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THE HOW-TO HOMEBREW BEER MAGAZINE

NOVEMBER 2022, VOL.28, NO.7

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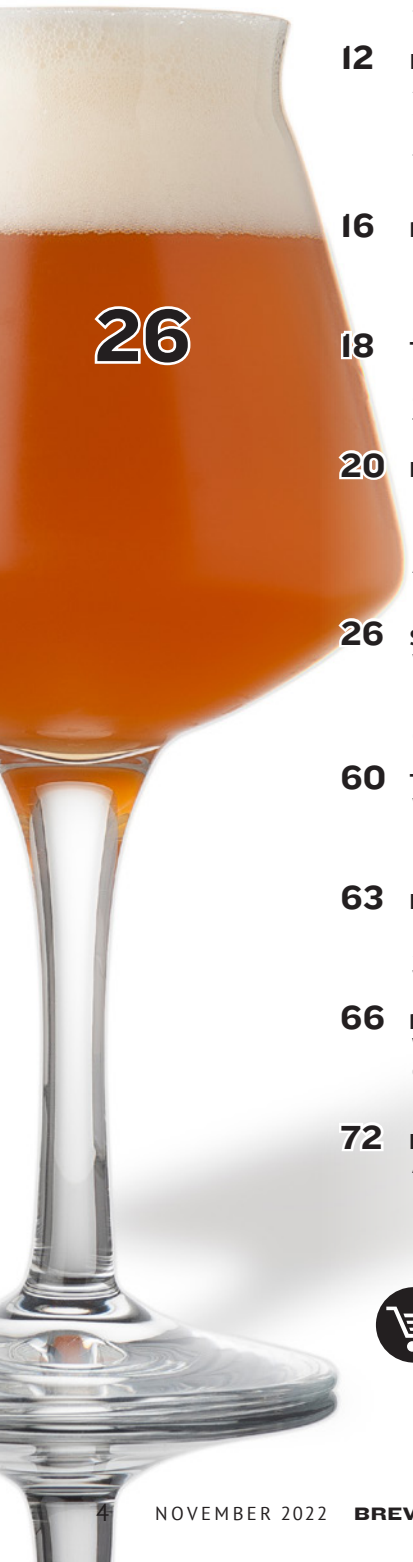

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RECIPE STANDARDIZATION

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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

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Charles A. Parker/Images Plus

Q What is your favorite kind of beer festival?

The Vermont Brewers Fest (summer and winter versions) is a ton of fun with special offerings often brewed in collaboration between multiple breweries just for the event. Beautiful settings, a laid back atmosphere, manageable lines, and beer enthusiasts who are drinking responsibly makes it a good time for everyone.

I especially enjoy a beer fest that offers one-off beers and collaboration brews specific to that event. Here in Vermont some of my favorite commercial beer festivals are Nanofest (a dozen or so of the smallest breweries in the state pouring on 150 year-old fairgrounds) and SIPtemberfest (a more intimate fest nestled in the Mad River Glen ski mountain). I also enjoy the twice-annual Southern Vermont Homebrew Fests in Bennington, Vermont, where I pour alongside 25 or so other homebrewers from around the greater New England region — always some really great and inventive homebrews poured at that one!

The kind that includes a wide array of beer styles so everyone can be included (i.e., a cider-only or a German lager-centered festival wouldn't be my jam).

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The King of Stouts

"Stout" is a description that summarizes more than a half-dozen specific beer styles, but there is no doubt that the imperial stout is king. Get tips to brew this tricky, high-ABV style, plus find recipes for 6 commercial imperial stout clones. https://byo.com/article/the-king-of-stouts/

MEMBERS ONLY

Is It Crystal Or Caramel Malt?

Homebrewers are often confused by the terms crystal and caramel malt and are sometimes uncertain as to whether these are basically the same thing and can be used interchangeably, or whether they have different applications. Learn about them. https://byo.com/article/crystal-caramel-malt/

Extract to Beer In 7 Days

Lucky for us, modern malt extracts are already boiled, which can save us some serious time without sacrificing much in the realm of flavor. Learn how to use this to our advantage. https://byo.com/article/extract-beer-7-days/

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Food and Beer Pairing

Food comes in a wide variety of flavors. Beer comes in a wide variety of flavors. And, if you pair them correctly, the whole is greater than the sum of its parts. https://byo.com/article/food-and-beer-pairing/

MEMBERS ONLY

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MAIL

CASK ALE QUESTIONS

I spent a semester in London, England, in 1994 and fell in love with cask-conditioned real ale. I started homebrewing in 2010 with Wheeler's *Brew Your Own British Real Ale* as my guide, with the goal of learning to brew and serve something as close to cask ale as possible. Getting the proper equipment (pins, a hand pump, dedicated cellar-temperature kegerator, and a cask breather) to properly dispense cask-conditioned real ale at home was financially prohibitive for me, so what I do involves a lot of compromises with CAMRA (Campaign for Real Ale) standards. I naturally carbonate and condition in Corny kegs, which I then hook up to my kegerator. For the first few days it feels and tastes a lot like cask ale, but the added CO_2 with enough pressure to dispense means it quickly turns into keg beer. Here are my questions:

1) Are there ways to serve a better approximation of cask ale using a gas-dispense kegerator than what I'm doing now?

2) If I do someday spring for the full hand-pump setup, will a cask-breather effectively preserve the natural carbonation for longer than simply hooking up to low psi CO_2?

3) Does keeping ale designed to be drunk at cellar temperature at colder temperatures prior to serving in any way harm or alter the flavor once warmed up to cellar temperature?

4) One thing I have long found fascinating but don't fully understand is how recipes should be designed for serving on cask, as opposed to kegged or bottled beers. You see this in the U.K. where the very same beer brand will be higher alcohol when sold in kegs and bottles compared to the cask version.

Bill Carter • *via email*

To answer these questions we turned to Ben Martin, a pro brewer in the U.K. with a ton of experience brewing cask ale professionally (and who has written about it for BYO*). Here is his response (edited for length):*

"1) I don't have much experience with kegs and kegerators, but I think you're right that the additional gas for dispense is over-carbonating your beer. I don't know that there is a way to get around this with your particular setup, but there may be affordable alternatives that will achieve the result you want. For example, a popular option here in the U.K. is a pressure barrel. These are naturally

contributors

Mirella Amato is a Canadian craft beer and sensory consultant who has dedicated herself to supporting the growth of craft beer by promoting a better understanding of beer and its many qualities since 2007. She is a Master Cicerone®, Doemens Biersommelier, and National Level Beer Judge Certification judge. She has created an online course — Mastering Beer & Food Pairing brought to you by Beerology® — to teach enthusiasts how to master pairing beer with food, step-by-step. Mirella is also the author of the award-winning book *Beerology: Everything You Need to Know to Enjoy Beer . . . Even More*.

In her first article for *BYO* starting on page 36, Mirella shares her expert advice for pairing food with the high-ABV styles of this issue's cover story, which happen to complement the comfort foods of winter perfectly.

Gordon Strong is President Emeritus and the highest-ranking judge of the Beer Judge Certification Program (BJCP), the organization that certifies beer judges for homebrew competitions and also registers qualifying homebrew competitions. In addition to his Grand Master Level V judge status, Gordon is a three-time winner of the National Homebrew Competition Ninkasi Award and the author of homebrewing books *Brewing Better Beer* and *Modern Homebrew Recipes*. He has been *BYO*'s "Style Profile" columnist since 2015 and is a frequent feature story author.

In addition to his "Style Profile" on Grape Ale (beginning on page 26), Gordon also shares advice for brewing three high-ABV beers perfect for winter — barleywine, wheatwine, and imperial stout starting on page 42.

Dr. Pattie Aron obtained a B.S. in Biochemistry from Elmira College and M.S. and Ph.D degrees in Food Science and Technology from Oregon State University. Pattie's passion for fermentation led her to conduct graduate research in wine chemistry and brewing science. Formerly, Pattie was the Senior Hop Chemist in the Applied Brewing and Research team at MillerCoors, now MolsonCoors. She then switched gears to build and manage Rahr Malting Corporation's technical research and innovation program at the Shakopee, Minnesota, headquarters. Today, Pattie manages Kalsec's (Kalamazoo, Michigan) portfolio of hop products as Director of Product Management, Hops. Her heart is warmed most by bicycles, yoga, wilderness, campfires with friends, adventures with her 4-legged buddy Bulleit Rye the Brittany spaniel, and by sipping whiskey.

Beginning on page 54, Pattie lays out what the experts know, and still have to learn, about hop creep.

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MAIL

carbonated, dispense under gravity, and you can connect small CO_2 bulbs to them that act like cask-breathers, injecting gas into the top as the barrel is emptied. Finding them in North America is difficult. eBay might be an option, or you could try your local homebrew store to see if they may be able to order them specially. Another option is 5-L (5-qt.) minikegs or minicasks. These also dispense under gravity, but have a simple vent at the top, so the contents need to be consumed in around 4-5 days, just as with a proper cask.

"2) The simple answer is yes. Cask breathers work by allowing CO_2 to flow into the cask at atmospheric pressure as beer flows out through the tap. As there is no positive pressure from the CO_2, it has minimal impact on the natural carbonation level of the beer. Even applying low pressure CO_2 can slowly increase the carbonation level of your beer over time, destroying the effect that you are after.

"3) Many U.K. breweries store their cask ale at below cellar temperatures to prolong its shelf life before delivering it to pubs. It may develop a noticeable haze when cold (called chill haze), but this will disappear when it warms up. However, repeatedly raising and lowering the temperature can cause chill haze to become permanent, so should be avoided. The important thing is the serving temperature, as this has a big impact on the flavor profile of the beer.

"4) This is a really interesting question and one that is quite tricky to answer as it's something that has become quite instinctual for me, but I will give it a go. The main reason a brewery will brew to a higher ABV for the beer going in a keg than a cask is that cask ale has a very limited lifespan once it has been tapped (about 4–5 days). Because of this, cask ale tends to be made at a more sessionable strength to encourage customers to drink more of it before the cask goes off. At my brewery, most of our beers are made at around 3.9–4.5% ABV because that is what our customers generally want. We will occasionally make something a little stronger (our strongest beer is 5.9%), but this is usually made as a smaller batch, often put into smaller casks, and made to coincide with beer festival season, as they are more likely to buy stronger beer than pubs. In terms of designing a recipe, it is worth keeping in mind that particular flavors will be more pronounced at 54 °F (12 °C) vs. 38 °F (3 °C), especially certain malt characteristics. That's one of the reasons British brewers tend to use crystal and toasted malts a little more, as they have a chance to shine through at slightly warmer temperatures. The fruity esters produced by British ale yeasts are also more appreciable at cellar temperatures, and hop bitterness is more noticeable, so less IBUs are required to achieve the same degree of balance. Obviously British hops have their own aroma characteristics, so I would recommend using these if you are trying to achieve an authentic profile, but I would always advise looking beyond Fuggles, East Kent Goldings, and Challenger to some of the other options available." BYO

BEGINNER'S BLOCK

BY DAVE GREEN

PREPPING FOR A COMPETITION

Entering your homebrew into a competition can result in unforeseen advantages other than just winning some hardware. Judges provide feedback that can lead to changes in your brewing protocol, which can lead to big advancements in your beer quality. But in order to get the best feedback possible, homebrewers looking to enter a competition need to avoid certain pitfalls so that their beer is presented to judges in top form.

RECIPE DESIGN

First off, you're going to want to brew for your audience. That Kölsch that scored high in a competition sanctioned by the BJCP (Beer Judge Certification Program), may not win many accolades at the local street fest homebrew competition where a trendy beer style may be more admired by the judges.

If you are serious about entering in a BJCP-sanctioned competition, then there are a few resources that will greatly help in the recipe design element. Your first resource should probably be the BJCP Style Guidelines. After that, three books that stand out to me are: *Designing Great Beers* by Randy Mosher, *Brewing Classic Styles* by Jamil Zainasheff and John Palmer, and Gordon Strong's *Modern Homebrew Recipes*. They are all great resources. Also, through the years both Jamil Zainasheff and Gordon Strong have done an amazing job outlining recipe development across a huge range of style in *BYO's* "Style Profile" column. Digital members to byo.com have access to nearly all of them at their fingertips.

INGREDIENTS AND BREW DAY

Procuring fresh ingredients is a big part of producing a top-quality brew. Now is not the time to use up that old bag of crystal malt that's been sitting in your grain bin since . . . huh, you're not actually sure when. And if you've had success with a certain base malt, now may not be the time to decide to "upgrade" to a more expensive type. I say to stick with what you know; go with the hops, malts, yeast, and water profiles that have worked for you. This could be said for most of your ingredients.

