 oz. (115 g) |
| **13.** | Nibs* in mash | 16 oz. (450 g) |
| **14.** | Dark roasted nibs** in mash | 16 oz. (450 g) |
| **15.** | Chocolate malt | 16 oz. (450 g) |
| **16.** | Pale chocolate malt | 16 oz. (450 g) |
| **17.** | Combining all of the above as appropriate and feasible # | |

| | | |
|---|---|---|
| **Blend 1:** 7&11 | Regular and dark nibs in boil | 8/8 |
| **Blend 2:** 11&13 | Dark nibs in boil, regular nibs in mash | 8/8 |
| **Blend 3:** 11&14 | Dark nibs in mash and boil | 8/8 |
| **Blend 4:** 12&17 | Low level nibs in mash and kitchen sink | 2/everything |
| **Blend 5:** 15&16 | Regular and pale chocolate malt | 8/8 |

* Whole, not ground, roasted to 260 °F (127 °C) – Dominican Republic Oko Caribe from Chocolate Alchemy

** Roasted to 365 °F (185 °C) — Dominican Republic Oko Caribe from Chocolate Alchemy

*** Ancillary Darkness from Chocolate Alchemy

**** Unsweetened Cholaca

^ 80% in-house made Dominican Republic Oko Caribe from Chocolate Alchemy (NFS)

^^ Natural Dominican Republic from Chocolate Alchemy

\# This was a hot mess and the details are just not important.

at the same time doesn't tell you a whole bunch. Fear not, I'm not going to leave you there as I've done my best to show my work. In preparation for this article, I brewed up 17 different ales (not over 4 million — sorry, not sorry), adding the main contenders to the stage of brewing that I believe gave them the best chance of success. The base ale was a very simple brown ale of about 8% ABV. I didn't want the roast character of a stout to overshadow our results. Here is the recipe that I used:

**The 5-gallon (19-L) equivalent Brown Ale recipe:**

8 lbs. (3.6 kg) dried malt extract
1 lb. (0.45 kg) Special B malt
1 lb. (0.45 kg) crystal malt (120 °L)
1 lb. (0.45 kg) caramel malt (120 °L)
1 oz. (28 g) East Kent Golding hops (60 min.)
Wyeast 1728 (Scottish Ale)

I spent the day meticulously dividing out the base recipe, adding the various chocolate additions and fermenting separately. Chart 1, above, shows the variations of each batch split. For all of these, the amounts listed are equivalent to what I would have used in 5 gallons (19 L). The boil and mash times are all one hour.

With myself, a member of my staff, and a couple of local professional brewers who have used cocoa nibs in their brews (go check out Mocha Rhino Suit from Alesong), we tasted all of these and I have to say, the results were not quite what I expected, even knowing that chocolate flavor is notoriously difficult to add to beer (hence this article).

If you want our complete set of tasting notes, check out the chart linked in the online edition of this article at https://byo.com/article/brewing-chocolate-beers/

However, to follow is my take on each one distilled down between the notes and conversation during the tasting. All the beers were tasted blind initially and we went back to discuss them further after the reveal. Spoiler – no one beer came out on top but the combos were found to have the most promise.

**1:** The control. No particular chocolate, tart, or sour notes were detected in the aroma nor in the taste. The head retention was mediocre.

**2.** Adding regular roasted nibs to the secondary surprisingly did not add much of anything in the way of chocolate. They added a little tartness and acidity.

**3.** The addition of cocoa powder to the secondary turned out to cause massive nucleation and the result was a gusher. Setting that aside, the body was a touch better but no one liked it due to the muddy quality it gave to the whole profile.

**4.** Adding the off-the-shelf Cholaca

at bottling didn't do much. Sure it was easy to add, and it did seem to add a little body, but I would say no real chocolate quality. After the reveal we all wondered if more was needed. I took a stab in the dark at the dosage rate as the company's only dosing suggestion was to experiment.

**5.** The addition of cocoa powder at bottling didn't do much, but thankfully it also didn't cause the gusher that adding it in the secondary did. We surmised the boiling of it with priming sugar may have caused a bonding of the particles to prevent nucleation. One person noted a little cocoa in the aroma.

**6.** Cholaca in the primary showed a little promise, with better and fuller mouthfeel, touches of fruit and roast.

**7.** Adding nibs to the boil produced a very interesting heady aroma. Everyone noted resin or solvent and not like a defect of fusel alcohols, but more like intense non-descript fruity esters. It also was decidedly sweeter. I have no explanation for that as the final gravity was the same as all the rest.

**8.** Adding brewing cocoa to the boil produced mixed results. Some liked it and found chocolate notes, some didn't care for the overall end product, even with noting the chocolate contribution.

**9.** Chocolate in the boil . . . I didn't want to do it as I've heard nothing but bad things but in the name of science I went onward. The stories were right. The cocoa butter killed the head, left floaters suspended, and just made for an unappealing beer. No one finished it. The resulting beer tasted nothing like the control nor the chocolate that was used.

**10.** The addition of cocoa powder to the boil seems to have co-precipitated other things out as it was decidedly thinner than the control and a bit sour/acidic with extra bitterness.

**11.** I was excited to test out adding darker roasted nibs to the boil. The feedback I'd heard from brewers was that it provides more flavor with the higher roast and that turned out to be true. In this case we think the roast level might have been too high (365 °F/185 °C) and that something more moderate in the range of 300–325 °F (149–163 °C) could be a real sweet spot. Descriptors that came up included: Porter-like, depth of flavor, brownies, and fullness.

**12.** Just a touch of regular roasted cocoa nibs in the mash added fruity acidity and sourness. Some people noted a touch of chocolate but some did not. The general response was "meh."

**13.** The same nibs at four times the level produced a cleaner fruit flavor, fuller body, and was generally liked even if it was not particularly chocolate-like.

**14.** When the dark roasted nibs were added to the mash, the tasting notes seemed to skew to more fruity and acidic again, losing that depth of flavor that was there when the nibs were boiled. This to me makes lots of sense if you think of making tea at 155 °F (68 °C) vs. making it with boiling water. There is certainly some aroma potential here.

**15.** It was both a surprise and not when we thought about it that adding traditional chocolate malt to the mash was really clean, added great cocoa notes to the aroma, and different levels/types of chocolate overtones to the beer itself. This beer was quite well received.

**16.** On the other hand, the addition of only pale chocolate malt was not received as well. Mostly non-descript. The overall conclusion was that pale chocolate malt is probably fine for layering but not as a single addition if chocolate character is the goal.

**17.** And now, for the finale we tasted one that I tossed the kitchen sink into. Nibs, brewing cocoa, and chocolate malts in the mash, more nibs,

brewing cocoa, plus cocoa powder, Cholaca, and chocolate in the boil, yet more nibs and powder in the secondary, plus powder and Cholaca at bottling. It was just a hot mess. Take every slightly negative about the single additions and amplify them. It was muddy, chunky, and just too bitter. Hard pass — don't do it. It was worth a shot, right? Personally I think the powder and chocolate probably ruined it.

And that my friend concludes our regularly scheduled program . . . but wait, there's more! I put together at bottling six combinations from the earlier brews, really just going on instinct and, with the exception of that last kitchen sink combo, all showed remarkable promise. The numbers that follow are 50/50 blends with the corresponding batch numbers:

**7&11.** Dark and regular nibs in the boil added complexity with hints of cocoa and brownies.

**11&13.** Dark nibs in the boil and regular nibs in the mash, again, added depth of flavor including cocoa, fruit, and sweetness.

**11&14.** Dark nibs in both the mash and boil was a real winner for myself and the panel. The combination added roasted notes, very little fruit, cocoa aroma, and some real easy drinking.

**12&17.** Regular nibs in the boil and the kitchen sink. Hot mess, moving on.

**15&16.** Finally, when both chocolate malts were mixed the body went up. I found this quite interesting if you keep in mind, since they were mixed, there was only half as much as the originals. Again, the combo was a real winner among our tasters.

As I previously said, no one addition did the trick (at least, to our very high standards) but basically all of the combinations (let's just agree to forget about the #17 kitchen sink mess) showed more complexity and chocolate aromas, with the chocolate malts and dark nibs really shining. And well, I suspect no one is surprised that some complexity to the grain bill is almost always well received. There is an interesting fact about chocolate flavor that surprises many people.

There is no one chemical responsible for "chocolate" just like there is not one pure pigment for the color teal. Among some of the more interesting chemicals responsible are those that give boiled cabbage, stale sweat, and old eggs their characteristic smells. To me, this explains quite well why no single addition was as well received as the combinations.

## IN SUMMARY

- Chocolate bars (even high-end chocolate) and cocoa powders are just not worth using to brew with.
- Water-based extracts or slurries and brewing cocoa hold promise, but either price or negative notes (in my admittedly limited experimenting with these types of products) do not have me recommending them.
- You should certainly be adding chocolate malt to your chocolate beers and some pale chocolate malt certainly is not going to hurt.
- A deeper roasted cocoa nib, combined with some regular nibs and traditional chocolate malts, added at various points in your brew is really the way to go. Putting together a recipe to try next, taking what we learned here, it would look something like this:

### The 5-gallon (19-L) equivalent Chocolate Brown Ale recipe:

**Mash Grain bill**
8 lbs. (3.6 kg) dried malt extract
1 lb. (0.45 kg) Special B malt
1 lb. (0.45 kg) crystal malt (120 °L)
1 lb. (0.45 kg) caramel malt (120 °L)
8 oz. (227 g) chocolate malt
8 oz. (227 g) pale chocolate malt
8 oz. (227 g) dark roasted (315 °F/157 °C) cocoa nibs

**In the boil (60 minutes)**
8 oz. (227 g) regular roasted (260 °F/127 °C) cocoa nibs
8 oz. (227 g) dark roasted (315 °F/157 °C) cocoa nibs
1 oz. (28 g) East Kent Golding hops (60 min.)
Wyeast 1728 (Scottish Ale)

**Secondary Additions (for 2–6 days, tasting daily)**
8 oz. (227 g) regular roasted (260 °F/127 °C) cocoa nibs
8 oz. (227 g) dark roasted (315 °F/157 °C) cocoa nibs

The final two things I want to mention that came up a lot during the tasting was that all cocoa nibs are not created equal and that a little counter intuitively slightly fruity and nutty beans tend to work better than ones that are deeply chocolate. As I mentioned, chocolate is not one chemical, but a combination of at least 20, and the more variation you get in there the better chance you have of getting that elusive chocolate coming through.

The other thing is that this was a medium-strength beer that I used for these test brews (~8% ABV). Alesong reported significantly better results with bigger beers (over 10% ABV) and slightly darker nibs in the secondary for a limited time. The extra alcohol acts as a solvent extract more and they limit the time in the same way you limit the time on brewing a fine tea or French press pot of coffee. More for a shorter time is much better than less and longer as that tends to over-extract sour and acidic compounds that overshadow the good stuff.

Lastly, as a direct response to this article, Chocolate Alchemy will soon be offering cocoa nibs (maybe a blend) specially roasted at 300-315 °F (149–167 °C) for beer additions, available in all quantities. That's not (entirely) a sales pitch, but a result of these trials. BYO

**Related Link:**
• Want more tips for brewing with chocolate malt? We've got a story for that. Here is what the pros say about brewing with chocolate malt: https://byo.com/article/brewing-with-chocolate-malt-tips-from-the-pros/

Photo by Charles A. Parker/Images Plus

# CHOCOLATE CLONES

## 6 UNIQUE CHOCOLATE BEER RECIPES

**by Derek Dellinger**

As craft beer continues to push the limits further and further with exotic ingredients and flavors, chocolate beers have become almost commonplace. It's no longer surprising to find a chocolate porter on a brewery's tap list or see a special release for a chocolate imperial stout. That doesn't mean brewers have been stagnant with these styles, however. Instead, brewers are finding new ways to introduce chocolate character and creating new complementary flavors and adaptations of the original wave of chocolate beers.

To complement the story "Brewing Chocolate Beers" on page 36, we've pulled together six chocolate beer clone recipes that have come straight from some of our favorite breweries. These are six ready-to-brew recipes that should hit the mark for all chocolate lovers. And for homebrewers who prefer to create their own recipes, a lot of recipe development advice can be gleaned by observing the ingredient choices and processes that professionals of every size are doing to create their chocolate beers.

With Valentine's Day quickly approaching, you should have time to surprise that special someone with a truly unique box of chocolate this year.

# WEYERBACHER BREWING CO.'S TINY CLONE


(5 gallons/19 L, all-grain)
OG = 1.090 (brew day)
FG = 1.024 IBU = 50
SRM = 50 ABV = 11.8%

*Tiny, a Belgian-style imperial stout, embodies Weyerbacher's philosophy of big, bold beers with a flavorful twist. While the craft beer world has largely gravitated toward stouts fermented with a clean-fermenting American ale yeast, leaving a window open for expressive adjunct ingredients, Tiny relies on the fruity esters of a Belgian yeast strain for its nuance. The result is a smoother, fruitier imperial stout that lacks astringency but still packs a big punch of flavor, with rounded stone-fruit and chocolate notes conjured by fermentation and a careful selection of dark malts. Perfecting this recipe will remind brewers how much can be achieved by simply respecting the power of yeast itself.*

## INGREDIENTS

14.5 lbs. (6.6 kg) 2-row malt
2 lbs. (0.9 kg) white wheat malt
1 lb. (0.45 kg) chocolate malt
12 oz. (0.34 kg) crystal malt (120 °L)
12 oz. (0.34 kg) Briess Blackprinz® malt (or Carafa® Special III) malt
2.5 lbs. (1.13 kg) table sugar (sucrose)
16 AAU Apollo hops (90 min.) (1 oz./28 g at 16% alpha acids)
LalBrew Abbaye, SafAle BE-256, or Wyeast 1762 (Belgian Abbey Style Ale II) yeast
¾ cup corn sugar (if priming)

## STEP BY STEP

Mash at 154 °F (68 °C) for 60 minutes with a thick mash, 1–1.15 qts./lb. (2.1–2.4 L/kg). Begin lautering process and sparge with 180 °F (82 °C) water. Collect approximately 7 gallons (26.5 L) of wort in the brew kettle.

Boil for 90 minutes adding the hops at the beginning of the boil. Adjusting water volumes accordingly to achieve desired fermentation volume and chill wort. Your target starting gravity on brew day should be about 1.090. Begin fermentation around 65 °F (18 °C), then raise temperature to 70 °F (21 °C) after three days. Add the table sugar just as fermentation begins to slow, around day 3 or 4. Final ABV listed for this recipe accounts for this sugar addition. After fermentation is complete, let settle for one week then transfer the beer off the yeast. Cold condition for one month between 32–40 °F (0–4 °C). Bottle and prime to 2.5 volumes or keg and force carbonate.

(5 gallons/19 L, extract with grains)
OG = 1.090 (brew day)
FG = 1.024
IBU = 50 SRM = 50 ABV = 11.8%

## INGREDIENTS

7 lbs. (3.2 kg) light dried malt extract
2 lbs. (0.9 kg) wheat dried malt extract
1 lb. (0.45 kg) chocolate malt
12 oz. (0.34 kg) crystal malt (120 °L)
12 oz. (0.34 kg) Briess Blackprinz® malt (or Carafa® Special III) malt
2.5 lbs. (1.13 kg) table sugar (sucrose)
16 AAU Apollo hops (60 min.) (1 oz./28 g at 16% alpha acids)
LalBrew Abbaye, SafAle BE-256, or Wyeast 1762 (Belgian Abbey Style Ale II) yeast
¾ cup corn sugar (if priming)

## STEP BY STEP

Starting with 5 gallons (19 L) of water in your brew kettle, warm the water up to 160 °F (61 °C). Place all the crushed grains in a muslin bag and steep in the kettle for 20 minutes. Remove the grains and let them drip back into the kettle. Add the hops and both dried malt extracts and stir until all the extract is dissolved. Bring wort to a boil and boil for 60 minutes total.

After boil is complete, adjust volume with cold water to achieve desired fermentation volume and chill wort. Your target starting gravity on brew day should be about 1.090. Begin fermentation around 65 °F (18 °C), then raise temperature to 70 °F (21 °C) after three days. Add the table sugar just as fermentation begins to slow, should be day 3 or 4. Final ABV listed for this recipe accounts for this sugar addition. After fermentation is complete, let settle for one week then transfer the beer off the yeast. Cold condition the beer for one month between 32–40 °F (0–4 °C). Bottle and prime to 2.5 volumes or keg and force carbonate.

# PELICAN BREWING CO.'S MIDNIGHT MALT CLONE

(5 gallons/19 L, all-grain)
OG = 1.060 FG = 1.014
IBU = 30 SRM = 43 ABV = 6%


*Pelican's Midnight Malt takes the structure of a classic, balanced porter and turns the complexity knob up just slightly with the rich character of dark chocolate. Brewed with Meridian Cacao Company nibs sourced directly from cacao farmers in Tanzania, this clone recipe can be adapted by using a range of cocoa nib varieties, based on the brewer's preference. Malts like Midnight Wheat offer an overall smoother mouthfeel and more refined roast character, with a grain bill designed to strike a balance between sweet, bitter, and roasty. Adapted from an earlier porter recipe (a draft-only exclusive, at the time), the base recipe of Midnight Malt makes for an ideal springboard into more adventurous adaptations, or simply a reliably easy-drinking porter ideal for all cold weather months.*

## INGREDIENTS

10 lbs. (4.5 kg) 2-row pale malt
1 lb. (0.45 kg) crystal malt (80 °L)
14 oz. (400 g) flaked barley
9 oz. (255 g) Briess Blackprinz® malt (or Carafa® Special III) malt
9 oz. (255 g) Briess Midnight Wheat malt
9 AAU Magnum hops (60 min.) (0.75 oz./21 g at 12% alpha acids)
6–8 oz. (170–225 g) Tanzanian cocoa nibs
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale), or Mangrove Jack's M44 (US West Coast) yeast
¾ cup corn sugar (if priming)

## STEP BY STEP

Several days before brew day, begin soaking the cocoa nibs in vodka, using just enough to cover the nibs. Cover and store at room temperature.

Mash grains at 154 °F (68 °C) for 60 minutes. Begin lautering by bringing the mash up to a mash-out temperature of 168 °F (70 °F) and hold for 10 minutes. Begin recirculating, vorlaufing until the wort runs clear then direct runoff to the boil kettle.

Boil for 60 minutes, adding the hops at the beginning of the boil. Chill wort and ferment at 68 °F (20 °C) until primary fermentation is complete. Transfer to secondary and add cocoa nibs along with the vodka. Allow for 3–5 days of contact time in order to extract the full flavor profile. After this, transfer beer to keg or bottle.

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(5 gallons/19 L, extract with grains)
OG = 1.060 FG = 1.014
IBU = 30 SRM = 43 ABV = 6%

## INGREDIENTS

5.5 lbs. (2.5 kg) light dried malt extract
1 lb. (0.45 kg) crystal malt (80 °L)
8 oz. (227 g) Carafoam® malt
9 oz. (255 g) Briess Blackprinz® malt (or Carafa® Special III) malt
9 oz. (255 g) Briess Midnight Wheat malt
9 AAU Magnum hops (60 min.) (0.75 oz./21 g at 12% alpha acids)
6–8 oz. (170–225 g) Tanzanian cocoa nibs
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale), or Mangrove Jack's M44 (US West Coast) yeast
¾ cup corn sugar (if priming)

## STEP BY STEP

Several days before brew day, begin soaking the cocoa nibs in vodka, using just enough to cover the nibs. Cover and store at room temperature.

Warm 5 gallons (19 L) of water in your brew kettle up to 160 °F (61 °C). Place all the crushed grains in a muslin bag and steep in the kettle for 20 minutes. Remove the grains and let them drip back into the kettle. Add the dried malt extracts and stir until all the extract is dissolved.

Bring wort to a boil and boil for 60 minutes, adding the hops at the beginning of the boil.

After boil is complete, adjust volume with cold water to achieve desired fermentation volume. Chill wort and ferment at 68 °F (20 °C) until primary fermentation is complete. Transfer to secondary and add cocoa nibs along with the vodka. Allow for 3–5 days of contact time in order to extract the full flavor profile. After this, transfer beer to keg or bottle.