Just like with ingredients, now is not the time to experiment with new techniques. This can add an undue stress on your brew day that may lead to mistakes. Go with what you know and whatever you do, no knee-jerk reactions if something goes a little off the tracks.

Also, I do advise keeping some sugar and dried malt extract on hand just in case your gravity comes in under where it should be. Brewing a double IPA only to find a gravity of 1.059 at the end of the boil can really take the wind out of your sails. A sugar and/or extract addition can remedy that quickly.

Finally, for many styles a yeast nutrient addition along with a kettle-fining agent should be employed. Both of these products will give you the best chance of both a strong and healthy fermentation and quality appearance.

FERMENTATION

While I generally understress brew days, I do stress fermentation control. Pitching an appropriate level of yeast should be the first area of focus. Using an online yeast-pitching calculator is especially helpful when using a liquid yeast strain and be sure your dried yeast is not out of date. In general, lagers should get roughly double the pitch rate compared to ales.

Temperature control is the next focal point. Those with advanced glycol systems have a definite advantage in this arena. But temperature control via enclosure, such as a refrigerator with an external thermostat, is equally beneficial. Having a temperature-stable room can also work, but not having the ability to adjust the fermentation temperature can be a drawback. Also, it's never a bad thing to raise the temperature several degrees near the end of fermentation to assure the yeast finishes cleaning up the byproducts of active fermentation.

PACKAGING TIME

If the competition is a local street fest, then packaging your homebrew can often come in the form of bottle, can, or keg. Even if you keg your beer, you can still bottle or can the beer in order to avoid the hassle of bringing a whole draft system along. A counter-pressure filler or BeerGun® type of filler would be your best options for filling. When filling with a BeerGun®, make sure you cap on foam (meaning the foam is above the level where the cap sits) and bump up the beer's carbonation level by about 0.2 volumes as some will be lost during the bottling process.

If you are sending in your beer for judging, then you need to bottle or can the beer. Bottle conditioning your beer will be required if you don't have a kegging system. Give the yeast an extended time to assure full carbonation.

ENTRY AND SHIPPING

Your final touch points revolve around entry category selection, packaging, and shipping (if needed). A local drop-off would be preferred if the competition entry deadline is either in summer or winter where excessive heat or freezing may pose an issue. Be sure to choose the correct category and be descriptive so judges aren't left guessing, especially when entering beers in the specialty beers category.

Finally, even if you thought your beer was amazing but the judges dinged it, try to use their feedback constructively. Sometimes it truly is the luck of the draw, what time of day your beer was judged, what beers were judged with it, the mood of the judging group . . . there are so many x-factors. Don't let a bad score ruin your day.

BYO STORY BEHIND THE LABEL

MICHAEL KEITH • SPOKANE, WASHINGTON

I was a special education teacher serving the BI (behavioral intervention) student population in a local middle school. These kids were shutting down regular classrooms with a variety of unacceptable behaviors. After numerous suspensions and multiple visits to the principal (and sometimes law enforcement), they would become members of my special BI class. They were mostly misunderstood and not received well by certain staff and administrators.

I came up with an idea to help reduce the negative impact these students had on our school. Our staff loved coffee. Each day teachers could be seen arriving with their favorite latte in hand. So, I created Trouble's Brew'n Coffee Company. I purchased a small latte machine, came up with a business curriculum, sent out letters to local vendors to get supplies . . . and crossed my fingers. Cravens Coffee Co., a local roaster, replied. Long story short, they provided coffee beans, cups, lids, and straws for 13 years! We would take orders every Monday, Wednesday, and Friday from staff who wanted lattes. My students would deliver the coffee mid-morning. They were met with smiles rather than disdain. Our proceeds were donated to Ogden Hall, a local women's shelter in the form of various goods needed by their clients. At the end of the school year, we would go as a class to our local Walmart, fill up several shopping carts (towels, diapers, personal care items, clothing, etc. — usually well in excess of $1,000), and deliver the goods to a very grateful group of women. My students felt valued in their community and extremely proud of their hard work in Trouble's Brew'n.

I have since retired, but this label is dedicated to Simon Thompson, the owner of Craven's Coffee Co. Craven's Montana Jack's blend was the coffee I used in this porter.

WHAT'S NEW

APEX CULTURES® DRIED YEAST STRAINS

Brewing yeast produced in Sweden by a team with more than 50 years of experience in yeast production, processing, and packaging, Apex dried yeast is now available to homebrewers in North America through wholesaler LD Carlson. Apex Cultures® offers consistent and healthy fermentations for a wide variety of beer styles. Currently there are two strains available in 11.5-g, homebrew-sized sachets: A San Diego West Coast ale strain and a London English ale strain. https://www.ldcarlson.com/apex-cultures.html

GLUTEN-FREE BREWING

The ubiquity of gluten-containing grains, such as barley, wheat, and rye, in modern-day brewing has prevented many potential consumers from fully enjoying the craft beer revolution. Individuals who have celiac disease, non-celiac gluten intolerance, or gluten sensitivity (as well as those who simply feel better when they avoid gluten) have historically been unable to enjoy today's characterful beers. But Robert Keifer's recently released *Gluten-Free Brewing: Techniques, Processes, and Ingredients for Crafting Flavorful Beer*, offers pointers for beer lovers and brewers who cannot or choose not to ingest gluten or those who just want to experiment with new and interesting flavors. https://www.brewerspublications.com/products/gluten-free-brewing-techniques-processes-and-ingredients-for-crafting-flavorful-beer

TRI-CLAMP AUTOSPARGE CONNECTION

For anyone looking to add a float switch on their mash/lauter tun, a new option is available through Blichmann Engineering. With its simple "set it and forget it" design, the Blichmann AutoSparge™ system has been a part of the brewing community for years and is now available with a 1.5-in. tri-clamp fitting as a choice. This option comes with 1.5-in. gasket and clamp and either a 9- or 12-in. (23- or 30-cm) float arm length. They fit any kettle larger than 12 in. (30 cm) in diameter. Besides the silicone hose, all material is stainless steel. https://www.blichmannengineering.com/autosparge.html

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Upcoming Events

BYO NANOCON ONLINE

BYO NANOCON ONLINE

November 4 & 5

Get your questions answered live by speakers, meet and learn from fellow attendees, and talk with vendors specializing in the small-scale nano brewing niche. Don't miss this targeted conference for anyone running (or thinking about starting) a small-scale craft brewery. Learn the new business, marketing, and brewing strategies targeted for your sized needs at NanoCon Online November 4 & 5. From strategies to building taproom sales to more accurately managing cash flow to checking out the latest nano-scaled gear, you'll learn invaluable and very timely strategies over two days from experts and nano brewers. 30+ Online seminars – Live and available for reference as video recordings after the event. Learn more at: http://nanocon.beer

LEARN TO HOMEBREW DAY

November 5

On the first Saturday in November, thousands of people will gather at Learn to Homebrew Day sites worldwide to brew beer and learn about the hobby of homebrewing. In 1999, Learn to Homebrew Day was established to promote the most rewarding and delicious activity of all time — homebrewing. Grab some friends, pull together a recipe, and show them the beauty of homebrewing this year. www.homebrewersassociation.org/aha-events/learn-to-homebrew-day/

BYO REPLICATOR

BY DAVE CLARK

DEAR REPLICATOR, I'm currently reading the book *Vienna Lager* by Andreas Krennmair — while drinking Vienna-Style Lager by Dovetail Brewery based in Chicago, Illinois. This brewery focuses on lagers. Their helles is excellent, but for me their Vienna is a "buy-on-sight" beer. Unfortunately, it's not always in sight! I have a new lagering fridge and I'd love for one of the first brews to grace it to be a Dovetail Vienna clone. Thanks!

Chris Carey
Evanston, Illinois

Imagine meeting your future business partner halfway around the world and coming to find out you are from the same town and the two of you have a unified vision for your future brewery. In a nutshell, that's the story behind Dovetail Brewery of Chicago, Illinois.

Hagen Dost and Bill Wesselink were both studying for their Master Brewing Certifications through the Siebel World Brewing Academy. The program split time between Chicago and Munich, Germany and though both brewery founders hail from Chicago, it was at the Doemens Academy in Germany where they met. Inspired by being in the heartland of the beer world, the two discussed future goals and found common ground about what they enjoyed most about beer.

"As we studied, we also had quite a few beers together in Munich," said Dost. "We both enjoyed beers made by smaller European breweries. As we went through our brewing education we found the common denominator of our favorite breweries was they used some type of traditional method. Any one of, or a combination of things, such as intensive mashing techniques, open fermentation, use of coolship for lagers or spontaneously fermented beers, long lagering times, and horizontal lagering tanks."

During one of their philosophical conversations, the concept of the "dovetail joint" surfaced, referring to a term describing a particular woodworking style known for creating a tight, strong bond. Wanting to create a similar bond in the beer world, the two aspiring brewers decided to join forces, believing they could create something stronger together than they might otherwise individually. They decided their new enterprise would be called Dovetail Brewery.

ENTER DOVETAIL

Located in Chicago's North Center neighborhood near Irving Park and Lincoln (Belle Plaine and Ravenswood Avenues, precisely), one mile north of Wrigley Field, Dovetail Brewery opened on May 23, 2016. The taproom opened about three weeks later. With an ode to long-standing European brewing tradition, interspersed with modern American brewing creativity, Dost and Wesselink created a solid lineup of beers that brought to life what they experienced in the small breweries of Europe.

With IPAs all the rage, Dovetail wanted to stand out from the crowd with a lineup that bucked the trend. On one end of the beer lineup is spontaneously fermented beers such as Kriek, Pomme, and Peche.

"One of the first conversations we had was about coolships and how great having a brewery with one would be. This was November 2011," said Dost.

On the other end you will find traditional German styles such as Kölsch, Pilsner, Maibock, Hefeweizen, and Helles bring a little bit of old school Germany to the American heartland.

VIENNA-STYLE LAGER

One of the standouts in the core lineup is their Vienna-Style Lager. A beer inspired by their own house lager (which contains twenty percent Vienna malt), Dost and Wesselink wondered what a beer made with one hundred percent Vienna malt might taste like.

"We get our Vienna malt from a Bamberg maltster called Bamberger Malsterei," said Wesselink. "They don't market; it's all word of mouth. They've been doing that since the 1850s. Their Vienna malt is not like anyone else's. This malt produces caramelly, nutty notes, and a nice reddish-orange hue."

The hops are Styrian Golding sourced from Slovenia that produce a spiciness that interplays perfectly with the nutty caramel notes.

Using a medium-thick mash, Dovetail employs a double decoction before the beer gets a coolship rest — in the Czech/Franconian tradition. It is then sent to the cellar through a heat exchanger, where it spends a few days in primary fermentation in an open fermenter. Finally, the beer is moved to secondary fermentation in horizontal lagering tanks where it finishes a few weeks later.

For the first decoction, pull one-third of a thick mash, boil for 20 minutes to maximize Maillard reactions, then return to the main mash. Then, pull another third, a little thinner this time, and boil again for 20 minutes. Once the decoctions are complete, mash out, lauter, and boil.

"Because we have a really nice rolling boil, we boil for one-hour. We feel that we get a good blow off of the dimethyl sulfide (DMS) precursor," said Dorst.

Homebrewers may want to extend the boil to 90 minutes to ensure proper DMS precursor blow off. Water should be soft, preferably reverse osmosis with minerals added back in. Using a coolship isn't necessary on a homebrew level, but if you happen to have one, go for it!

"On the first day we brewed it, we had Mozart blaring through the brewery for extra good luck," said Wesselink. "The resulting beer was exactly what we envisioned, if not better."

Source your favorite Vienna malt and Styrian Goldings hops and brew your own! Serve it in a lager glass and pair it with wiener schnitzel. Listening to Mozart while brewing is optional.

DOVETAIL BREWERY'S VIENNA-STYLE LAGER CLONE

(5 gallons/19 L, all-grain)
OG = 1.052 FG = 1.012
IBU = 27 SRM = 6 ABV = 5.1%

A traditional Vienna lager using one malt, one hop, and traditional double decoction method.

INGREDIENTS

11.25 lbs. (5.1 kg) Weyermann Barke® Vienna Malt
3.9 AAU Styrian Golding hops (50 min.) (0.75 oz./21 g at 5.25% alpha acids)
3.9 AAU Styrian Golding hops (30 min.) (0.75 oz./21 g at 5.25% alpha acids)
1.5 oz. (43 g) Styrian Golding hops (0 min.)
SafLager S-23, Wyeast 2206 (Bavarian Lager), or White Labs WLP920 (Old Bavarian Lager)
¾ cup corn sugar (if priming)

STEP BY STEP

The brewery uses reverse osmosis (RO) water and adds back calcium chloride and magnesium sulfate to achieve a soft water profile for this beer. At home, for strike and sparge water, do the same or use a mixture of 90 percent distilled water and 10 percent moderately hard, dechlorinated water.

This is a double-decoction mashed beer. Mill grains and mash-in at 127 °F (53 °C). Rest for 5 minutes then pull about one-third of your mash (from the thickest part) and, in a separate pot, bring to a boil. Boil for 20 minutes. Slowly and gently return your decoction to the main part of the mash, until the mash temperature reaches 140–149 °F (60–65 °C). (Don't exceed 149 °F/65 °C.) Rest for 15 minutes. Pull the second decoction — again, one-third of the mash — and boil for 20 minutes. Slowly and gently return decoction to the main part of the mash, until the mash temperature reaches 158–167 °F (70–75 °C). (Don't exceed 167 °F/75 °C.) Rest for 45 minutes (this is for good foam). Raise to 172 °F (78 °C) to mash out. Lauter. Boil for 60 minutes, following the hopping schedule.

After the boil, whirlpool for 20 minutes, then crash cool to 41–45 °F (5–7 °C). Pitch the yeast, aerate well, and allow the temperature to free rise to 48 °F (9 °C). Hold at 48 °F (9 °C) until 50 percent attenuation (3 to 4 days), then raise to 54 °F (12 °C) for a diacetyl rest. When the beer reaches its final gravity (typically 5 to 7 days), crash to 30 °F (-1 °C) and lager for 4–5 weeks. Rack and package at 2.6 volumes (5.2 g/L).

DOVETAIL BREWERY'S VIENNA-STYLE LAGER CLONE

(5 gallons/19 L, extract only)
OG = 1.052 FG = 1.012
IBU = 27 SRM = 6 ABV = 5.1%

INGREDIENTS

7.3 lbs. (3.3 kg) Muntons Vienna liquid malt extract (see Step by Step if not available)
3.9 AAU Styrian Golding hops (50 min.) (0.75 oz./21 g at 5.25% alpha acids)
3.9 AAU Styrian Golding hops (30 min.) (0.75 oz./21 g at 5.25% alpha acids)
1.5 oz. (43 g) Styrian Golding hops (0 min.)
SafLager S-23, Wyeast 2206 (Bavarian Lager), or White Labs WLP920 (Old Bavarian Lager)
¾ cup corn sugar (if priming)

STEP BY STEP

If the Vienna liquid malt extract is not available from your supply retailer, you could substitute in ⅔ light liquid malt extract and ⅓ Munich liquid malt extract. The brewery uses reverse osmosis (RO) water and adds back calcium chloride and magnesium sulfate to achieve a soft water profile for this beer. At home, do the same or use a mixture of 90 percent distilled water and 10 percent moderately hard, dechlorinated water.

Since this recipe is 100% extract and you're not mashing anything, simply raise 2 gallons (7.57 L) of water to a temperature somewhere around 150 °F (66 °C). A little higher or lower is fine. Remove pot from heat source, and slowly pour in half of your extract, stirring the entire time. Return to flame, raise to boil and boil for 60 minutes, adding hops as indicated. If you want to add a clarifier such as Whirlfloc® or Irish moss or a yeast nutrient, do it with 10 minutes left in the boil. Add the remaining extract with 5 minutes left in the boil, but be sure to take the pot off the heat source and pour extract very slowly while stirring. Return to the heat source and complete the boil. Meanwhile, pre-boil, then chill 3.5 gallons (13.25 L) of water that you'll later use to top up your wort.

Follow the all-grain recipe for fermentation and packaging instructions.

TIPS FOR SUCCESS:

If using a coolship, upon completion of the boil, immediately transfer your wort to the coolship, allowing the wort to cool to 167 °F (75 °C). Then crash to 41–45 °F (5–7 °C) and follow the rest of the directions above. This step replaces the traditional whirlpool stage.

At this temperature (167 °F/75 °C), while not sterile, the wort is still sanitized. The 25 or so minutes it takes from boiling in the kettle to 167 °F (75 °C) in the coolship gives enough time for the hot trub to settle and any more DMS precursor to blow off. This also provides a window for additional hot-side hopping if so desired. BYO

BY DAWSON RASPUZZI

CRYSTAL MALTS

A group of malts with a range of benefits

Crystal malts run the gamut in color and flavors they contribute to a brew. Beyond these positive characteristics, crystal malts enhance a beer's body and help with foam stability. They do come with risks for the inexperienced, however, such as impacting pH, fermentability, and contributing harsh flavors if added with a heavy hand. Small additions are key, as these pros explain.

I look for lighter colored crystal malts to provide a depth of flavor and aroma, enhance a beer's body, and add to foam stability. We use a variety of lighter colored crystal malts in paler beers so that we can obtain the desired effect without changing the color too much. Some of my favorite lighter crystal malts are the Best Malz Caramel Pils and Caramel Hell. We've used these in all sorts of beers from pale German lagers all the way to heavy imperial stouts. Darker colored crystal malts have the same benefits (flavor, aroma, body, foam stability), but in a more enhanced way. They add more candy-like flavors and aromas as well as dark fruits. Some of the darkest crystal malts can have some burnt sugar, raisin, prune, or even a slightly roasted character. Amber, brown, and caramel Munich are some of my favorite mid-range dark crystal malts that provide distinct flavors when used at about 5%. CaraAroma® is probably my favorite of the darkest crystal malts. I really enjoy the toasted nuttiness, dark fruit, and deep caramel and toffee flavor it provides.

Layering crystal malts is a great idea as it provides a depth of flavor, but layering in a lighter colored crystal malt or two can also keep your water's pH at a level easier to control. Too much crystal malt, however, will negatively impact the mash pH and bring it out of the ideal range. The beer can become too acidic and astringent and add an unpleasant harshness. We don't go over 10% crystal malt usage and even then when we're going that high, we'll layer the dark and light crystal malts together to help maintain a proper mash pH. The water profile greatly impacts the mash pH as well, but that's for another article!

In addition to pH impact, adding anything more than 10% crystal malt tends to get too sticky and sweet for my liking. I'd rather add depth with base malts such as Maris Otter, Vienna, or Munich versus going too heavy on crystal malts.

Certain crystal malts can have an impact on wort fermentability, but it tends to be minimal. The difference between fermenting a beer with 100% base malt compared to 90% base malt and 10% crystal malt is pretty small, but it depends on the diastatic power of the base malt as well. In general, you'll probably see the final gravity a touch higher when using crystal malts and keeping all other variables the same, but the reduction in attenuation is minimal when using smaller amounts.

In addition to the styles that require it, we've experimented with lighter crystal malts in traditional styles like a helles, Pilsner, and hefeweizen and had a lot of success, but don't go overboard! Something like a 5% Caramel Pils addition in a helles adds a delicious layer of complexity without taking away from the traditional aspects of the beer. Sometimes we'll also experiment with layering or substituting a similar colored crystal that provides a different flavor and aroma than what is traditionally used in a particular style. There are so many new, experimental crystal malts, so why not try them all? And that would be my biggest take-home message for homebrewers is to experiment with all the new crystal malts that are out there; and to layer light and dark crystal malts in some of your favorite darker beers. Don't be afraid to use a small percentage of a lighter crystal malt in a more pale beer as well!

Layering crystal malts is a great idea as it provides a depth of flavor, but layering in a lighter colored crystal malt or two can also keep your water's pH at a level easier to control.

Brian Pawola is the Head Brewer, Distiller, and Co-Founder of Pollyanna Brewing & Distilling. Pollyanna opened their production brewery and tap room in Lemont, Illinois in 2014 and has since added two more in-state locations, including a distillery.

Casey Motes is Co-Founder and Head Brewer of Eureka Heights Brew Co. in Houston, Texas. He has been brewing professionally for the better part of a decade and is a passionate fan of The Golden Girls.

With lighter crystal malts I get a lot of caramel flavor and in the darker varieties the flavors change to toffee and then some really great plum and dark fruit characteristics. Aside from the flavors, added mouthfeel and body are big reasons why we use crystal malt in a recipe. Crystal 120 is definitely the most common crystal that we use at Eureka Heights because the dark fruit flavors work really well with our house English yeast. Another reason is the bang for your buck — we don't need to use as much of the malt to get a big impact.

Layering a couple of crystal malts of different colors is a great way to provide a depth of flavor you can't get from a single roast level. The first test batches of our ESB only used a single crystal malt and the flavor just felt flat. Splitting the crystal to ⅔ 45 °L and ⅓ 120 °L made a huge difference in the final product. That said, we've found that using more than two types of crystal in a recipe didn't really add more depth than just using two.

When building a recipe, 10% crystal malt is pretty much a hard stopping point for us, but we have the best luck between 4-7% depending on the beer style. Crystal malts do lower the pH of your mash, which homebrewers should keep in mind. We start with reverse osmosis water and adjust our salt profile for beers with heavy crystal or roasted malt to take that into account.

You also need to consider wort fermentability when using more crystal malts. We've tried mashing some of the beers with crystal at a lower temperature, but we've found that most styles that use crystal tend to work better with a little extra residual sweetness. Also, our house yeast has a pretty high attenuation, so yeast selection definitely plays an important role there.

In addition to the traditional styles, we're big fans of adding multiple crystal malts to stouts and porters. The sweetness and added mouthfeel from the crystal can help balance out any dryness from the roasted and chocolate malts.

My last bit of advice is the next time you are at the homebrew shop, taste a few of the different crystal malts. It's amazing to taste the difference between the different levels.

Logan Ackerley has brewed at Wallenpaupack Brewing Co. in Hawley, Pennsylvania since its inception in 2017, and has served as Head Brewer since 2018. He began his brewing career at Abandon Brewing Co. in 2015, focusing on clean and wild Belgian-style ales. He then worked at Olde Saratoga Brewing Co., where he learned the science and nuance of lager brewing.

I generally use lighter crystal malts to balance the flavor of lower alcohol, hoppy beers. Our Party Cove Session IPA and Smallmouth Low-Cal IPA rely on C-30 and C-10, respectively, to provide a bit of complexity and malt sweetness. With the lower level of alcohol and the dryness of these beers, there has to be something in the grist to balance out the hop load.

There is such a wide range of flavors and sweetness in crystal malt. Mixing them allows you to make a much more complex beer. Our darker barrel-aged beers have really benefited from this method. We can add flavors ranging from sweet malt and toffee to burnt sugar and stone fruit. Layering these flavors can really add a unique drinking experience for darker and higher alcohol beers as they warm.

My favorite crystal malt is Thomas Fawcett Crystal Rye. The color is in the mid-range and it adds a unique spiced toffee flavor. A lot of my darker beers get 3–5% in the grist. Even small amounts of crystal malt can make a significant impact on a variety of styles. A good example would be our English Pale Mild. We won a silver medal at Great American Beer Festival in 2020 for that beer but I brewed the beer again in 2021 and dropped the crystal rye in the recipe by just 1%, and it totally changed the beer. I wouldn't say crystal rye is traditional for English mild, but without it the beer just fell flat.

We probably don't go much over 15% with crystal malts in any recipe, but depending on what you're brewing, which crystal malts you plan to use, hopping rates, attenuation rates, etc., you may be able to use more.

One more thing that I would recommend paying attention to is the crush on your crystal malts if you're brewing all-grain and with a higher percentage of them. We had some really annoying lautering issues early on when we would brew anything in the amber to brown color range. We found that our mill was crushing the crystal malts a little too fine, causing slow runoffs and making for some really long brew days.