# TERRAPIN BEER CO.'S MOO-HOO CHOCOLATE MILK STOUT CLONE


(5 gallons/19 L, all-grain)
OG = 1.066 FG = 1.021
IBU = 35 SRM = 42
ABV = 6%

*For a beverage that's only consumed by adults, craft beer is surprisingly good at playing upon nostalgia. Many of the most popular beer trends of the last decade, from milkshake IPAs to pastry stouts, explore the rich and vibrant flavors of childhood sweets in new and inventive ways. But perhaps one of the most classic childhood indulgences—especially in those parts of the country dotted with dairy farms—is a refreshing glass of chocolate milk. Striking the perfect balance between rich and wholesome, it should come as no surprise that the chocolate milk flavor profile would become a classic in the world of craft beer as well. Terrapin's Moo-Hoo employs a generous addition of lactose sugar along with cocoa nibs from Olive and Sinclair Chocolate Company to recreate the perfect equilibrium of that American favorite, demonstrating that the pairing of dark beers and chocolaty richness can be both endlessly adaptable and enduringly simple.*

## INGREDIENTS

9.5 lbs. (4.3 kg) 2-row pale malt
13 oz. (370 g) flaked oats
12 oz. (340 g) crystal malt (80 °L)
12 oz. (340 g) English chocolate malt
5 oz. (140 g) Carafa® Special III malt
3 oz. (85 g) English roasted barley
1 lb. (0.45 kg) lactose sugar (0 min.)
2–3 oz. (57–85 g) cocoa nibs
6 AAU Nugget hops (60 min.) (0.5 oz./14 g at 12% alpha acids)
6 AAU Nugget hops (30 min.) (0.5 oz./14 g at 12% alpha acids)
Wyeast 1272 (American Ale II), White Labs WLP051 (California Ale V), or Mangrove Jack's M36 (Liberty Bell Ale) yeast
⅔ cup corn sugar (if priming)

## STEP BY STEP

Several days before brew day, begin soaking the cocoa nibs in vodka, using just enough to cover the nibs. Cover and store at room temperature.

Mash grains at 154 °F (68 °C) for 60 minutes. Begin lautering by bringing the mash up to a mash-out temperature of 168 °F (70 °F) and hold for 10 minutes. Begin recirculating, vorlaufing until the wort runs clear then direct runoff to the boil kettle.

Boil for 60 minutes adding the hops as indicated in the ingredients list and the lactose at the end of the boil. Chill wort and ferment at 68 °F (20 °C).

When the beer has finished primary fermentation, transfer to secondary and add cocoa nibs along with the vodka. Allow for up to one week of contact time to extract the desired flavor profile. After this, transfer to a keg or bottle condition.

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(5 gallons/19 L, extract with grains)
OG = 1.066 FG = 1.021
IBU = 35 SRM = 43
ABV = 6%

## INGREDIENTS

5.1 lbs. (2.3 kg) extra light dried malt extract
12 oz. (340 g) Golden Naked Oats malt
12 oz. (340 g) crystal malt (80 °L)
12 oz. (340 g) English chocolate malt
5 oz. (140 g) Carafa® Special III malt
3 oz. (85 g) English roasted barley
1 lb. (0.45 kg) lactose sugar (0 min.)
2–3 oz. (57–85 g) cocoa nibs
6 AAU Nugget hops (60 min.) (0.5 oz./14 g at 12% alpha acids)
6 AAU Nugget hops (30 min.) (0.5 oz./14 g at 12% alpha acids)
Wyeast 1272 (American Ale II), White Labs WLP051 (California Ale V), or Mangrove Jack's M36 (Liberty Bell Ale) yeast
⅔ cup corn sugar (if priming)

## STEP BY STEP

Several days before brew day, begin soaking the cocoa nibs in vodka, using just enough to cover the nibs. Cover and store at room temperature.

Starting with 5 gallons (19 L) of water in your brew kettle, warm the water up to 160 °F (61 °C). Place all the crushed grains in a muslin bag and steep in the kettle for 20 minutes. Remove the grains and let them drip back into the kettle. Add the dried malt extracts and stir until all the extract is dissolved. Bring wort to a boil and boil for 60 minutes adding the hops as indicated in the ingredients list and the lactose at the end of the boil.

After boil is complete, adjust volume with cold water to achieve desired fermentation volume. Chill wort and ferment at 68 °F (20 °C). When the beer has finished primary fermentation, transfer to secondary and add cocoa nibs along with the vodka. Allow for one week contact time in order to extract the desired flavor profile. After this, transfer to a keg or bottle condition.

# EVIL GENIUS BEER CO.'S PURPLE MONKEY DISHWASHER CLONE

(5 gallons/19 L, all-grain)
OG = 1.066 FG = 1.014
IBU = 35 SRM = 33
ABV = 6.7%


*If a cold creamy glass of chocolate milk (or, perhaps, a smooth glass of chocolate milk stout) is a reliable throwback to the more innocent days of childhood, Evil Genius' Purple Monkey Dishwasher is a twist on a more indulgent morning treat. Chocolate and peanut butter are natural complements, layering rich and roasty on top of savory and salty. This recipe spins the standard chocolate stout base in an even more indulgent direction, though without pushing flavor profiles as extreme as, say, a pastry stout. Since peanut butter is still a smoother, more savory flavor, no one should find this recipe too over-the-top. Though that's certainly an option too. For those wishing to punch things up several more notches, consider that other classic pairing with peanut butter: Jelly. Once brewers have this baseline recipe dialed in, they should find themselves with a perfect foundation for layering ripe fruit flavors on top of a chocolaty porter base.*

## INGREDIENTS

12 lbs. (5.4 kg) 2-row pale malt
12 oz. (340 g) crystal malt (30 °L)
12 oz. (340 g) chocolate malt
5 oz. (140 g) roasted black barley
9.6 AAU Warrior hops (60 min.)
(0.6 oz./17 g at 16% alpha acids)
0.25 oz. (7 g) Tettnang hops (5 min.)
0.13 fl. oz. (3.8 mL) chocolate extract
0.1 fl. oz. (3 mL) peanut butter extract
Imperial Yeast A07 (Flagship), Omega OYL-004 (West Coast Ale 1), or SafAle US-05 yeast
⅔ cup corn sugar (if priming)

## STEP BY STEP

Mash grains at 154 °F (68 °C) for 60 minutes. Begin lautering by bringing the mash up to a mash-out temperature of 168 °F (70 °F) and hold for 10 minutes. Begin recirculating, vorlaufing until the wort runs clear then direct runoff to the boil kettle.

Boil for 60 minutes adding the hops as indicated in the ingredients list. Chill wort and ferment at 70 °F (21 °C) for one week.

When the beer has finished primary fermentation, transfer to secondary if desired and then add chocolate and peanut butter extracts. Allow two to three days for flavors to integrate. After this time, transfer to keg or bottle condition.

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(5 gallons/19 L, extract with grains)
OG = 1.066 FG = 1.014
IBU = 35 SRM = 33
ABV = 6.7%

## INGREDIENTS

6.5 lb. (3 kg) extra light dried malt extract
12 oz. (340 g) crystal malt (30 °L)
12 oz. (340 g) chocolate malt
5 oz. (140 g) roasted black barley
9.6 AAU Warrior hops (60 min.)
(0.6 oz./17 g at 16% alpha acids)
0.25 oz. (7 g) Tettnang hops (5 min.)
0.13 fl. oz. (3.8 mL) chocolate extract
0.1 fl. oz. (3 mL) peanut butter extract
Imperial Yeast A07 (Flagship), Omega OYL-004 (West Coast Ale 1), or SafAle US-05 yeast
⅔ cup corn sugar (if priming)

## STEP BY STEP

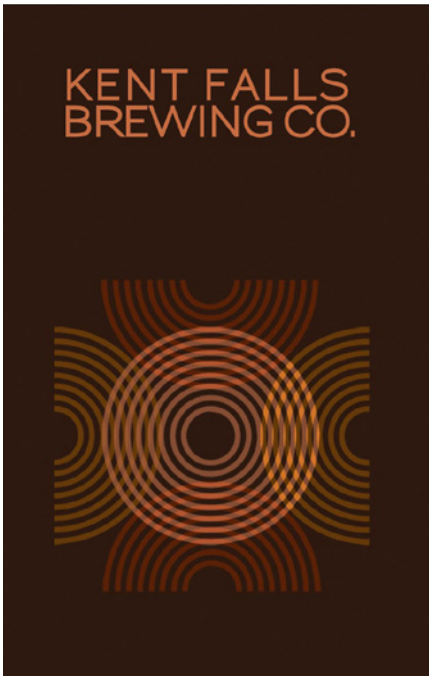
Starting with 5 gallons (19 L) of water in your brew kettle, warm the water up to 160 °F (61 °C). Place all the crushed grains in a muslin bag and steep in the kettle for 20 minutes. Remove the grains and let them drip back into the kettle. Add the dried malt extracts and stir until all the extract is dissolved.

Bring wort to a boil and boil for 60 minutes adding the hops as indicated in the ingredients list.

After boil is complete, adjust volume with cold water to achieve desired fermentation volume. Chill wort and ferment at 70 °F (21 °C) for one week.

When the beer has finished primary fermentation, transfer to secondary if desired and then add chocolate and peanut butter extracts. Allow two to three days for flavors to integrate. After this time, transfer to keg or bottle condition.

# KENT FALLS BREWING CO.'S CHOCOLATE SPELT PORTER CLONE




(5 gallons/19 L, all-grain)
OG = 1.062 FG = 1.018
IBU = 32 SRM = 37
ABV = 5.6%

*As the former Head Brewer at Kent Falls, a farm brewery that utilizes local ingredients while still distributing beer throughout a diverse market, I was tasked with developing unique, varied beers that took advantage of as many local products as possible. In the Northeast, the options for interesting, one-of-a-kind local malts are a great deal more accessible than the options for unique hop varieties. Several of the malt options we came across immediately caught my eye: Roasted "chocolate" versions of typical adjunct grains like rye and spelt. Chocolate (or "Midnight") wheat has always been one of my favorite grains to employ in a dark beer, as it adds both body and a smooth roasted chocolate character without being overly bitter or acrid. Spelt and rye are even more flavorful, already contributing nutty, toasty flavor notes even in their typical forms. The possibilities for a beer based around chocolate spelt immediately leapt out to me. The intended result was a porter aiming for the classic rich, smooth body, with slightly punched-up chocolate notes. Being that I wanted to focus this beer entirely on unusual grain profiles, I chose to avoid adding any form of actual cocoa to this beer. Instead, this recipe relies on the nutty nuances of spelt, with its smooth roasty characteristics drawn out entirely by the malting process, bolstered by the complex earthy subtleties of chocolate rye. Chocolate spelt and chocolate rye may not be as easy to source as some other specialty grains, but in addition to local variations, they can usually be special ordered from German malt suppliers. The end result of this recipe is a great study in the nearly endless variety of flavors available within the world of beer — even if one sticks to only the traditional core ingredients.*

## INGREDIENTS

11 lbs. (5 kg) 2-row pale malt
1 lb. (0.45 kg) chocolate spelt malt (270 °L)
8 oz. (225 g) chocolate rye malt (240 °L)
6 oz. (170 g) brown malt (65 °L)
4 oz. (113 g) chocolate wheat malt (440 °L)
6.8 AAU Brewer's Gold hops (60 min.) (0.75 oz./21 g at 9% alpha acids)
1 oz. (28 g) Brewer's Gold hops (5 min.)
LalBrew BRY-97 (West Coast Ale), White Labs WLP001 (California Ale), or Wyeast 1056 (American Ale) yeast
⅔ cup corn sugar (if priming)

## STEP BY STEP

Mash grains at 154 °F (68 °C) for 60 minutes. Begin lautering by bringing the mash up to a mash-out temperature of 168 °F (70 °F) and hold for 10 minutes. Begin recirculating, vorlaufing until the wort runs clear then direct runoff to the boil kettle.

Boil for 60 minutes adding the hops as indicated in the ingredients list. Chill wort and ferment at 69 °F (21 °C) for one week. Keg or bottle and force carbonate as usual.

## TIPS FOR SUCCESS:

While no special additions are called for in this recipe, this base beer does make for a great springboard for further experimentation. A small addition of cocoa nibs is recommended for a subtle boost to this beer's chocolate flavor profile. For this variation, add 3 oz. (85 g) cocoa nibs to either primary or secondary after primary fermentation has finished. Let sit for three to four days before packaging.

(5 gallons/19 L, partial mash)
OG = 1.062 FG = 1.018
IBU = 32 SRM = 37 ABV = 5.6%

## INGREDIENTS

5.5 lbs. (2.5 kg) light dried malt extract
1 lb. (0.45 kg) 2-row pale malt
1 lb. (0.45 kg) chocolate spelt malt (270 °L)
8 oz. (225 g) chocolate rye malt (240 °L)
6 oz. (170 g) brown malt (65 °L)
4 oz. (113 g) chocolate wheat malt (440 °L)
6.8 AAU Brewer's Gold hops (60 min.) (0.75 oz./21 g at 9% alpha acids)
1 oz. (28 g) Brewer's Gold hops (5 min.)
LalBrew BRY-97 (West Coast Ale), White Labs WLP001 (California Ale), or Wyeast 1056 (American Ale) yeast
⅔ cup corn sugar (if priming)

## STEP BY STEP

Mash the pale and brown malts in a muslin bag in 1.1 gallons (4 L) of water at 154 °F (68 °C) for 30 minutes. Add the crushed chocolate malts in a separate bag to the mash. Hold for another 30 minutes. Place both grain bags in a colander and wash with 1 gallon (3.8 L) of hot water. Add water to total a volume of 5 gallons (19 L) and stir in the dried malt extract. Bring wort to a boil and boil for 60 minutes adding the hops as indicated in the ingredients list.

After boil is complete, adjust volume with cold water to achieve desired fermentation volume. Chill wort and ferment at 69 °F (21 °C) for one week. Keg or bottle and force carbonate as usual.

# NEWBURGH BREWING CO.'S CHERRY CHOCOLATE CAKE CLONE

(5 gallons/19 L, all-grain)
OG = 1.075 FG = 1.018
IBU = 36 SRM = 46
ABV = 7.5%

*Chris Basso, the Head Brewer and Co-Owner of Newburgh Brewing Company, in Newburgh, New York made his way into craft beer from the world of fine dining as a graduate of the Culinary Institute of America. Food has therefore always informed the brewery's identity. Many of the recipes Chris has developed for Newburgh are born with a food pairing in mind or are explicitly inspired by a specific food. The inspiration for this Cherry Chocolate Cake stout — a collaboration with Fruition Chocolate Works — is of course no mystery, though it's a wonder that cherries and chocolate are not even more common in the world of dark beers, being that they make for such a naturally complementary pair. Pastry stouts with extreme adjunct flavors are now all the rage, but Newburgh's take on the dessert stout concept is a bit more refined, turning a few flavor dials up enough to make this a memorable concoction without getting lost in excessive indulgence.*

## INGREDIENTS

10 lbs. (4.5 kg) Pilsner malt
12 oz. (340 g) white wheat malt
12 oz. (340 g) flaked oats
12 oz. (340 g) Simpsons chocolate malt
12 oz. (340 g) Crisp brown malt
5 oz. (140 g) crystal malt (60 °L)
5 oz. (140 g) Simpsons black malt
5 oz. (140 g) roasted black barley
1 lb. (0.45 kg) lactose (0 min.)
1.75 lbs. (0.79 kg) pure cherry puree
8 oz. (225 g) cocoa nibs
6 AAU Nugget hops (60 min.)
(0.5 oz./14 g at 12% alpha acids)
5.5 AAU East Kent Golding hops (30 min.)
(1 oz./28 g at 5.5% alpha acids)
Wyeast 1272 (American Ale II), White Labs WLP051 (California Ale V), or Mangrove Jack's M36 (Liberty Bell Ale) yeast
⅔ cup corn sugar (if priming)


## STEP BY STEP

Several days before brew day, begin soaking the cocoa nibs in vodka, using just enough to cover the nibs. Cover and store at room temperature.

Mash grains at 149 °F (65 °C) for 60 minutes. Begin lautering by bringing the mash up to a mash-out temperature of 168 °F (70 °F) and hold for 10 minutes. Begin recirculating, vorlaufing until the wort runs clear then direct runoff to the boil kettle.

Boil for 60 minutes adding the hops as indicated in the ingredients list and the lactose sugar at the end of the boil. Ferment at 68 °F (20 °C) for one week.

When the beer has finished primary fermentation, add cherry puree and cocoa nibs. Allow an additional week for fermentation of the fruit sugars and conditioning. After this, transfer to keg or bottle condition.

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(5 gallons/19 L, partial mash)
OG = 1.075 FG = 1.018
IBU = 36 SRM = 46 ABV = 7.5%

## INGREDIENTS

5.5 lbs. (2.5 kg) light dried malt extract
12 oz. (340 g) white wheat malt
12 oz. (340 g) flaked oats
12 oz. (340 g) Simpsons chocolate malt
12 oz. (340 g) Crisp brown malt
5 oz. (140 g) crystal malt (60 °L)
5 oz. (140 g) Simpsons black malt
5 oz. (140 g) roasted black barley
1 lb. (0.45 kg) lactose (0 min.)
1.75 lbs. (0.79 kg) pure cherry puree
8 oz. (225 g) cocoa nibs
6 AAU Nugget hops (60 min.)
(0.5 oz./14 g at 12% alpha acids)
5.5 AAU East Kent Golding hops (30 min.)
(1 oz./28 g at 5.5% alpha acids)
Wyeast 1272 (American Ale II), White Labs WLP051 (California Ale V), or Mangrove Jack's M36 (Liberty Bell Ale) yeast
⅔ cup corn sugar (if priming)

## STEP BY STEP

Several days before brew day, begin soaking the cocoa nibs in vodka, using just enough to cover the nibs. Cover and store at room temperature.

Mash the wheat, brown malts, and flaked oats in a muslin bag in 2 gallons (8 L) of water at 149 °F (65 °C) for 30 minutes. Add the crushed roasted and crystal malts in a separate bag to the mash. Hold for another 30 minutes. Place both grain bags in a colander and wash with 1 gallon (4 L) of hot water. Add water to a total volume of 5 gallons (19 L) and stir in the dried malt extract. Boil for 60 minutes adding the hops as indicated in the ingredients list and the lactose sugar at the end of the boil. Chill and ferment at 68 °F (20 °C) for one week.

When the beer has finished primary fermentation, add cherry puree and cocoa nibs. Allow an additional week for fermentation of the fruit sugars and conditioning. After this, transfer to keg or bottle condition. BYO


# BUILDING A COLD ROOM

## NOW THAT'S A COOL SPACE!

**Story and photos by Greg Paterson**

Early in 2020 my keezer was at the end of its life and struggled to keep my kegs cold. The timing was apt, as I was planning to move to a new home and build a brewery-oriented garage. I considered three options: Replacement, upgrading to a 3-door fridge, or upgrading to a full cold room. The cold room had the clear advantage for space, access to taps, heat and noise generation, and planned layout, and was the direction I ended up going. Now complete, I thought it may be helpful to run through the design choices and features for others who may be considering their own cold room upgrade.

*The first step was to create a concept model of my garage brewing space. The cold room is on the left, with brewing gear filling the rest of the wall.*

Above is my concept model from early in the design phase, showing the brewery side of the garage. Left to right, you'll see the cold room concept with six taps, storage racking, fermenting fridge (BrewPi-driven, arduino-controlled), 3-vessel electric system, my second-hand L-shaped sink, and my malt mill. The cold room would have an internal footprint of 6.5 x 3.3 feet (2 x 1 m), with 43 square feet (4 $m^2$) in volume. This is compact enough for my needs, and much smaller than any commercially available cold room like those from CoolBot. I planned in space for six kegs on tap, six on reserve, a rack for my bottle cellar, and a cold water reservoir for chilling needs in the future.

*During construction an opening was created for a through-wall air conditioner to cool the room.*

The garage has a glycol-heated concrete pad, so when laying that plumbing the area around the cold room was avoided. The only other consideration in the garage-build phase was to include a small window opening for the through-wall air conditioning unit. The cold room frame was built after the outer shell of the garage was up, with the door opening sized for a commercial door in case I was able to find a used one.

The garage construction has 2x6 wood studs, so I kept to that for the cold room. Since an R-value of at least 25 is recommended by the CoolBot manufacturers, I also included an internal 1-inch (25.4-mm) rigid foam layer. Remember to always put your vapor barrier on the warm side of your construction — for the cold Canadian winters where I live in Saskatoon, Saskatchewan that meant only inside of the outdoor-facing walls got barriers. The walls and roof of the cold room that face the inside of the garage also got an outer vapor barrier layer. Inside and outside were shelled with a 7/16-inch (11.1-mm) oriented strand board, OSB. Then a fiberglass reinforced plastic (FRP) called Exceliner FRP went up, which lends a clean, professional, finished look, as well as a beer-proof shell.

SAFETY ADVISORY: Wear breathing protection when cutting fiberglass, use function-specific circular saw blades (or an oscillating tool for detail cuts), and make sure all your dust and waste gets bagged and goes into the trash — not outside into the environment. Be sure to wear gloves at all times, as exposed edges are quite sharp.

As cut sheets, the FRP was good to work with. It is light, flexible, strong, and resilient. Panels are adhered to the OSB substrate with a water-based adhesive. Only the vertical surfaces needed to be supported during cure, the rest stayed adhered after applying pressure with a dry paint roller.