BY ASHTON LEWIS

FERMENTATION UNDER PRESSURE

Also: A solera system, a new flavor in a classic beer, and cooking beer

Q I RECENTLY PURCHASED THE 27-L (7.1-GALLON) FERMZILLA CONICAL FERMENTER. I JUST COMPLETED MY FIRST ATTEMPT AT PRESSURE FERMENTATION. I READ SEVERAL ARTICLES ABOUT HOW FAST AND CONVENIENT IT CAN BE, AS WELL AS A GREAT WAY TO KEEP THE BATCH OF BEER AWAY FROM OXYGEN DURING TRANSFERS. I WAITED 24–30 HOURS BEFORE SETTING MY SPUNDING VALVE TO 12 PSI. FERMENTATION WAS VERY ACTIVE AND I HAD A FAIR AMOUNT OF KRÄUSEN WITH A RELATIVELY STEADY TEMPERATURE OF 72 °F (22 °C). AFTER ABOUT A WEEK, I COULD STILL SEE WHAT I BELIEVED TO BE CONTINUED FERMENTATION. THE SPECIFIC GRAVITY HAD DROPPED FROM 1.066 TO 1.018, BUT IT STILL LOOKED LIKE ACTIVE FERMENTATION AND THERE WAS STILL KRÄUSEN ON TOP. IT ALSO DIDN'T REALLY CLEAR MUCH DURING THE SECOND WEEK IN THE FERMENTER, BUT IT IS A WITBIER. IS A STEADY SPECIFIC GRAVITY THE BEST WAY TO DETERMINE WHEN PRIMARY FERMENTATION IS OVER? SHOULD I ALWAYS GO BY SPECIFIC GRAVITY WITH PRESSURE FERMENTATION?

JOHN COLLINS
GAFFNEY, SOUTH CAROLINA

When monitoring fermentation using density measurement, the end is typically marked by steady readings over 2–3 days.

Photo by Christian Lavender

Applying a spunding valve during fermentation has become a popular technique in homebrewing over recent years, but a lot of questions still surround the concept.

A Yes, using gravity to monitor fermentation status is the best method for use at home because observing bubble activity and kräusen appearance are simply not reliable indicators. I am a fan of clear fermenters (like a carboy or FermZilla) because visual observation of movement during fermentation is telling, but that convenience is given up when using stainless steel. Commercial breweries almost exclusively use closed, stainless steel fermenters these days and monitoring activity using instruments is the method in the commercial world of brewing. When monitoring fermentation using density measurement, the end is typically marked by steady readings over 2–3 days. That usually works, until it doesn't.

Whether fermenting in glass or stainless, and under pressure or not, fermentations sometimes fail to fully attenuate. It's always a good practice to have an idea of where a fermentation is likely to finish. This depends on grist bill, original gravity (OG), and yeast strain. For the sake of discussion, let's assume a witbier has an apparent degree of attenuation of 78%. In your case, predicted FG = [66 – (66 x 0.78)] = 14.52 (gravity points) or 1.015 (specific gravity). Your beer finished at 1.018. If you have multiple data points at 1.018, it's reasonable to conclude that your fermentation finished a bit higher than expected or that your fermentation may be stalled/stuck. Unless you run a forced fermentation (small, over-pitched, fast ferment used to identify the finish line) alongside of your large fermentation, you really don't know if you are finished or not. Because 1.018 is not much over my estimated FG of 1.015, I would consider this fermentation complete and chalk up the difference to something to do with mashing.

Let's take this example to an extreme . . . instead of finishing at 1.018, what if the fermentation was sitting at 1.022? Without having any forced

fermentation data, my brewing experience is telling me that there is a pretty high likelihood that this fermentation has stalled and is stuck with fermentables still present. Again, this can happen in any type of fermenter and at any over-pressure. The kräusening method is a great tool to have in one's bag of tricks to address suspected stuck ferments. Simply add very young beer, aka kräusen beer in the high-kräusen stage of fermentation, at a rate of about 10% of the batch volume. Stuck ferments are usually jump-started by the addition of kräusen beer and will finish out fairly quickly. This is an especially effective tool for bigger beers.

Another layer to this onion are changes in turbidity as fermentation moves through the process from wort to beer. Beers like weizens, wits, and hazy IPAs are not the best types to monitor using clarity as a metric tied to finished beer because these styles are all cloudy to varying degrees. Suffice to say, assuming that cloudy styles will go from one degree of cloudiness to a lesser degree of cloudiness is probably realistic because yeast is not the main source of haze in these beers and some clearing is likely to occur at the end of fermentation, but using cloudiness as a performance metric is a pretty dull tool. Gravity is much more revealing . . . but it does consume beer in the process. That's one reason in favor of extending the time at fermentation temperature for ~3–5 days after the end of obvious activity before pulling a sample for measurement. I am a pretty frugal homebrewer and am not keen on sacrificing more beer to Ninkasi than required (sorry Ninkasi, goddess of brewing and the baker of the bappir). If I am expecting a FG of 1.015 and measure something near it 3–5 days after the party seemed to end, I am OK with chilling and moving to the next step.

You also mentioned observing kräusen on the top of your fermenter towards the end of the period associated with active fermentation. That's not uncommon, especially with top-cropping yeast, like many witbier strains.

And now onto the last major layer to your question: Carbon dioxide release and spunding valve set point. When beer is fermented under pressure, carbon dioxide will saturate the beer at the temperature-pressure condition of your fermenter. You fermented at 12 psi and 72 °F (22 °C); beer equilibrated with carbon dioxide under this condition contains about 1.48 volumes of carbon dioxide. That is pretty low in carbon dioxide, so much so that most folks would describe this level of carbonation as "flat." Because you are spunding early in fermentation, it's safe to assume that you are totally equilibrated after a couple days of gas venting. The only reasons for gas venting late in the process are continued fermentation and gas production or increases in beer temperature that will reduce the solubility of carbon dioxide, increase keg pressure, and cause gas release for your relief valve. You may have been observing the effects of slowly fermenting beer.

Pressure fermentations are convenient for a few reasons, including possible changes in ester profile, fermentation rate, and, the big one in my view, carbonated beer at the end of the process. In order to end up with fully carbonated witbier at 72 °F (22 °C), an equilibrium pressure of ~36 psi is needed (note the FermZilla is rated to 34.8 psi). While that pressure is too high for primary fermentation, it is required if you want to end up with fully carbonated beer. The next time you ferment under pressure, you should consider increasing your spunding valve setting with at least 1.5 °Plato residual extract (1.5 °P / 1.006 above predicted FG) to ensure you have enough fermentables to end up with fully carbonated beer. Hope this information is helpful.

Q CAN I DO A SOLERA PROJECT IN A 10-GALLON (38-L) BARREL WITHOUT BUGS OR AM I MISSING THE POINT?

MIKE BIEL
KENOSHA, WISCONSIN

A Quick definition for our readers: The solera process is a type of fractional blending used to produce a diverse range of aged liquids including Sherry, vinegar, wine, whiskey, and beer. The term solera comes from *solum*, loosely meaning "ground" or "bedrock." The solera system consists of multiple layers of barrels called criaderas, with each layer representing a blend component, usually a harvest year of the final blend that happens in the bottom layer of barrels. Because the barrels are at the lowest level, i.e., the ground level, of the system, they are called soleras. Etymology aside, there is absolutely nothing in the rulebook that states that your solera project must include bugs, bacteria, or funky yeast related to how some sour beer brewers operate their solera systems.

According to the books, the main reason that this system was originally developed was to improve the consistency of Sherry. By definition, Sherry must be aged for at least three years. As such, a common method for Sherry production is to annually transfer about a third of each barrel in the system. This transfer process begins at the bottom by bottling a portion of the solera and replacing by re-filling the solera with the criadera one tier up, then refilling that criadera from a level up, until the top criadera is then filled with new product.

The other rule related to your question is the number of layers and the number of barrels: No rule exists! You can indeed use the solera process using a single barrel so that every year you have a bottling of one-year product blended over the age of your solera. In practice, it does make sense to do something other than aging beer in a solera system (or single-barrel solera) because the oak characters are going to quickly fade as the solera is used for multiple bottlings. You could move aged beer into a new barrel, but if your solera system consists of only one barrel this process would put in a kink in the whole consistency idea. Whatever the master plan, the solera system is a pretty nifty method with lots of fun and interesting applications — no bugs required!

HELP ME, MR. WIZARD

Q I HAVE A QUESTION RELATED TO A PERSISTENT FLAVOR THAT I FIRST NOTICED IN MY FAVORITE AMERICAN MAJOR DOMESTIC LAGER ABOUT A YEAR AGO. I FIND THE SAME FLAVOR IN OTHER BEERS BREWED BY THE SAME COMPANY. NOT SURE EXACTLY HOW TO DESCRIBE THE FLAVOR BUT IT REMINDS ME OF THE TYPE OF STRAW USED AS BEDDING IN A BARN WITH A BIT OF EARTHINESS ADDED INTO THE MIX. DOES THIS MAKE ANY SENSE? IF SO, WHAT COULD BE CONTRIBUTING THIS FLAVOR?

JOE CHAPMAN
LITTLE ROCK, ARKANSAS

A Thanks for the interesting question, Joe. I also enjoy all types of beer, so I went to the store and purchased a selection of beers in attempt to put a finger on what you are describing. It sounds like you are describing grain flavors that are either new to your favorite beer or new to you.

My own taste panel consisting of me, myself, and I, did note a grainy/grassy note in several beers by one of the major U.S. breweries; Brewery Z or BZ for sake of discussion. In my statistically insignificant, but otherwise enlightening sensory exercise, the grainy/grassy notes in beers from BZ were much easier to detect when tasted against other beers. This sort of tasting requires a solid palate, keen attention to detail, and the persistence of a mule. Because of the solitary approach to my analysis, I repeated the sampling a few times (I did buy 6-packs after all) so that I was convinced that my palate was not the issue. My conclusion is that beers from BZ have a pronounced grain/grassy note. But as I mentioned, this observation has zero statistical validity.

This flavor, it's real and not somehow related to bias, is probably from the grain because these beers don't have too many ingredients that could contribute such flavors. How's that for being obvious? I don't know if this character is a new character for BZ because, up until reading your question, I had not previously tasted several domestics at one time and had not noticed this pattern with BZ.

What I do know is that not all base malts taste the same. These differences may be due to differences among malt houses, barley sources (growing region), growing year (weather effects), barley variety (genetic effects), and how the malt is produced/kilned (process effects). Differences among malts is one of the many things that makes brewing interesting. It's very easy to make malt teas to assess the aroma and flavor of malt before brewing. Just like with hop evaluations, much of the aroma found in malt does not survive wort boiling and some of the more volatile and overt notes are removed with water vapor. One of the keys to raw material sensory is knowing what may make its way into finished beer. So all of these observations need to be taken, at least to some degree, with a grain, er, kernel of malt.

But there is something else that may be going on here. As people age, our senses change. Unfortunately, this change is usually accompanied by a decreased sensitivity to subtle notes. It's possible that your perception of your go-to beers is changing, rather than the beers themselves changing. Another possibility is that you are recovering from something like COVID-19 that temporarily whacked out your senses. What once tasted clean and crisp is now being perceived as grassy and green. Now I am questioning my own palate!

Not sure what else to write about this. Perception can be a transient thing as can flavor profiles of beers we may know very well. Breweries generally avoid making changes to beer that can be detected by consumers, but sometimes changes are abrupt and are detectable. If you don't like the change, my suggestion is to find a new commercial fave for those times you are low on your own brew. In the meantime, pick up the pace and brew your own!

Q IN AN ARTICLE BY JOHN NALESZKIEWICZ IN THE OCTOBER 1995 ISSUE OF *BYO*, HE REVIEWED A METHOD OF REMOVING THE ALCOHOL AFTER FERMENTATION BY HEATING THE BEER IN AN OVEN AT 180 °F (82 °C). IS THERE ANY RISK OF FIRE WITH THIS METHOD?

CHRIS PATTERSON
DOWNERS GROVE, ILLINOIS

A Wow! Talk about a blast from the past and a reminder of how brewing trends often slowly develop. The topic of no-alcohol and low-alcohol beers is certainly gaining traction in the world of craft beer as consumer trends are pulling breweries in new directions. Depending on the conditions, enough alcohol vapor could conceivably accumulate in an oven containing a pot of beer to create a combustible atmosphere, but it's pretty unlikely.

A much more likely scenario, however, is really gnarly beer remaining in the oven following this process. Even if an oven-based process was designed to eliminate oxygen from the beer, the beer would certainly develop cooked flavors because batch distillation like this requires long exposure to heat. In the September 2022 issue of *BYO*, I covered several methods currently used to produce low-alcohol and no-alcohol beers. The "Advanced Brewing" column in the October 2022 issue also covers the topic. I recommend giving those both a read.

My usual view on homebrewing methods is to go with the flow and embrace the free-spirited innovators who make homebrewing so vibrant. In this case, however, I suggest more nuanced methods to the pursuit of low/no-alcohol brews than the oven treatment. BYO

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SCHEDULE AT-A-GLANCE

(All Times are Eastern)

BYO NANO CON ONLINE

NanoCon Online Day #1 • Friday, November 4, 2022

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

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

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

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BY GORDON STRONG

GRAPE ALE

Pyment's beery cousin

A grape ale is a kind of fruit beer, but it's not just any type of beer with grapes.

GRAPE ALE
BY THE NUMBERS

OG:	1.059–1.075
FG:	1.004–1.013
SRM:	4–8
IBU:	10–30
ABV:	6–8.5%

Photo courtesy of Shutterstock.com

Originating in Italy as Italian grape ale, this style was introduced in the 2015 Beer Judge Certification Program (BJCP) Style Guidelines as a local style to Italy. Other grape-producing areas around the world learned of this style and began experimenting with their own variations using non-Italian grapes but a similar method. In the 2021 BJCP Guidelines, Italian grape ale remains in the appendix as a local style at the request of the Italians, but a broader style was introduced to the fruit beer category, grape ale. This style takes elements of wine and beer and combines them in a single beverage that can express the terroir of worldwide viticulture.

Combining grapes with other beverages is not something new, nor is combining multiple types of alcoholic beverages. Meadmakers have long made pyment, a hybrid of mead and wine; and braggot, a hybrid of mead and beer. Historical beverages other than wine certainly included grapes as part of the fermentables. But this modern grape ale is a newer phenomenon from the modern craft beer era. Its name is meant to be descriptive, but it sometimes causes confusion with those unfamiliar with the style.

A grape ale is a kind of fruit beer, but it's not just any type of beer with grapes. The base beer and the kind of grapes are somewhat restricted — the base beer is generally neutral, and the grapes are wine-type grapes (red or white). A grape ale is not a beer with wine-like character, such as a Flanders red, which is sometimes described that way (especially by Michael Jackson). It is not a beer using grape-derived products such as Phantasm, that add grape character to beer. It's not a beer having wine-associated hop character from thiol-rich hops such as Nelson Sauvin or Hallertauer Blanc. It's not a sour beer with some kind of grape content. And finally, it is not some kind of historical beer that used grapes as some of the fermentables.

Grape ale is style 29D in the 2021 BJCP Style Guidelines. Italian grape ale is present as style X3, a local Italian style. Compare the two for an understanding of how the style has been broadened beyond using just the local Italian grape varieties. Note, however, that the style parameters for them were developed using an analysis of commercially available Italian grape ale examples.

HISTORY

I've summarized the history in the introduction section, describing how the style evolved beyond its Italian roots to the modern style that is still developing today in other winemaking regions of the world (including the United States). As a developing style, it is still likely to change in the future as more examples are produced and commercial brewers coalesce around common ideas that work.

The original Italian grape ale style is generally considered to have begun in Italy around 2006 when producers Birrificio Barley and Birrificio Montegioco produced early examples. Ironically, the Birrificio Barley example, BB10, was based on imperial stout. The modern Italian grape ale style description (written by Italians to promote the style) specifically excludes beers with a roasted character from the style. Yet, it was one of the first examples and helped start the trend.

Other breweries began experimenting with the concept and the style began to develop. I enter the picture in 2014, when I was in Ireland conducting a BJCP exam. One of the examinees was Gianriccardo Corbo, who I later learned was leading an Italian beer movement seeking to recognize the style. They had developed an early

draft of the guidelines that they provided to me for consideration for the forthcoming 2015 Style Guidelines.

My initial reaction was that it sounded like a fruit beer and that commercial examples were not widely available. However, the Italians were adamant about wine grapes not being a fruit since people didn't eat them that way, and that wine was an important part of their culture. While the BJCP is not involved in promoting the beer industry in different countries, it did seem to be a style that was produced and that was appearing in local competitions. So, as part of including similar submissions from Argentina for local products that their competitions used, I took this as an emerging style that wasn't part of the main section of the guidelines.

Subsequent to the publication in the 2015 Style Guidelines, the style continued to evolve and Corbo continued to enhance their guidelines. On trips to South America and elsewhere, I began to see more examples of the style, including one trip to Brazil where I helped create a collaboration batch of this beer with a local brewery. Other countries in Europe expressed interest in their own versions using non-Italian grapes. So I was faced with creating a profusion of local styles or building a more generic style encompassing them all. This is the style that appears in the 2021 Style Guidelines. But since the Italian version has a strong following locally, it remains as a separate local style for their use while the rest of the world continues developing their versions.

SENSORY PROFILE

A grape ale has elements of both wine and beer present and noticeable. The grape character has a dry, fermented quality like wine, not a sweet juice character like a breakfast drink. The beer character is relatively neutral, but has enough of a malt presence to distinguish the grape ale from a wine alone. The product is well carbonated, which makes the impression seem more related to a sparkling wine.

Grape ale can utilize red or white grapes, with all the various fruity and sometimes spicy notes present in wines based on the same grape varieties. The malt is typically just pale, Pilsner, or

GRAPE ALE

(5 gallons/19 L, all-grain)
OG = 1.055 (pre-juice)
FG = 1.010 IBU = 10
SRM = 4 ABV = 7.7%

INGREDIENTS

5 lbs. (2.3 kg) Pilsner malt
1.75 lbs. (794 g) wheat malt
0.4 lbs. (181 g) Carapils® malt
2.1 gal. (8 L) Moscato grape juice, fresh, unconcentrated (21 °Brix = 1.088 SG)
4.6 AAU Amarillo® hops (0 min.) (0.5 oz./14 g at 9.2% alpha acids)
4.3 AAU Mandarina Bavaria hops (0 min.) (0.5 oz./14 g at 8.5% alpha acids)
2.5 oz. (71 g) Amarillo® hops (dry hop)
2.5 oz. (71 g) Mandarina Bavaria hops (dry hop)
Lalvin D-47 or Lalvin 71B yeast
⅞ cup corn sugar (for priming)

STEP BY STEP

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

This recipe uses an infusion mash. Use enough water to have a moderately thick mash (1.5 qts./lb. or 3.1 L/kg). Mash in the malts at 151 °F (66 °C) and hold for 60 minutes. Raise the temperature to 169 °F (76 °C), and recirculate for 15 minutes.

Sparge slowly and collect 4 gallons (15 L) of wort. Target a pre-boil gravity of about 1.049.

Boil the wort for 60 minutes, adding hops at the end of the boil and allowing them to steep for 20 minutes, stirring the wort gently. Target final volume is 3.2 gallons (12 L) of wort at about 1.055.

Chill the wort to 65 °F (18 °C), then add the grape juice, resulting in a pre-fermentation volume of about 5.25 gallons (20 L) and an OG of about 1.068. Pitch the yeast, and ferment until complete, about 10 days, allowing the temperature to rise as high as 73 °F (23 °C). Dry hop for two days, then remove hops. Rack to secondary at 73 °F (23 °C) and gradually chill over 10 days to 36 °F (2 °C). Racking should result in about 5 gallons (19 L) of finished beer. Cold condition on the yeast for 6–8 months. To learn more on this process and best practices, check out: https://winemakermag.com/technique/lees-sur-lie-aging-and-battonage

If possible (using a container such as a Corny keg that can hold pressure), prime the beer in secondary and allow natural carbonation slowly over time. A slow forced carbonation over a long period of time can replicate this process. Rack and package.

GRAPE ALE

(5 gallons/19 L, extract only)
OG = 1.055 (pre-juice)
FG = 1.010 IBU = 10
SRM = 4 ABV = 7.7%

INGREDIENTS

4 lbs. (1.8 kg) weizen or wheat dried malt extract
2.1 gal. (8 L) Moscato grape juice, fresh, unconcentrated (21 °Brix = 1.088 SG)
4.6 AAU Amarillo® hops (0 min.) (0.5 oz./14 g at 9.2% alpha acids)
4.3 AAU Mandarina Bavaria hops (0 min.) (0.5 oz./14 g at 8.5% alpha acids)
2.5 oz. (71 g) Amarillo® hops (dry hop)
2.5 oz. (71 g) Mandarina Bavaria hops (dry hop)
Lalvin D-47 or Lalvin 71B yeast
⅞ cup corn sugar (for priming)

STEP BY STEP

Use 4 gallons (15 L) of water in the brew kettle; heat to 158 °F (70 °C). Turn off the heat. Add the malt extract and stir thoroughly to dissolve completely. Turn the heat back on and bring to a boil.

Boil the wort for 60 minutes, adding hops at the end of the boil and allowing them to steep for 20 minutes, stirring the wort gently. Follow the all-grain recipe for post-boil, fermentation, and packaging instructions for the beer.

> **The grape ale can be refreshing to complex in character and normally is quite aromatic.**

wheat malt, with very limited use of pale crystal malts. Darker malts are not used. The use of other fruits to add fruitiness is not appropriate in this style; that type of beer would be a fruit beer with grape ale as the base style. Since the base beer is relatively pale, the color is driven mostly by the grape variety used.

Having some wine knowledge helps when judging this style, since certain wine grape varieties are well known and have very expressive characters. Red grapes often have flavors of darker fruit (blackberries, cherries, etc.) while white grapes often have lighter flavors like melon, peach, apricot, pear, and such. Paler grapes can often be quite floral, while darker grapes may have some more rustic and earthy notes. It is very hard to generalize solely on the color of the grape; the varieties of grapes used and where they were grown play the largest roles in determining the character.

Bitterness in this style is fairly low, typically, since grapes have some natural acidity that provides balance. The beer is normally quite dry, like most fine wines, and has a sparkling character. A grape ale should not have a wild or strongly tart character just as a wine would not normally have the same. A grape ale with that kind of character would fit better in one of the American wild styles, such as 28C wild specialty beer.

The yeast character can be neutral, or bring fruity and/or spicy notes. Likewise, the hop character can take on many forms, but is usually floral or fruity. Both the yeast and the hops should combine well with the grape character — most of the skill in making this style involves deftly pairing the grape with the beer ingredients. As wine might be oaked, this style can see some wood character. However, most do not have this feature, since the oak can easily dominate the aromatics and flavor — an undesirable outcome.

The grape ale can be refreshing to complex in character and normally is quite aromatic. While both wine and beer character are present, the best examples have a very well-integrated flavor profile. The beer elements should not dominate the wine character, so hopping is often restrained, especially in the flavor dimension. The beer can have a wide range of alcohol strengths. Most are in the 6 to 8.5% ABV range, but commercial examples exist from 4 to 12%.

BREWING INGREDIENTS AND METHODS

The beer is normally prepared with typical methods, and the grape juice is added after the wort is produced and chilled, but before the yeast is introduced. The beer and wine components are fermented together, not separately. The percentage of grape juice used can vary quite a bit, from 15–20%, to upwards of 40%. This is determined by volume in the fermenter, so the base beer recipe should be calculated for an amount that assumes the addition of a known quantity of grape juice. Also note that wine grape juice often contains high levels of sugar. Gravity readings of 1.090 to 1.110 are common in wine regions where full ripeness is achieved.

The base beer is based on pale or lightly kilned malts such as Pilsner or pale ale malt, with wheat and sometimes light crystal malts involved. Mash programs that produce a somewhat attenuative wort are desired, since a heavily dextrinous beer would hurt the drinkability. The grape juice is often fresh, especially when using higher percentages. If the juice is concentrated, smaller percentages are used. The availability of fresh juice often makes grape beer a seasonal product since it is dependent on when grapes are harvested and processed. Red or white grape varieties can be used, or blends of grapes can be chosen.

The hops can vary widely, but should be selected with care so as to blend well with the chosen grape variety. Most have fruity or floral notes. Those hops that are overly wine-like might tend to dominate the grapes themselves. Those hops with dank, vegetal, or overly sulfury notes might not combine well with the grapes.

Beer or wine yeast can be chosen, often with the wine yeast being paired with the grape variety. Belgian, English, or neutral American yeast strains may be used. As with hops, the pairing of the aromatics from the yeast have to be done carefully to complement the selected grape varieties.

A variety of options are available for maturing and conditioning the grape ale. It can be packaged young, it can be aged on the yeast for additional complexity (a winemaking process known as aging sur lie), it can be lagered like beer to smooth out the profile, or it can be barrel-aged for some additional character. The choices are more like those a winemaker would consider than a brewer.

HOMEBREW EXAMPLE

This example is based on the version I made with Cervejaria 4 Árvores in Porto Alegre, Brazil in 2018. Head Brewer and Owner João Henrique Franco and I worked together to create a beer that matched hops with their local Moscato grape must that was freshly pressed at the time. Since then, the brewery has continued this beer as an annual series with a different type of grape every time, plus some experimental editions with wild fermentation and added fruit.