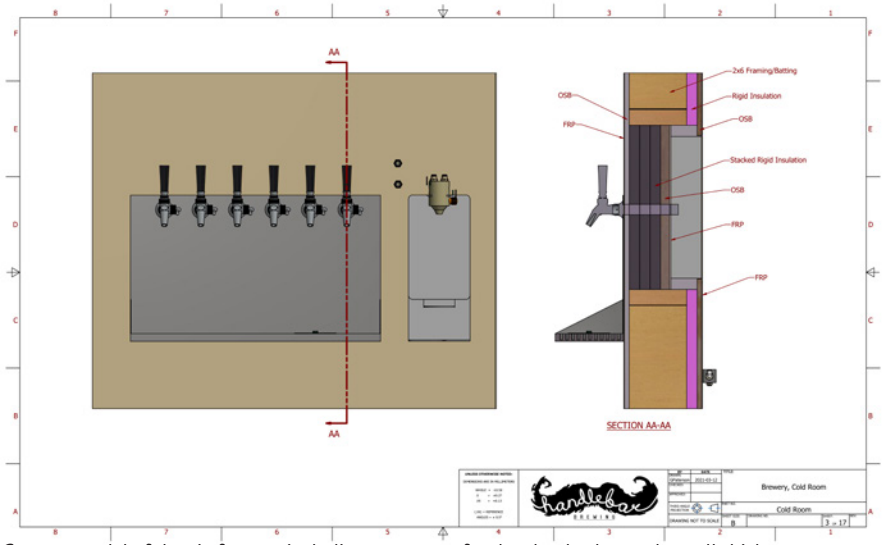
Having selected some components and layout early, I'd included a few handy features. I wanted to have distributed plumbing throughout my garage (air, water, sewer, compressed air, ethernet, $CO_2$), so I knew my $CO_2$ tank would need plumbing from the attic. I added two bulkhead fittings to plumb $CO_2$ though the cold room walls. The entire room runs on one GFCI 120V circuit, and the air conditioner has a dedicated 240V circuit sized for my A/C unit. I included a ceiling-mounted outlet for plugging in the CoolBot, and a RJ12 junction box leading above the cold room for the CoolBot Pro Wi-Fi module. I also included an outlet on the large wall where I planned to have a cold water reservoir and pump for a fermenter and brew day cooling loop. Note there are grommets on the outer wall for two PEX tubes for that expansion, which will be a project for another year. I also included an ethernet jack and AC outlet to the front wall to eventually build a Raspberry Pi-based tap list.

A cross-section view of the taps shows that I made a cutaway for the shanks. In hindsight I should have just bought longer shanks and used a full-thickness wall. It was a challenge to finish with the FRP, reduces my insulation, and as designed, relies on the compression resistance of the rigid foam. It has been a challenge to keep my shanks tight as the foam compresses. Longer shanks are chrome-plated steel instead of stainless — but I'd rather replace them periodically in the long run if I had it to do over.

By the time the main construction was complete, I hadn't had any luck finding a used commercial door. I quoted new ones at around $2,500, which was more than I was willing to pay. Plan B was to design my own triple-sealed door.

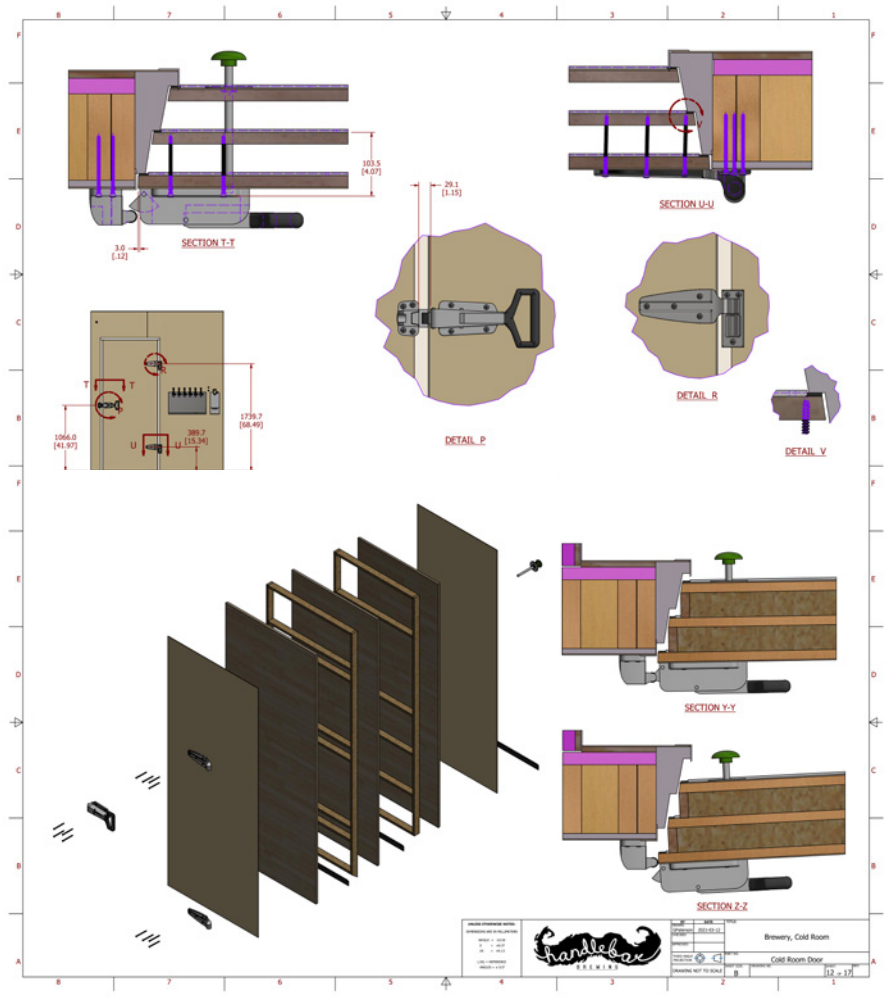
Turning back to my 3D model I started to design the thicknesses, angles, heights, and widths of construction to allow the door to swing open without interference. I'd selected my door hardware and modeled it in 3D as well to aid in the design and ensure mounting would line up. The

*A fiberglass-reinforced plastic gives a finished look to the wall over oriented strand board for strength.*




*Concept model of the six faucets, including a cutaway for the shanks due to the wall thickness.*

*The completed six-faucet draft system from the outside of the cold room.*




*Three layers of maple plywood with foam insulation between each and the plastic shell glued on with a water-based adhesive make up the body of the triple-sealed door.*

door is built from premium thin-layer ¾-inch (18-mm) maple plywood and the same rigid foam from earlier in the build (double layers between plywood). I copied the step design for the top of the door as well for simplicity. The bottom of the door has three weather strip floor seals. Cutaway drawings to the left show the door open action, and the need for the angled steps. The door jam also needed to be custom from treated lumber. I used 2x6 and 2x8 lumber that was planed, cut to shape, glued together, sanded, and painted.

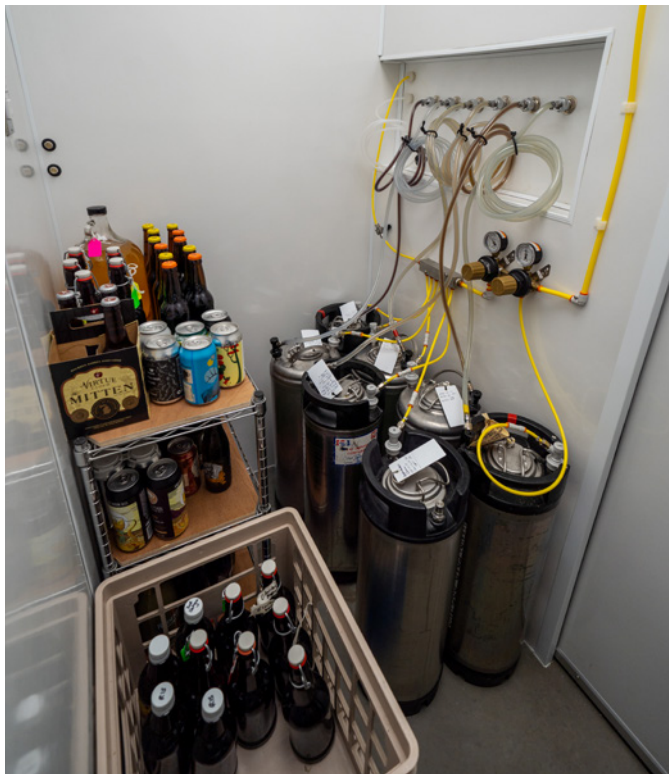
The rest of the door is two torsion boxes assembled with a pneumatic pinner, adhesive, and some heavy duty long wood screws all anchored to the middle layer of plywood. I used some long stainless steel oval-head screws for mounting the main hardware. The door was assembled from the inner layer outward, shimming the bottom and sanding the edges to fit evenly in my door jam. Links to more photos of the construction process and a short time-lapse video illustrating the stages the door was constructed in are included at the end of the article.

With the door and weather stripping installed, the next step was to start up the air conditioning and test out the CoolBot.

I'd intentionally oversized my air conditioner out of due caution, but that seems to have driven my air temperature to drop below freezing briefly during cooling cycles. I haven't seen any ill effects from this as the freezing temperature doesn't last long. Even on hot summer days, the system only turns on about once per hour.

Inside the cold room (pictured on page 59) isn't large but it feels great and looks amazing. It will eventually get epoxy floors along with the rest of the garage.

To get this cold room build operational, I estimate it cost me $4,500 CAD ($3,600 USD). I already had the WilliamsWarn counter-pressure bottle filler and a dozen kegs. The LED light is a 6,000 lumen 50W fixture, and is excellently bright. A link to a full bill of materials (in Canadian dollars) is at the end of the article, but

***Top Left:*** *The completed triple-sealed door.* ***Top Right:*** *A monitor displays the beers available on draft.* ***Bottom Left and Right:*** *Inside the completed cold room.*

here's a quick summary:

- Exceliner FRP, trim, and adhesive ($900)
- Kason door hardware ($900)
- Insulation ($225)
- 2x6 framing ($200)
- Air conditioner ($800)
- CoolBot Pro ($400)
- Perlick taps, shanks ($300)
- Drip tray ($540)
- $CO_2$ tank, lines, regulators, manifolds, and accessories ($300)

After planning to have a chalkboard tap list, I stumbled upon tapitgood.com, a web-based tap list. Its interface is easy to use and it looks good. You can program in your beers and add or remove them from the list at any time. There are also several integrations with various software — hopefully more to come. I invested in the annual subscription fee of $20 for more than four taps and installed a computer monitor, and Raspberry Pi programmed to boot full screen to my page, which can be seen in the picture at the top right.

Want to see more of this build? Visit these links:

- **Cold room and door dimensioned drawings:** https://bit.ly/GP-BYO-ColdRoomDrawing
- **Bill of materials:** https://bit.ly/GP-BYO-ColdRoomBuild
- **Build video**: https://youtu.be/-n3YAtKM7w8

BY DREW BEECHUM & DENNY CONN

# LOVE WHAT YOU DO

## Stop worrying and enjoy the brew

One of the hardest lessons a hardcore homebrewer has to learn is that homebrewing should be an enjoyable pastime. There are so many things to learn and stress over that sometimes the prime directive gets lost. We're making beer; in our kitchens, garages, sheds — we're not launching a rocket into space on a mission to expand human consciousness (or save us from an alien species we've inadvertently maddened).