We selected a neutral base beer somewhat similar to that used for a saison or a Catharina sour: Pilsner malt and wheat malt. A small amount of Carapils® was used for additional head retention. We made this beer late in the grape harvest season, so we selected Moscato grape as one of the only available at the time. I supported this choice because it is a white grape that often makes very nice sparkling wines. He wanted to use a full 40% grape juice, so we did. Note that this is freshly pressed, unconcentrated grape juice without additives, not something that has been boiled. This is added after the wort has been prepared and chilled, so the recipe is for the beer portion of the final product. Since grape juice is higher gravity than the wort, the final ABV will be closer to 7.7%.

We debated several hop options. I liked the use of Amarillo® since I knew it had paired well with things like

Belgian IPAs that have a strong fruity character. João wanted to use more than one hop, and suggested Mandarina Bavaria rather than some of the New Zealand hops that I liked, since they were available. When we brewed the beer, I crushed some of the hops and added them to a sample of the Moscato must to see if they worked well together, and the aromatics were quite pleasant indeed. João has also used Cascade and Amarillo® together on other beers to good effect.

One departure we have from the Italian tradition is to dry hop the beer, which I think does have a positive impact on the final profile. Brewers should also note that the bitterness of this beer comes entirely from whirlpool additions of hops, so allowing them to steep for 20 minutes after the boil is critical for the bitterness to be extracted.

Given the high percentage of grape juice, we decided to use the D-47 yeast, which is a widely available wine strain. I had used that in meads previously, and thought it worked well. My preference, the 71B wine yeast I use most when making meads, was unavailable in Brazil. But we both wanted to use a wine yeast.

João also wanted to use the Italian Charmat method to carbonate the beer, which involves a long secondary fermentation in a closed steel tank where the carbon dioxide from fermentation slowly dissolves into the beer. This is a natural way of fermenting the beer and is used in the Italian winemaking industry to produce Prosecco and Asti Spumante, among others. I was happy to use a traditional method that gave a very fine bubble and a high level of carbonation. Another benefit of the long conditioning time is that the beer ages on the yeast, which gives a slightly more complex profile.

I was very pleased with the final result of this collaboration when it was packaged and released. I also am honored that it continues to remain in 4 Árvores' annual release schedule. It had a very expressive wine character, a bubbly texture, and was dry and refreshing. Exactly what we had hoped for when we designed the beer. If you decide to make this beer, please try to source fresh grape must or juice intended for winemaking in season.

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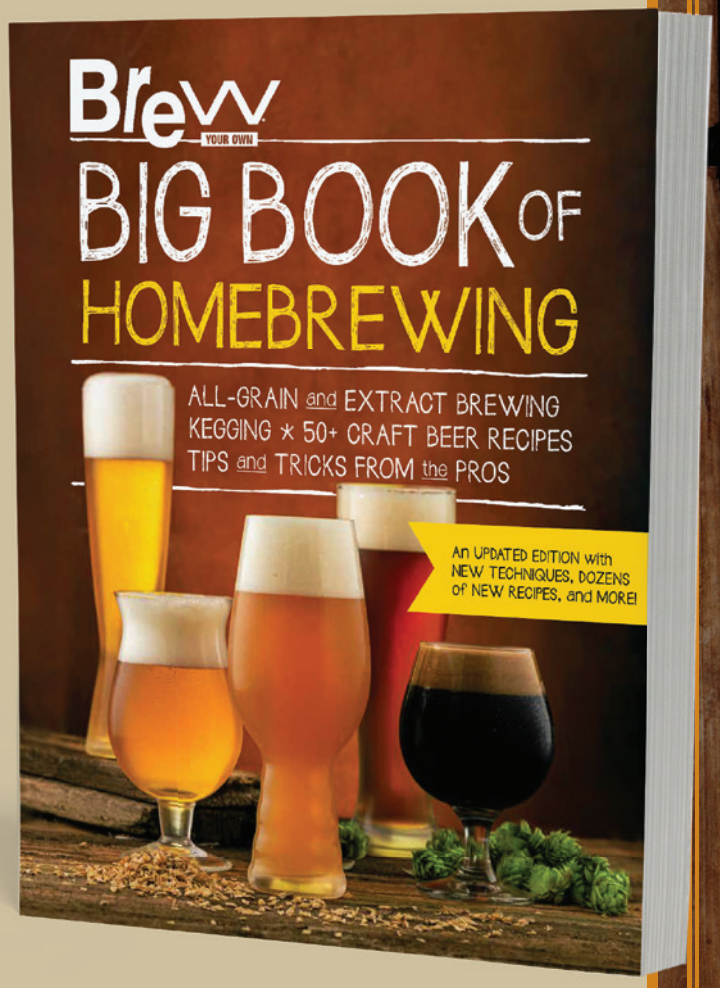

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Brew YOUR OWN — THE HOW-TO HOMEBREW BEER MAGAZINE

Perfect Winter Pairings

Pairing foods with your big beers

by Mirella Amato

Pairing beer with food is a great skill to have. In a good pairing, the combination will coax out interesting flavor nuances in both the food and the beer; it will be greater than the sum of its parts. The right combination will bring your dining experience to a whole new level as the flavors in the beer and food interact and play off each other in new and sometimes surprising ways.

Photo by Charles A. Parker/Images Plus

Photo by Charles A. Parker/Images Plus

Wine isn't the only beverage that pairs well with food. With the wide array of beer flavors and styles, it's possible to find a great beer match for any dish by considering the intensity, tastes, and flavors of both.

Although bringing beer to the table is becoming more commonplace these days, especially with the proliferation of brewpubs over the past decade or two, the more common belief is that wine is the beverage best suited for pairing with dining experiences. Why is that? One theory of note is that, for many years, the majority of fine-dining establishments served Italian or French food. These are two countries where wine is more traditionally served at the table (although both now have thriving craft beer movements as well). It therefore became natural to think of wine as the beverage that should be served with higher-end food, and to relegate beer to pubs.

Another reason that certainly helps explain why pairing beer and food is not as common in North America when compared to some other countries, like Belgium for example, is that the ability to compellingly pair beer with food is fairly new. This has to do with the fact that for a good 30 years the beer selection in North America was very limited. In the years following Prohibition, breweries had to merge and consolidate in order to thrive. They also pared down brands to be more efficient and, as a result, the beer landscape was almost entirely populated with golden colored, lightly flavored, highly carbonated lagers. That's not a lot to work with food-pairing wise. Had the only wine available to us for those 30 years been a range of oak-aged Chardonnays, we probably wouldn't be pairing wine with food either.

Those days are long gone, thankfully, and this is a fantastic time to get into pairing beer with food. With such a large selection of beer styles and flavors to choose from — from light, crisp Pilsners, to full-bodied, complex weizenbocks, and dry, tart fruit lambics, it's possible to find a great match for any dish.

In a nutshell, putting together a pairing involves breaking down the characteristics in the beer you plan to drink, and then finding a dish with characteristics that will work well with those in the beer (or vice versa). At a beginner level, there are three characteristics of the beer and food to consider: **Intensity, tastes,** and **flavors.** Beyond these three aspects there is a lot of room for fine-tuning to get from good to great pairings, but aligning the intensity, tastes, and flavors of your beer and food will reliably yield a harmonious match. Let's take a moment to look at each of these three characteristics.

Intensity is the overall impact of a beer or food. At a high level, the concept of intensity is quite straightforward: With beer, a double IPA, for example, is more intense than a witbier and, with food, a vindaloo is more intense than hominy grits. When picking a food to pair with your beer, your best bet is to match their respective intensities. If you drink a light lager with a chocolate cake, the richness of the cake will completely overwhelm the delicate character of the beer. On the flipside, if you pair a doppelbock with a green salad, the delicate flavors in the salad will be hard to appreciate. Although it is possible to get quite granular when gauging intensity, working with a general impression is a great first step.

On to **taste.** Tastes are the structural characteristics of the beer. They include bitterness, sweetness, acidity, umami, and — in the case of Gose — salt. In a food-pairing context, these tastes all interact with each other differently. They can also interact with other sensations such as warming and cooling sensations, from wasabi or mint, for example. Some interactions, like the one between acidity and salt (think salt and vinegar chips) are harmonious, while others like acidity with sweetness (imagine having a chocolate marshmallow brownie with a side of pickles) will result in a sharp distortion of flavors. While it's good to be aware of common taste interactions when experimenting with beer and food pairing, the best way to learn about them is through trial and error. Once you taste an unpleasant interaction, you never forget it!

The third characteristic to consider when approaching beer and food pairing is **flavor.** Both beer and food have a large range of possible flavors. There is also a notable overlap between the two. Malt flavors, such as cereal, cracker, biscuit, bread, toast, caramel, toffee, coffee, and chocolate can all be found in food. Similarly, there are a wide range of fruity and spicy flavors in beer that mirror food ingredients and flavors. When putting

together a pairing, you want to look at flavors that either match or work well together. For example, a beer with lemon notes can be paired with a dish like lemon chicken, which is prepared with lemons, or with a dish like wiener schnitzel, which is typically served with lemon. Both approaches work, but it's best to resist the temptation to pair beers and foods that match too closely (raspberry beer with raspberry pie, for example). While this type of pairing will work in a pinch, because of the similarity in flavor, it won't be particularly compelling.

Focusing on these three traits and taking the time to align the intensity, considering interactions and finding complementary flavors is an effective technique and yields solid beer and food pairings. Having covered the basics, we're now going to focus on pairing foods with high-ABV beers and then three specific styles that are great for the wintertime (and happen to be featured in this issue's cover story on page 42).

PAIRING FOOD WITH BIG BEERS

Winter is a great time to indulge in fuller-bodied, high-alcohol styles that might be less enjoyable in hot weather. These include barleywine, wheatwine, and imperial stout; beers with a warming quality and round, luscious mouthfeel as well as a more notable sweetness. Their rich, warm character makes them ideal sippers in cold weather. Although these beers certainly have enough presence and complexity to be enjoyed on their own, they're also great with food. In fact, pairing them with food can highlight new dimensions of flavor and bring a new appreciation for the many contexts in which each style can be enjoyed. Let's now take a moment to examine intensity, taste interactions, and possible flavor combinations with these styles.

These beers all have a similar high intensity. This intensity comes from a combination of high alcohol, complexity of flavors, richness, a full body, and moderate sweetness. Their high intensity works out well for food pairing in the winter months because it can be matched with some of the more intense, richer foods that we gravitate to for comfort in cold weather. The foods that pair with these beers will derive their intensity from a notable flavor impact or a rich texture and, in many cases, both. This combination of characteristics will allow the foods to stand up to these bold beers and, with the appropriate combination of complementary tastes and flavors, yield an array of complex and satisfying pairings.

In terms of interactions, the key trait to be aware of in these strong beers is alcohol warmth, which can be notable in all three styles as they tend to hover around 9–12% ABV. The warmth of alcohol reacts with certain tastes in a way that can overwhelm both the dish and the pairing. The first characteristic to approach with caution is a high salt content. A dish like salt cod stew, for example, will lose its nuance of flavors and taste sharply salty when paired with a high-alcohol beer. High bitterness in food is another trait best avoided when pairing with high-alcohol beers. This is less of a concern because rich dishes that also have a strong bitterness are quite rare. The third characteristic to be mindful of with these beers is spicy heat. The warming sensation of a high-alcohol beer will aggravate the capsaicin heat in food to distracting levels, detracting from the flavors in both the beer and the food.

While barleywine, wheatwine, and imperial stout are alike in intensity and share a similar alcohol warmth, when it comes to flavor, there are a number of nuances to consider. Each of these three styles has its own balance of flavors, resulting in a wide number of pairing options. Their flavor differences allow for fine-tuning to find the best candidate to pair with any given hearty/rich food. Let's next examine the flavor profiles of each of these three bold styles as well as the types of food that might best pair with each.

BARLEYWINE PAIRINGS

Barleywines are English in origin and date back to the late 1800s. They have a round, chewy malt presence that features varying levels of caramel flavor, depending on the interpretation, as well as a complexity of toast, biscuit, and other Maillard products. These malt flavors are accompanied by dried fruit esters that can range from prune, raisin, and fig to plums and dark berries. Hop aromas and bitterness varies, depending on the interpretation. Some barleywines have an English character, with delicate

Photo courtesy of Shutterstock.com

There are both matching and complementary flavors when pairing barleywine with roasted, seared, braised, or stewed meats. Roasted duck with plum sauce is a great pairing as the Maillard products and caramelization in the beer matches that of the roasted duck and complements the sweet plum sauce.

earthy or floral hop notes and enough bitterness to balance the malt. Others are American in style, typically with bold citrus or resinous hop notes and an accompanying firm bitterness.

When it comes to main courses, barleywines call for roasted, seared, braised, or stewed meats, especially lamb or duck. Here we find both matching flavors and complementary flavors because the Maillard products and caramelization match the seared and caramelized flavors of the cooked meat and the dark fruit notes mimic common accompaniments to the meats (think duck with plum sauce or lamb with blueberry sauce). The richness of barleywines, along with their sweeter caramel and dried fruit notes are also a great match for paté or foie gras, which are commonly served with caramelized onions and dried fruit respectively.

Dessert-wise, barleywines are great with crème brûlée where caramel flavor serves as a bridge, allowing other flavors in the beer and food to shine.

When it comes to cheese, English-style barleywines pair very well with aged, caramelized cheddar, while the added intensity of the American-style makes it well-suited for bolder blue cheese. In both cases, the combination of sweet malt and fruit flavors of the barleywine mirror sweet notes in the cheese and a chutney or dried fruit accompaniment.

WHEATWINE PAIRINGS

Wheatwines are the most modern of these three styles, having emerged in the United States in the late 1980s. They are typically lighter in color than barleywines, often deep gold or pale amber. Although interpretations vary, the most compelling examples are brewed to highlight the bready and honey-like flavors of wheat, which forms a large part of the grain bill and lends its name to this style. Consequently, caramel, toast, or biscuit notes from specialty malts are usually very light, as are hop aromas, and there is just enough bitterness to clip the malt, without overpowering it. These beers also have fruit esters that can lean towards dried fruit or sometimes reflect dark fruit notes such as plum or black cherry.

Wheatwines, being lighter than barleywines and more bready in flavor, fare better with lighter roasted gamey meats like pheasant and rabbit. While the body and deep fruit flavors of these beers allows them to stand up to any sauces and condiments required to offset the dryness of the meat, their leaner flavor leaves room for the delicate, gamey flavors in the meat to shine through. Examples of other foods that benefit from this combination of rich texture and delicate flavors include meatier fish (such as swordfish) and mild chickpea curries.

For dessert pairings, wheatwines work well with sweet potato pie. The bread and honey flavors tie in with the crust and delicate sweetness of the pie, highlighting the baking spices and whipped cream. Another fun option is French croquembouche, which has a similar balance of flavors to sweet potato pie, but a completely different texture.

Cheese-wise, wheatwines are a good match for Limburger. Wheat and honey flavors in the beer mirror the grassy notes and light sweetness of the cheese, without masking that trademark funk.

IMPERIAL STOUT PAIRINGS

Imperial stouts, like barleywines, originate in England and date back to the late 1700s. These beers are dark brown or black and opaque from the use of dark roasted malts, which also give them bold coffee, cocoa, or chocolate notes. These bold, bitter flavors are usually supported by softer malt notes of caramel or toast as well as fruit esters that contribute aromas of figs, dates, prunes, or raisins. Some interpretations have a richer malt character and subdued bitterness, while others are fairly dry, with a firm bitterness and American hop character. The bitterness and finish of these beers usually features a combination of hop and roasted malt characteristics.

The deep roasted malt flavors in imperial stouts are a great bridge for smoked flavors in foods like brisket or ribs. The complexity of underlying malts and dried fruit in these beers also result in a great match for saucy smoked pulled pork or baked beans. Here, sweeter sauces should be met with sweeter interpretations of the style.

Imperial stouts are particularly great with dessert. Creamy chocolate desserts, like mousse or cheesecake taste richer when paired with these

Photo courtesy of Shutterstock.com

There may be no beer style that pairs better with dessert than imperial stout. With mirroring malt and coffee notes, imperial stout pairs perfectly with tiramisu.

beers. The dark chocolate and cocoa character of the beers cancel out the bitter chocolate notes in the desserts, emphasizing their richer, creamy qualities. Another creamy pairing for imperial stout is tiramisu, which is made with biscuits that mirror the underlying malt notes of the beer as well as coffee that ties in with the roasted malt flavors. This pairing is so compelling, in fact, that some people include imperial stout in their tiramisu recipe.

With cheese, again, a creamy texture works well; sweeter imperial stouts are great with triple-crème brie. Drier examples of the style, with a more pronounced American hop character, like barleywines, are wonderful with a bold blue cheese.

BARREL-AGED PAIRINGS

Adding to all this fun is the fact that all three of these styles are often barrel-aged, to great effect. When barrel-aging these beers, it is common to use barrels that previously housed spirits like Bourbon, rum, or Cognac. This will add a complexity of sweet flavors that can include vanilla, brown sugar, honey, dried fruit, and baking spice. Barrel-aged strong beers are great for dessert, but they're also great *with* dessert. Desserts with dark chocolate notes, in particular, are highlighted by the many flavors that barrel aging can bring, coaxing out an underlying complexity of flavors in the chocolate. Barrel-aged beers also have tannins that provide a lovely textural contrast to the creaminess of chocolate.

There are so many different possible pairings for each of these three styles. Barleywine, wheatwine, and imperial stout are all great at the table, especially in the winter months. In addition to offering the perfect complement to a range of heartier food, their bold, complex flavors and warming character make them an ideal choice for cold weather. These beers are already showstoppers in their own right. Pairing them with food will open a whole new dimension of flavor appreciation and the experience is bound to be both satisfying and memorable. BYO

Photo by Charles A. Parker/Images Plus

Bring on the Warmth

Brewing big beers for winter

by Gordon Strong

When the cold winds blow, jack-o-lanterns are removed from porches, and pumpkin beers disappear from store shelves, we know winter is upon us. The coming of winter calls for warming up, from putting on a favorite sweater, chopping wood and lighting fires, to breaking out those big beers you've been saving. Don't wait until it's deep into winter to discover you are out; start brewing now to have an ample supply for those long, cold nights.

Many styles of beer can serve as a wintertime companion, but in this article, I'll take a closer look at three high-ABV styles that can help shake off the frost: Barleywine, wheatwine, and imperial stout. The general tips I give for brewing big beers (which I arbitrarily define as beers 8% ABV and up) will work for all of these, as well as other high-gravity favorites. The areas of specific interest to me when brewing big beers, and I'll discuss more in depth next, are recipe formulation, the brewing process, fermentation, and conditioning.

RECIPE FORMULATION

There are a few things to keep in mind when creating a recipe for a strong beer. First is that big beers tend to have more body and flavor, and a higher finishing gravity than normal strength beers. I tend to use lower percentages of crystal-type malts in big beers than in low-gravity beers because the base malt itself provides richness. Munich-type malts are an alternative for providing added maltiness without as much residual sugar sweetness. Sugary adjuncts can be used for flavor and sometimes for boosting starting gravity, but excessive use of sugary and starchy adjuncts can result in a nutrient-poor wort that is not a good environment for subsequent fermentation. I sometimes add a pinch of a dark malt in the grist for color adjustment, but also to improve storage characteristics due to anti-oxidant properties.

I often think about using the no-sparge brewing technique, sometimes called brewing with first runnings. Rather than sparge the mash, simply run off the mash and use that as your starting volume of wort. Of course, you have to have enough liquid in the mash to reach your starting volume. I will use an infusion of near-boiling water to raise the mash temperature at mashout, which also increases my runoff volume.

The no-sparge technique has a lower mash efficiency than when you sparge, so you have to increase grist weight accordingly. I find that increasing the grist by about one-third is needed if you follow this technique. The idea is that you are sacrificing mash efficiency for better flavor from first runnings and a higher gravity of runoff. Of course, the mash can be sparged to create a smaller beer from the second runnings.

Another consideration for brewing big beers is your mash volume. A larger grain bill will require a larger mash tun to brew your usual batch sizes. A 5-gallon (19-L) batch will often require a 10-gallon (38-L) mash tun.

THE BREWING PROCESS

Recall that bigger beers tend to have more body and a higher final gravity unless you take additional measures to counter this effect. One thing that you can do is mash at a lower temperature to increase attenuation. Mashing in the range of 144-149 °F (62–65 °C) favors beta-amylase activity, which is the enzyme that produces the highly-fermentable maltose sugar. If you are concerned about body, you can always add dextrin-rich malt such as Carapils®.

You also want to develop sufficient nutrients (free amino nitrogen, or FAN) to support a healthy fermentation. If you are using well-modified malts and avoiding excessive sugary and starchy adjuncts, this should happen naturally. However, if you want to be sure, keep your mash pH in the lower range (5.1 to 5.2), mash with a thicker water-to-grist ratio — 1.5 qts./lb. (3.1 L/kg) or less — to protect the enzymes, and mash for a longer period of time (up to 2 hours). Keep the mash well-stirred, but avoid heavy shearing forces (whipping the mash or pumping it fast). Conduct an iodine test to see if starches are fully degraded before proceeding to lauter. FAN can also be preserved by limiting the boil to 60 minutes, since longer boils can reduce FAN content.

FERMENTATION

Remember that wort is yeast food, and that you are trying to create a hospitable environment for fermentation. When brewing big beers, you are creating problems for yeast. The osmotic pressure of high sugar density stresses yeast cells, and the alcohol produced during fermentation is toxic to yeast. Selecting yeast strains that have higher alcohol tolerance gives you some increased margin of error, but you have more work to do. Higher gravity brewing increases esters and higher (fusel) alcohols in beer, so you don't want to add even more stress to the fermentation that exacerbates that effect.

Using more yeast is important in higher gravity beers, especially lagers. Use more yeast packs, make starters with yeast nutrients, step up your starters, or reuse yeast from a previous batch. I sometimes will get a fresh pitch of yeast from a commercial brewery if making a big beer to ensure maximum viability. If reusing yeast from your own brewing, you might want to add yeast nutrients that contain zinc (such as Servomyces) to improve yeast health and performance.

I will oxygenate the wort with pure oxygen before pitching the yeast to encourage yeast growth and a healthy start to fermentation. I run my oxygen through a sintered stone and let it go full blast for around a minute. When you do pitch the yeast, don't pitch it into wort colder than the starter, which can shock the yeast. Keep the starter at the same temperature as the wort or slightly cooler.

I try to pitch on the cooler side of ale temperatures most times, around 64 °F (18 °C), and to keep the fermentation cool for the first three days. Then I allow the yeast to free rise in temperature during fermentation to help it finish and fully attenuate the beer. Rousing the beer gently during fermentation to keep the yeast in suspension also can help.

Photo courtesy of Shutterstock.com

American barleywines are generally more bitter and have a greater hop intensity than the original English barleywines.

CONDITIONING

Big beers can take some time to condition, so plan ahead and leave sufficient time for this phase. The commercial beer Samichlaus was famously aged for a year before being released. Some big beers are vintage dated to encourage cellaring. I quite enjoy a well-aged big beer for the additional flavor complexity that can develop with time.

If you have the ability to drop the trub and spent yeast from fermentation, you may consider doing this prior to conditioning — it can help improve flavor stability, clarity, and foam, while avoiding the potential for developing some off-flavors. Racking your beer to a secondary vessel or dropping yeast from a cylindroconical fermenter can achieve this. Repitching with fresh yeast might help a beer that isn't quite attenuated enough, but it also can help with maturing the beer. You don't necessarily have to use the same yeast strain. I have used

a more attenuative strain, and have also packaged with a lager strain to work better at cool temperatures.

Take special care to avoid introducing oxygen during packaging and seal your containers (bottles, kegs, or other storage units) well to avoid extra oxidation. Having live yeast in your packaged beer will result in a longer shelf life for your beer, and might help scavenge any remaining dissolved oxygen. Store your beer in stable cellar conditions. Take care of your beer and it will take care of you.

Now, let's take a look at a mini profile of some candidate styles to brew. I have covered these in previous "Style Profile" columns in greater depth, if you want to dig deeper. And after you brew them, check out some food pairing recommendations for each in the story "Perfect Winter Pairings," beginning on page 36.

BARLEYWINE

Traditionally the richest and strongest of English ales, barleywine is a style that inspired derivatives in Belgium (Bush), the United States (Anchor Foghorn), and elsewhere. Originally a darker beer descended from historical strong Burton ales, paler versions appeared after World War II. The balance was malty and rich with a full body and pleasant alcohol warmth. The finish could be sweet to dry, which often changed with age (becoming drier with age). The balance of hops could vary greatly, which could also affect the impression of sweetness due to the bittering level.