Brewing is a hobby that is filled with knowledge, lore, gear, ingredients, and nearly endless ways to bring about a very tasty outcome. Before and after you get lost in the weeds, remember that in the murky fog of pre-history, before things like scientific measures and microbiology were understood our ancestors were successfully making large quantities of beer.

If they could do it, then barring a failure to follow first principles (sanitize!), you can do it now. That's not to say there's no point in sweating any of the details or the technical knowhow. Being able to use an electric all-in-one system with temperature control makes life easier after all.

What we mean to say is — while learning all the technical stuff, we also have to figure out how to keep the brew day fun and simple while still making the best beer we can make. It's a balance between those goals and we all get to decide which way the scales tip.

When Denny started brewing many years ago he was infatuated with the science and nerdery behind homebrewing . . . how things worked and how to manipulate parameters in order to get his desired results. He spent hours reading and many more hours experimenting with lessons gleaned from books and forums. He learned how to put grist bills together, which hops went with which grains and other hops, how water chemistry played into things, how to properly package beer . . . since we're all homebrewers here, you know the drill.

After 20-plus years and hundreds of batches, he suddenly realized that he was intuitively integrating various bits of knowledge into a complete brewing philosophy. But there was another aspect to it all, he also realized that he knew what mattered to him and what didn't. He was tossing out the stuff that he had decided didn't make a difference or that he wasn't interested in. All the nitpicky stuff he'd done all those years had been interesting at first, but now he knew what he was interested in and what he didn't care about. He started to lose his infatuation with beer and just did what he wanted to do and how he liked to do it.

Drew wasn't much different — insatiably reading, brewing, and writing. But he's always been a bit more of a seat-of-the-pants brewer. Quick — which one of us is the former rock and roll roadie and which the classically trained engineer?

If a new brewer, you'll probably want to try everything. New beer styles are a siren call. New ingredients fascinate you. You want to try every technique you hear about . . . and that's great. That's how we learn about brewing. But eventually we all decide what we're looking for in our version of homebrewing. We may be over the things we list here, but that doesn't mean you have to be. You get to choose what matters; you get to choose how you approach your hobby. So, with that in mind, here's what Denny and Drew are over.

You get to choose what matters; you get to choose how you approach your hobby.

*Brewing with friends and family is a good way to make sure the pleasure you derive from this hobby exceeds the work and stress it can also provide.*

### STRANGE INGREDIENTS — BEEN THERE, DONE THAT

**Denny:** Do you really want to put doughnuts on your mash? What is it that you think you'll get? Too

many times, when we ask homebrewers that question, the answer is "why not?" To me that is not the correct response. There should be a purpose to these types of strange additions.

**Drew:** You'd expect for the guy known for weird beer and strange ideas, I'd be all gnashy teeth on this one, but I'm not. What I'm over is the thoughtless use of "strange ingredients." Explain to me why you need three different flavor extracts and a bag of pretzels and I'm down. But too many people just throw weird stuff at the mash, kettle, or fermenter praying that it works.

## COMPLEX MASH SCHEDULES — START HIGH, LET IT DROP; START LOW, STAY LOW . . . GO A LITTLE HIGHER, ETC.

**Denny:** Some malts require or benefit from a complex mash, but most malts will perform pretty much the same without it. Look at your malt specs and base your mash schedule on that. For example, a traditional protein rest with most modern malts will result in a beer with the body approaching a glass of water.

**Drew:** With today's highly modified malts, it feels like an exercise in futility to manipulate wort character via mash regimens. Modern malts carry enough enzymatic power that they convert quickly and cleanly. Having said that — the rules do change when dealing with heritage malts or adjunct-heavy beers (think spelt, wheat, emmer, but not corn/rice/sugar). And hey, sometimes a step mash (particularly when you're automated) can provide an easy time to drink a beer.

## CONSTANT pH FUSSING

**Denny:** There is no doubt that pH can have an effect on beer. But we've found that close enough is good enough. Our basic rule is to shoot lower for light, crisp beers and higher for darker, maltier ones. Get your water analyzed, get a water program you can trust (we both use Bru'nwater), do what the software tells you and you're good. No need to agonize over a fraction of a point.

**Drew:** Having said that — we are seeing an increase in brewers trying to increase the acidity of their IPAs to counteract the pH rise due to massive dry hopping. Still don't know if it makes a difference for me, but a few of my favorite IPAs use the technique. (But that's a whole different kettle of water.)

## KVEIK YEAST STRAINS

**Denny:** Sure, it's fast. Sure, you can use it at high temperatures. But those aren't advantages if you don't like the flavors you get from it or if it's a struggle to keep warm. Keep using it if it works for you and it's got great potential for those that live in a hot or tropical environment. But for us it's one more thing we can eliminate and not have to worry about.

**Drew:** I think kveik has the potential to be interesting. I also think it's been a great vehicle for reminding people that farmhouse beers exist and can be made anywhere. (I also think it's another thing that gets abused.)

## COLD-SIDE OXIDATION

**Denny:** Every few years, it seems there's a new thing that homebrewers are told they have to worry about. The latest enemy is oxidation. We all know that you want to limit oxygen contact as much as you can, but we've seen some homebrewers going to what we think are ridiculous lengths. One of the latest that Denny laughs at are the expensive devices to allow you to dry hop without allowing oxygen to enter the fermenter. Yes, gases mix and the idea of a $CO_2$ "blanket" protecting your beer has some flaws in it. But gases don't mix instantly. It takes a bit for the interface between them to fade away and allow them to mix. Denny has timed his dry hop addition and found that he can open the fermenter, add dry hops, and close it back up in less than three seconds. There will be little to no gas mixing in those few seconds. Time it for yourself using an empty fermenter. If your times are similar, there's one less thing for you to worry about.

**Drew:** Don't forget — homebrew has one advantage over commercial beer (where the obsession with oxidation is absolutely justified) — we keep our beer cold the whole time. That forgives a number of sins! But when it comes to cold-side oxidations my thought is: Don't be sloppy and generally you'll be fine.

## PRESSURE FERMENTATION

**Denny:** I looked into pressure fermentation after hearing Chris White do a seminar on it at the Australian National Homebrew Conference a couple years ago. While it may offer benefits to commercial brewers, I just didn't see that it had anything to offer me. The results he presented were inconclusive, and he indicated that you had to match yeast strain, fermentation temperature, and pressure carefully to get good results. Given that, I decided to skip it.

**Drew:** Pressure fermentation is a tricky beast and seems to be inconsistent even at the smaller professional level. I really don't have a need to try and produce a lager faster and warmer, so it's not for me. (Capturing $CO_2$, also known as spunding, for carbonation on the other hand is a fun technique, but again not strictly necessary.)

## THERE'S ONLY ONE RIGHT WAY

**Denny:** There are many roads to the same destination. Find the one that takes you where you want to go and then enjoy the trip. Decide where you want to go, look at the "map" of ideas, then go for it. The right way is the way that works for you.

**Drew:** If you haven't figured it out — the only right way to brew is to brew in a way that makes you happy with how you've spent your day and what you get out the other side in the beer glass. And that applies to everyone. You may not approve of everything someone does as a brewer, but that doesn't mean you are the supreme moral authority of the brewing universe (neither are we or anyone else). Give them the space to make their own decisions and recognize yours as just one opinion in many.

> **Every few years, it seems there's a new thing that homebrewers are told they have to worry about. The latest enemy is oxidation.**

## COMMERCIAL BREWER WORSHIP

**Denny:** As we've said several times, just because a commercial brewery does something doesn't mean that's the right way for you to do things. Most homebrewers and commercial brewers operate on very different scales.

**Drew:** You can learn a lot by listening to the professionals out there, but remember, we're operating at a different scale with different needs and desires. A classic example of how things can change — fermentation temperatures. Brewers will tell you, "Oh, we ferment with Wyeast 1056 at 72 °F (22 °C) for our beers." When a homebrewer tries it, the results end up different because of ester suppression in larger volumes of beer. My rule of thumb is to take larger brewers' temperatures and drop them by 3–5 °F/1.5–2.5 °C for my sized system.

## PUTTING IT ALL TOGETHER

We're not telling you to ignore science. In fact, it's exactly the opposite. We encourage you to learn the science behind homebrewing . . . but even more important is to learn how that science relates to how you brew. Internalize the concepts, and don't sweat the details.

As an example: Yeast starters. We have found that healthy, active yeast is more important than shear quantity. We both quit using yeast calculators and stir plates years back and there was no reduction in the quality of our beer. That one step coincided with an increase in our enjoyment of the hobby because we didn't have to worry about getting yeast started days ahead of time.

But don't forget to pay attention to the changes that are happening. Don't become too closed off from listening to others' input. We've both changed up our dry hopping schemes and even hop selection schemes after looking at the latest research coming out of the hop regions. Playing around was fun and yielded really great results!

The details are important but don't get hung up by them. Enjoyment is the main reason any of us brew. Enjoyment of the beer, enjoyment of the process, enjoyment of the learning process. Learn what matters to you and base your brewing on it. Because if you're not having fun, you're doing it wrong! What were we saying about supreme moral authorities? Ha . . . sláinte! BYO

BY BOB PEAK

# MANAGING DRYNESS

## Malt enzymes and yeast choice

Do you have a dryness target for the next beer you brew? Many factors play roles as you make choices for a new or modified beer recipe. Your goal for ethanol content (ABV) is probably among them. Likely you also consider the color of your eventual beer. Prominent for many brewers these days are the twin factors of hop bitterness and hop aroma. With specifically hazy beers among those currently popular, you may be considering deliberate haziness (or, conversely, bright clarity) as well. Overall flavor, aroma, and mouthfeel will be top of mind. But today we will specifically address dryness. That is, how low will you finish your final gravity and how will it relate to your starting gravity?

Homebrewers do, of course, consider whether a new recipe is intended to be dry and crisp, malty and rich, or something in between. Many of us consult the Beer Judge Certification Program (BJCP) Style Guidelines for reference when we set out to brew a new beer. There we find key parameters like IBUs for bitterness, SRM for color, ABV for the target alcohol level and, related to this column, both original gravity (OG) and final gravity (FG) ranges for the style we plan to brew.

When assessing numerical values for final gravity, we are comparing the density of the beer at the end of fermentation to the density of pure water, 1.000, expressed as a ratio. The density exceeds 1.000 by an amount that is loosely ascribed to residual maltiness or unfermented carbohydrates that include dextrins and sugars. In reality, it is an empirical measure that includes any dissolved materials heavier than water, minus an offsetting figure that represents the extent to which the alcohol in the beer is lighter than water. Ethanol's specific gravity is 0.79, so the overall FG is water plus dissolved solids minus the density reduction from ethanol. Beers can have actual final gravity readings that range from below zero for a very dry American light lager to perhaps as high as 1.040 for a wee heavy. The former would be perceived as "very dry" due to the very low level of residual sugars or other carbohydrates. A wee heavy on the other hand might be described as "sweet" or "malty." Some consumers find overt sweetness indicative of under-attenuation — failure to complete the fermentation of the particular beer wort. Maltiness, though, might be found to represent carbohydrates beyond simple sugars in the beer. From the measured OG and FG of any beer we can calculate a measure of fermentation completeness: Apparent attenuation (sometimes referred to as apparent degree of fermentation, or ADF). Expressed as a percent, apparent attenuation = (OG – FG)/(OG – 1) x 100.

Apparent attenuation is the measure I will discuss today. There is another measure known as real attenuation (or real degree of fermentation), but for our purposes it is not needed in this context. Yeast producers will typically use apparent attenuation to express a yeast's fermentation efficacy.

There are additions you can make to a wort to help "dry out" your beer. Simple sugars are 100% fermentable, so an addition of corn sugar (glucose) or table sugar (sucrose) will add gravity (and alcohol) with no addition to residual maltiness. Many adjuncts have similar influence, with rice and corn typically used to make a lighter beer (see page 20 for Mr. Wizard's explanation why). Even with an all-malt wort, there are exogenous enzyme products derived from fungal cultures that can help you make a beer with reduced residual carbohydrates. (For more on exogenous enzymes in brewing, see the October 2020 issue or online at https://byo.com/article/explore-the-world-of-exogenous-enzymes/.) On the other

Beers can have actual final gravity readings that range from below zero for a very dry American light lager to perhaps as high as 1.040 for a wee heavy.

Photo courtesy of Brulosophy.com

*Choosing a certain mash temperature is one way brewers can help manipulate a beer's final gravity.*

hand, brewers can make additions to create a "bigger" tasting beer. Using a high percentage of specialty malts or sugar additions like lactose or maltodextrin will typically raise the final gravity of the beer. But with a given grain bill there are two natural methods for managing dryness in an all-malt beer: Manipulating mash enzymes through temperature control and selection of a yeast strain based on its attenuation capability.

There are two primary enzymes that break down the barley starches, beginning at the malting stage. When barley kernels are moistened, the embryo begins to grow, just as though the plant were growing in a field. That germination sets in motion the production of α-amylase enzymes, joining the other enzyme group, ß-amylases, in the barley kernel. Both enzymes degrade starch into fermentable sugars and sometimes non-fermentable dextrins. As the embryo begins to utilize the sugars, starch breaks down and enzyme concentrations rise. Since the maltster is selling starch to the brewer, a time comes to cut off the embryo's access. The grain bed is heated to inactivate the embryo but leave the enzyme population, which is relatively heat-stable, in place. The malt may be further toasted or roasted for color or flavor, but the mild heating of pale malt makes it possible to brew.

When the brewer crushes barley malt and then mashes it, the enzymes are reactivated and go to work breaking down starches without further participation by the now-inactive barley plant. Although α- and ß-amylases are at work in the mash, there is enough difference in their biochemistry that this is a point to influence fermentability and ultimately dryness. The mash needs to be hot enough to solubilize the starch, but not so hot as to inactivate the enzymes. The enzymes have different temperature sensitivities and they act differently on the starch substrate. ß-amylase attacks from one end of a starch molecule and systematically cuts off maltose units. It has particular affinity for large molecules and rapidly begins breaking down chains of amylose or amylopectin. The process can continue to completion with amylose, but the enzyme is less effective and eventually gives up entirely as it approaches the branched part of amylopectin. It is often called the saccharifying enzyme as it releases simple sugars that contribute directly to fermentability. α-amylase, however, can attack any α-1-4 link in the starch molecule, but acts randomly. That means the initial activity of that enzyme produces many different dextrins and only tends to produce high levels of fermentable sugars later in the mash when breaking random bonds in small chains that will result in sugars.

As a brewer, you can manipulate these enzymes using temperature control for desired wort fermentability. Both are heat tolerant, but α-amylase is more so, surviving in temperatures as high as 160 °F (~70 °C). ß-amylase, on the other hand, works best around 130 to 140 °F (~55 to 60 °C). I brew primarily with single infusion mashing. The well-modified American and European malts available to me yield good extract levels even at a fairly low mash temperature like 145 °F (63 °C). When I want a highly fermentable wort to produce a dry beer, I will use an infusion mash temperature like that, activating the ß-amylases to chop off regular chunks of fermentable sugars. On the other end, if I am working on a very malty beer recipe like a strong Scotch ale or milk stout, I will go to a much higher infusion temperature, possibly up to 160 °F (71 °C). Mashed in that range, the α-amylases are actively producing random starch fragments, some of which are unfermentable dextrins. The less active ß-amylases, meanwhile, do not break down those fragments. The resulting beer still presents a satisfactory OG, but with a higher FG, even fully fermented. If you use other than single infusion mashing, the principles still apply. Low mash temperature supports fermentability and high mash temperature suppresses it.

> **If instead of standard conditions, you want to try an extreme brew with unusually high gravity or non-standard fermentation temperatures, do not necessarily expect textbook attenuation.**

There are a few other considerations when coming up with a mash schedule. Not only are the rest temperatures important but also the duration of each rest and possible time between the rests if using a step mash or when mashing out. A half-hour mash will yield a less fermentable mash, even if all the starch is converted, compared to a one-hour mash at the same temperature. While the starch is chopped up in the shorter mash and showing no negative in an iodine test, the extra time will allow for continued action by the amylase enzymes to more finely dice the dextrins. Also, if you're running a 1500W recirculating infusion mash system (RIMS) for a 12-gallon (45-L) batch, ramping up to mash out will take a while and that time needs to be taken into consideration.

Once a wort of given fermentability is on hand, a next influence on dryness is your choice of yeast. If you really want to perfect a single recipe, you could split a batch or make multiple batches the same way with different yeast strains. Most of us, though, are going to look at the yeast producer's product literature and decide from there. In determining the published figures, the producer probably presents the candidate yeast with fairly standard, straightforward conditions. The wort will likely be all-malt and the gravity will be in the low-to-medium range to avoid creating especially difficult fermentation conditions. The simple calculation of apparent attenuation is what will appear in the guidelines. Those published values are often long established, subject to periodic verification as part of ongoing quality control.

If instead of standard conditions, you want to try an extreme brew with unusually high gravity or non-standard fermentation temperatures, do not necessarily expect textbook attenuation. That said, you can certainly look to the published

figures for yeast strain comparisons. The ranges for different strains are different enough that you can easily get a different beer from the same wort, based on yeast selection alone. While most attenuation percentages are in the 70s, they can drop into the upper 60s, particularly for some British ale yeasts. That is where you want to look if you are designing a rich, malty, full-bodied traditional-style ale as these strains are unable to ferment maltotriose. At the other end of the scale, the high end of attenuation can rise above 80% for some strains. You might be seeking something like that for a light or amber lager where you want a crisp, clean finish. If you go further afield and get into strains for farmhouse ales that may include non-*Saccharomyces* yeasts, you may find figures that rise well beyond the standard range for beer.

One yeast strain of noteworthiness when discussing attenuation is *S. cerevisiae* var. *diastaticus*. Most longtime brewers would know this strain as it's common among saisons and Belgian yeasts, among others. You must note that that these strains emit an enzyme called amyloglucosidase, which can continue the work of mash enzymes and break down dextrins into simple sugars. If you are looking for a way to really dry out a beer, then choosing one of these yeast strains is one way to achieve that goal. Amyloglucosidase can be found elsewhere as well. As many unfortunate breweries have found, these enzymes are also found in hops and when a beer is dry hopped, can work to re-ignite fermentation. Amyloglucosidase can be purchased separately as well.

So when choosing a yeast to match your goals, look to the published yeast strain attenuation figures. Keep in mind that you have a lot of control over the eventual dryness of your beer beyond wort fermentability and yeast choice. You also need adequate oxygenation, good nutrition, a sufficient pitch, and steady temperature control. The yeast choice can nudge your dryness one way or the other, but you are the primary guide. If the dryness you get the first time doesn't exactly match your expectations, keep in mind something someone once told me: "The yeast don't know what the numbers are." BYO

BY ANDREW COPLON

# SPECIAL EVENTS

## Get creative to fill voids

You didn't choose to be a nanobrewery to live up to brewing industry norms. You're quirky, you're unique, and you may not play by the rules. Sure, the affordability may have been a factor in your business decision; however, embrace the nano's ability to act quickly and experiment as a strategy to differentiate yourself. Know who you are and rock it shamelessly. With 9,000+ breweries operating in the U.S. alone, it is vital to not only make high-quality beer, but to also create an overall experience that leaves your guests craving more.

With 9,000+ breweries operating in the U.S. alone, it is vital to not only make high-quality beer, but to also create an overall experience that leaves your guests craving more.

You are small on purpose and that comes with a story to tell. Craft beer is about engagement, education, and expanding your audience. The value of your brewery lies much deeper than just the beer you are producing. A great part of your value is in the space you occupy — no matter the size. Taprooms are social gathering places where every minute left empty can reduce your bottom line. You've got the space and you need to maximize its potential. As a current or future brewery owner or manager, create a plan to entertain and impress your guests with a variety of events and promotions.

There is no playbook to follow, but as an entrepreneur your mindset should be that you will forever be striving to find repeatable strategies that can make your life easier and more successful. You and your team best know your space and your audience. It is my hope that the concepts discussed here can inspire you to never stop crafting innovative and memorable experiences for your customers.

As you strive to find what works best at your brewery, you will without a doubt fail. No one continually bowls strikes, and you will have your share of winners and losers. However, in figuring out what events and promotions work best for you, always stay true to who you are. How you use your space and the events you host must reflect the ethos of your brand.

When successfully executed, events are a fantastic tool to grow your brand. We define an "event" as any planned social occasion that happens at your taproom. This could be anything from trivia to live music to a seasonal craft fair to a homebrew club get-together to a wedding. It is something outside the scope of your normal operation. Before your brewery becomes a nano-event mecca, you must create the desire for groups and parties to hold events at your space. Just as you aim to stand out by the beer you produce, differentiate in the experience you create.

Because letters are fun, we are going to use the word "NANO" as an acronym to help you stay on track when planning events.

N – Need
A – Authenticity
N – Numbers
O – Originality

Let's begin with **need** (N). When you begin to brainstorm what events you may host, first ask yourself, "Is there a need?" Have your guests been requesting a trivia night based on some obscure '80s sci-fi show? Do you frequently have patrons wishing there was a small music venue in your area that featured acoustic acts? Would it be a good idea to host a seasonal food and beer pairing? A simple way to determine the need is to ask your guests. You and your staff should have a strong pulse on your guests' preferences. Take the time to find out what they'd like. The better you understand your audience, the more they'll spend, and the sooner they'll return. People like to spend money with those they like. Simple, right?

Following that same train of

Photo courtesy of Lady Justice Brewing Co.

*One way to fill seats on slow nights is to create an event to draw folks through your door.*

thought, those guests will support the events that they are interested in. Outside of asking, also use other channels to understand your audience's needs. Utilize your social media to not only engage daily but learn. Asking the audience (we're throwing back to you, *Who Wants to be a Millionaire?*) is market research 101. Determine if there's a demand, how large that demand may be, and then if the idea at hand is feasible in your taproom. This will help brainstorm potential concepts to consider. So axe throwing may be the exception (we'll get to outliers and originality at the letter "O"). The best ideas are often the most basic and expected, but along the discovery process, you may also uncover unexpected concepts ready to be capitalized upon.

As you continue planning, consider whether your event will only appeal to a narrow demographic, or will it appeal to the masses? This decision should be cautiously made. To my knowledge, Dungeons and Dragons players aren't your average brewery goer, thus an exceptionally niche event should be tested on a slower day rather than the marquee event of the season. On the other hand, if considering a weekly trivia night, a themed event based on your favorite TV program as a kid may not draw your desired audiences, but perhaps a regular, more generalized program will. When you first launched your brewery, you mapped out your target demographic. Perhaps this has evolved over time. In the current state of the industry, it should be your goal to not limit your audience and to build relationships around community, conversation, and craft beer while maintaining your integrity.

**Authenticity** (A) would have been a better first letter to begin with, unfortunately I can't change the spelling of nano. Even more important than the need for a particular event, it is vital for you to stay true to your brand. Is hosting an intimate, politically charged gathering at your small, sports-themed taproom going to gel with your clientele? Probably not. Is partnering with the SPCA on a Saturday rescue event going to go over well? It just might if you're highly engaged with the local animal lover community.

Don't simply host an event because. I repeat, do not just let any event take place in your taproom. Everything that happens in your taproom reflects your core values. Does your brewery have a mission statement? If not, sit down right now and begin the process. This doesn't have to happen in one sitting but start writing down the words that reflect what you aim to be. This may end up forming a sentence or may ultimately end up as a few strong words that represent what you stand for. Having a mission statement isn't something that just corporate, Cheesecake Factory-like breweries do. Having a mission statement is a key strategy to understand who you are and how to stay true to your brewery's core values and identity.

This mission statement should carry over to every decision that happens at your brewery. Sure, you run a business, but selling yourself to the devil and aligning yourself with ideas and partners that do not line up with your values can ultimately be detrimental.

The **numbers** (N) are what really matter. You must ask yourself if hosting a specific event is a smart financial decision. Before we discuss the actual event, let's look at the potential consequences. Should you stray from routine? If your taproom is a local watering hole with a captive audience of regulars, you will want to consider whether the financial gain from hosting a less inclusive or private event outweighs the possibility of upsetting your regular guests. It is much easier to host a private event on off days, as opposed to shutting down the brewery on Saturday for a wedding. However, a brewery is a business and the decision that amounts in the most overall good is the decision that should be made.

You're not Uber or AirBNB, making money is a necessary goal for the long-term success of a nanobrewery. Use the below formula when considering the decision to host, or continue hosting, a special event.

**Event Value = Rental Fee + Projected Beer Sales + Projected Food Sales + Goodwill of Guests – Lost Regular Sales – Added Operational Costs**

Goodwill of guests refers to how much fun those in attendance have and how that enjoyment will transfer to future loyalty. This is basically impossible to quantify but in the marketing world acquisition and lifetime value of customers is something businesses look at and this sits in that realm. The future value of holding your local kickball team's championship celebration may hold a tad more future sales value than a presentation by the local university on climate change (which could be equally as important to craft beer). Find the events that work best for your space. The more fun guests have at your events, the more likely they will return sooner and recommend your taproom to their friends and family. Use the above formula as a guide.

If considering private events, dive deep into all potential costs. How much staff will it take to accommodate? Any other special requirements other than just offering your space? Be sure to dictate what's included in the rental. Consider how much business you would do on that specific non-event day and look at the pros and cons of holding a special event.

If you do choose to host private events, be sure to have information on your website and at your brewery to direct any interested party to the proper person to contact. Once again, do not upset your regulars. Whether you are hosting a public or private event, it is important to make potential patrons aware on both social media and at the brewery. Advertise in advance so that a guest does not show up surprised. That Tuesday regular may not stay a regular if they show up to a sign reading "Taproom closed for a private party." Do your best to spread the word.

Hosting events that make financial sense is a must. While it may take time for some events to hit their potential, have conversations internally to discuss how much effort can be placed on a specific campaign before it is considered worth being continued or cancelled. Additionally, consider the value each event may offer. For example, a karaoke night at your brewery may only bring a crowd of 20, but those 20 guests may spend twice as much as your average guest.

Timing also plays into the decision. Paying for live entertainment on a Saturday may be nice for your regular weekend crowd, but if it's not showing an added value (i.e. higher tabs, more guests), it may be worth reconsidering.

On the other hand, putting that same live entertainment on a historically slow Thursday evening may convince your Thursday night crowd to hang out even longer and bring a few more friends the next week. Ultimately, it is your goal to build a strong connection with your community through activities that deepen the brewery-guest relationship. When you achieve this, it will benefit all parties involved.

The "O" stands for **originality.** Forget what I said about need for a moment. Originality is your chance to do something no one else in your area is doing. While a large portion of the events you host will be based on need, there is also opportunity to think outside the box. This is your opportunity to innovate. This is your chance to forget whether or not there's a need and throw a dart (or axe) at the wall blindfolded and see if it sticks. Of course, this must be a well-thought-out plan. You can't simply decide to host an event and expect the, "if you build it, they will come," results.

The "O" is why you opened a nanobrewery. This is where your creativity shines. Are your Tuesday's slow? Try that wacky idea you've considered. Worst case, you have that regular old slow Tuesday and you give up after a few tries. Best case? Your stab at hosting a Dungeons and Dragons league takes off and now you have a potentially new audience and revenue stream. It is your responsibility to try these non-traditional ideas that match the feel of your taproom. Some will fail miserably, some will ignite a fire in your guests that they didn't know they needed, but all will be learning experiences.

It was not my aim to give you a list of tried-and-true events to host. It is my goal to challenge you to discover what works best in your market. The best part of our industry is that every taproom represents a unique experience.

Let's end with a checklist to help you find the events that may work best in your taproom. Ask yourself:

(N) Have my guests been asking for this?
(The answer is often, but not always, "yes")
(A) Does the potential event align with our core values?
(The answer must always be "yes")
(N) Is the idea financially viable?
(Most commonly, "yes")
(O) Will it help me stand out?
(Should be a strong "yes")

If you get through these four questions with four, mostly "yes" replies, I wish you the best of luck and hope to be there to experience it. BYO

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BY KIEV RATTEE

# WEBREW

## Celebrating a synagogue brew day

I must admit that when John Coppola, one of the new guys in our homebrew club, emailed me an invitation to swing by the synagogue for a brew day my initial thought was that he must have made a typo. A brew day at the synagogue? I know about sacramental wine and the abbey monks brewing their classic Trappist beers in Belgium and elsewhere, but surely John meant the brew day was happening somewhere else. He's not even Jewish! But there it was right in the subject line: "Brew day at the Synagogue." So, on a beautiful, late-summer day I jumped in the car and headed to the Israel Congregation synagogue just up the street from the *BYO* office.

I was met on the back patio of the synagogue by a convivial group of about a dozen folks, most of them seated on a stone wall enjoying some of John's previous brews. The wonderful smell of mashing grains wafted by with John's clone recipe brew of Tree House Brewing Company's Julius IPA well underway. There was a rectangular white and blue tent located on the far side of the patio with its roof open to the sky. This tent, called a *sukkah,* turned out to be a significant symbol for why this celebration brew day was occurring. John introduced me to the group and to Cantor Scott Buckner, the Clergy and Spiritual Leader of Israel Congregation. Scott invited me to sample some refreshments on a table inside the *sukkah* and asked if I was familiar with the Sukkot celebration in Judaism. I was not at all familiar so he proceeded to explain to me the essence of Sukkot is to "commemorate the Israelite's dwelling in temporary shelters in the desert following their exodus from Egypt. It also celebrates the harvest, giving thanks for our bounty while acknowledging the fragility of life and illusion of our permanence on earth." Heady stuff for a brew day.

I asked the cantor how John's brew fit into the celebration to which Scott replied, "We each have incredible gifts that we're obligated to enjoy." One of John's gifts just happens to be crafting some of the finest homebrewed hazy IPAs in our area. It provided me a new perspective into how beer and brewing has the capacity to unify people. John's wife, Jennifer, is Jewish and one of the ways John brings his particular skills and interests to the congregation is by sharing his beers and now even brewing them at the synagogue. As in any religious congregation its members and their spouses come with their full array of interests outside of the church or synagogue. Some are great cooks. Some garden. Some are carpenters. John brews.

It turned out that this was in fact John's third brew day at the synagogue. He hauls his Klarstein all-in-one brew system to the back patio along with all of his ingredients and gear for an afternoon of camaraderie with anyone from the congregation who wants to participate. Some, like Jon Prial, enjoy learning the terminology and getting their hands in on the process. While others prefer watching from a distance with a sample of a past brew day's bounty in their glass.

During the first Israel Congregation brew session a few of the guys had joked that they should call the synagogue brew days "HeBrew," however, several of the women in attendance quickly suggested "WeBrew" as a more inclusive label and it stuck. It was refreshing for me to be a part of a brew day with a mix of people very familiar with homebrewing and many who were completely new to the science of turning water, grain, hops, and yeast into beer. There was a real sense of joy, learning, and alchemy in the air. Speaking of naming things . . . when I asked John if he'd come up with a name yet for his Julius IPA clone a woman sipping her beer at the edge of the patio piped up and said, "I think it should be Jew-lius." BYO

There was a real sense of joy, learning, and alchemy in the air.

Photo by Kiev Rattee

*The group gathers in the* sukkah *to enjoy some treats on the synagogue's brew day.*

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