American barleywines became a distinct style after Sierra Nevada created Bigfoot, which inspired many other highly bittered and hopped strong beers. Double (and stronger) IPAs have mainly replaced American barleywines today in the marketplace, but they have a drier and even hoppier balance. Most current American barleywines exist as barrel-aged products, leaving homebrewers to produce the original versions. Barleywines are much maltier and have a higher finishing gravity than double IPAs, and are meant for sipping rather than drinking. American barleywines traditionally featured the classic American craft C-type hops (Cascade, Centennial, Chinook, and Columbus).

I see the differences between American barleywine and English barleywine as mainly the character of the malt, yeast, and hops, and the intensity of the hops. English barleywines use English ingredients so the base malt is breadier, often with biscuity flavors, while the American version is more neutral. Both may use crystal malts, although English versions are often darker. English hops are more floral and earthy, while American hops more citrusy and piney. Times have changed, and these distinctions are often blurred. English yeast is often fruitier, while American yeast gives a cleaner fermentation profile. American barleywines are generally more bitter and have a greater hop intensity than their English cousins.

While separating the styles is useful for competition purposes, I often like to play around with different interpretations. I do enjoy the Belgian Bush beer, so sometimes I do the Belgian version. Sometimes I like to mix American and English ingredients. Sometimes I increase crystal malts and use a more complex grain bill to simulate aging, so I can enjoy a "mature" version without having to cellar it as long. Sometimes I add different sugars, candi syrups, or honey to bring in another flavor dimension. If the beer winds up too sweet, I often will add some medium toast oak spirals to add tannins and make the beer seem drier on the palate.

Whatever version you choose to make, start with a high percentage of pale ale malt from that country. Use crystal- or Munich-type malts to increase malt flavors and add color. Use sugar to increase gravity and flavor, if desired. Select hops and yeast from the country of choice. Don't mash too high, or you risk having the beer seem like a Scottish wee heavy. Be prepared for the flavor profile to change over time as the beer ages.

WHEATWINE

Wheatwine is a modern American craft invention that seems increasingly hard to find today, and is often a winter seasonal beer that may be wood-aged. The name might lead people to believe that it is a barleywine made with wheat, but it's quite a bit more involved than that. Many examples play up the "wine" angle, and have a leaner body and lower bitterness rather than being a heavily malty and bitter beer.

It is more of a scaled up American wheat beer, so the main malt flavors are the grainy, bready flavor of wheat with a more dextrinous body. The yeast character is neutral, so don't expect the German weizen ba-

Photo courtesy of Shutterstock.com

In addition to being lighter in color and brewed with wheat, wheatwines tend to have less hop character, be more attenuated, and have a drier finish than barleywines.

Photo courtesy of Shutterstock.com

Imperial stout is a style with a wide range of interpretations; they can be dry to sweet, low or high in bitterness, and are often amplified with oak aging or adjuncts.

nana-and-clove flavors. Wheatwines tend to be more attenuated than barleywines, and usually have a dry finish. The increased body provides a filling sensation but this is usually not accompanied by a syrupy or sugary sweetness.

The aromatic qualities of wheatwine features hops less prominently than a barleywine, which allows some of the bready, wheaty aromas to be enjoyed. Hops can be of any variety, but milder floral, spicy, and fruity varieties tend to play better than more aggressive choices. Likewise, the malt can have some additional character, but not at the expense of masking the bready wheat flavors. Light caramel, toast, or honey qualities can add complexity while complementing the base wheat character.

Wheatwine may be oak-aged, which can add some oak, toast, and vanilla flavors, increase the perception of body, and the dryness. If the beer is aged, some light oxidation notes may be present, but should be the more positive Sherry-like notes and not the harsh papery ones. Oak aging adds tannins, which can mellow over time to give the beer a more velvety texture, like in a fine aged red wine. I wouldn't use oaking in a beer that will be consumed young since it could be perceived as harsher in the short term.

Since a lighter body is desirable, a mash schedule that favors attenuation is appropriate. I tend to use a step mash with this style, and further accentuate the dryness with a sugar addition. The hopping is often aromatic and vinous, so choosing modern varieties that mimic some of the wine-like aromas is a good start. Likewise, if oak aging is used, select woods and toast levels similar to those found in wines.

IMPERIAL STOUT

As with barleywine, imperial stout has an English origin and a modern American story. The style originated in England in the late 1700s as an export beer for the Russian Empire and other countries on the Baltic Sea. The strongest version of the dark stout beer, it eventually fell out of favor before being resurrected in the craft beer era. It basically inspired Baltic porters in the 1800s. As with many styles, American versions started in the modern craft era as copies of English versions and became more Americanized with local ingredients and the craft brewing desire to increase the hop content.

An imperial stout is always very dark, strong, and roasted. The balance can vary quite a bit, with examples ranging from dry to sweet, and the bitterness level varying as well from moderate to high. Given the broad range of ingredients that can contribute to the dark color, and the varying bitterness and dryness levels, the overall flavor profile and balance can be quite broad. This is truly a beer style with a wide range of possible interpretations, and it often serves as a base style for adding specialty ingredients.

While no distinction is made in the Beer Judge Certification Program (BJCP) Style Guidelines between English and American variants, commercial examples often do tend to have some differences. English versions tend to be more estery and often have a more tar-like flavor, while American examples can favor more of a late-hop character and clean fermentation profile. Both acceptable, as are those that blend any of these components. In the market, some brewers may tend to identify as one or the other.

Today, many American examples are barrel-aged or involve specialty ingredients. One such example I enjoy is Cigar City Hunahpu Imperial Stout with cinnamon, vanilla, cacao nibs, and chili peppers. During my travels, I often see examples in South America and elsewhere, showing the global reach of modern craft beer. I have had wonderful examples in Brazil that were aged in Amburana wood.

Imperial stout recipes typically include selections from the major groups of base malts, dark malts and grains, crystal malts and sugars, and adjuncts. The major base malt is typically pale ale malt, but could include almost any other type. Dark malts and grains often include roasted barley, but chocolate malt and black malt are also common. Darker-colored crystal malts and brewing sugars provide deeper sugary and fruity flavors. Starchy adjuncts help improve body and mouthfeel. Hops and yeast could be almost anything you choose, as is the overall balance.

Now that we've reviewed these three high-ABV styles perfect for winter, I'll share a recipe for each on the following pages.

Big Beers for Winter

RECIPES

Barleywine

BARLEYWINE

(5 gallons/19 L, all-grain)
OG = 1.097 FG = 1.028
IBU = 70 SRM = 17
ABV = 9.3%

This is kind of a hybrid English/ American barleywine.

INGREDIENTS

15 lbs. (6.8 kg) English pale ale malt
1 lb. (454 g) aromatic malt
0.5 lb. (227 g) Carapils® malt
1 lb. (454 g) crystal malt (65 °L) (preferably English)
0.5 lb. (227 g) CaraMunich® III malt
1 lb. (454 g) raw brown sugar
28 AAU Magnum hops (60 min.) (2 oz./57 g at 14% alpha acids)
4.5 AAU Fuggle hops (10 min.) (1 oz./28 g at 4.5% alpha acids)
6 AAU Cascade hops (5 min.) (1 oz./28 g at 6% alpha acids)
2 oz. (57 g) East Kent Goldings hops (whirlpool)
2 oz. (57 g) Styrian Goldings hops (dry hop)
Wyeast 1335 (British Ale II), Omega Yeast OYL-013 (British Ale VI), or LalBrew Nottingham 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.

This recipe uses an infusion mash. Use enough water to have a moderately thick mash (1.5 qts./lb. or 3.1 L/kg). Mash in the malts at 149 °F (65 °C) and hold for 60 minutes. Begin recirculating, raise the mash temperature to 169 °F (76 °C), and recirculate for 15 minutes.

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

Boil the wort for 60 minutes, adding hops at the times indicated. The sugar is added with 15 minutes left in the boil. Add the whirlpool hops when the heat is turned off. Stir, and wait an additional 15 minutes before chilling.

Chill the wort to 65 °F (18 °C), then oxygenate and pitch the yeast starter or sprinkle two packets of dried yeast. Ferment until complete. After three days, rouse the yeast gently (if necessary) and allow to free rise in temperature up to 70 °F (21 °C) until finished. Dry hop for three days at room temperature.

Rack the beer, prime and bottle condition, or keg and force carbonate.

BARLEYWINE

(5 gallons/19 L, extract with grains)
OG = 1.097 FG = 1.028
IBU = 70 SRM = 17 ABV = 9.3%

INGREDIENTS

11 lbs. (5 kg) Maris Otter liquid malt extract
0.5 lb. (227 g) Carapils® malt
1 lb. (454 g) crystal malt (65 °L) (preferably English)
0.5 lb. (227 g) CaraMunich® III malt
1 lb. (454 g) raw brown sugar
28 AAU Magnum hops (60 min.) (2 oz./57 g at 14% alpha acids)
4.5 AAU Fuggle hops (10 min.) (1 oz./28 g at 4.5% alpha acids)
6 AAU Cascade hops (5 min.) (1 oz./28 g at 6% alpha acids)
2 oz. (57 g) East Kent Goldings hops (whirlpool)
2 oz. (57 g) Styrian Goldings hops (dry hop)
Wyeast 1335 (British Ale II), Omega Yeast OYL-013 (British Ale VI), or LalBrew Nottingham yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Use 6 gallons (23 L) of water in the brew kettle; heat to 158 °F (70 °C). Place the grains in a mesh bag and steep in the hot water for 30 minutes. Remove the mesh bag, then turn the heat off as the bag drains back into the kettle.

Add the malt extract and stir thoroughly to dissolve the extract completely. You do not want to feel liquid extract at the bottom of the kettle when stirring with your spoon. Turn the heat back on and bring to a boil. Boil the wort for 60 minutes, adding hops at the times indicated. The sugar is added with 15 minutes left in the boil. Add the whirlpool hops when the heat is turned off. Stir, and wait an additional 15 minutes before chilling.

Follow the remainder of the all-grain recipe instructions.

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Big Beers for Winter

RECIPES

Wheatwine

WHEATWINE

(5 gallons/19 L, all-grain)
OG = 1.102 FG = 1.018
IBU = 51 SRM = 9 ABV = 11.4%

INGREDIENTS

12 lbs. (5.4 kg) German wheat malt
3.5 lbs. (1.6 kg) German Pilsner malt
1 lb. (454 g) flaked wheat
1 lb. (454 g) caramel wheat malt (~50 °L)
0.5 lb. (227 g) honey malt
2 lbs. (907 g) white sugar
21 AAU Magnum hops (60 min.) (1.5 oz./43 g at 14% alpha acids)
1 oz. (28 g) Citra® hops (5 min.)
1 oz. (28 g) Nelson Sauvin™ hops (0 min.)
1 oz. (28 g) Motueka™ hops (0 min.)
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale), or SafAle US-05 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.

This recipe uses a multi-step mash with a mash out. Use enough water to have a moderately thick mash (1.5 qts./lb. or 3.1 L/kg). Mash in all the grains at 104 °F (40 °C) and hold at this temperature for 10 minutes. Raise the temperature by infusion or direct heating to 131 °F (55 °C) for 15 minutes, then raise to 146 °F (63 °C) for 40 minutes, then to 158 °F (70 °C) for 15 minutes. Finally raise to 168 °F (76 °C) for 15 minutes to mash out, recirculating. Sparge with 168 °F (76 °C) water until 6.5 gallons (25 L) of wort is collected.

Boil the wort for 60 minutes, adding the hops at times indicated in the recipe. Add the sugar in the last 15 minutes of the boil. After adding the final hops when the heat is turned off, let the wort stand for 20 minutes before chilling. Chill to 66 °F (19 °C).

Oxygenate, then pitch the yeast or sprinkle two packets of dried yeast. Allow the fermentation temperature to rise to no more than 72 °F (22 °C) until fermentation is complete. Rack and allow the beer to drop bright, using crash cooling or fining if necessary. Prime and bottle condition, or keg and force carbonate.

WHEATWINE

(5 gallons/19 L, extract with grains)
OG = 1.102 FG = 1.018
IBU = 51 SRM = 9 ABV = 11.4%

INGREDIENTS

8.5 lbs. (3.9 kg) wheat dried malt extract
1 lb. (454 g) caramel wheat malt (~50 °L)
0.5 lb. (227 g) honey malt
2 lbs. (907 g) white sugar
21 AAU Magnum hops (60 min.) (1.5 oz./43 g at 14% alpha acids)
1 oz. (28 g) Citra® hops (5 min.)
1 oz. (28 g) Nelson Sauvin™ hops (0 min.)
1 oz. (28 g) Motueka™ hops (0 min.)
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale), or SafAle US-05 yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Use 6 gallons (23 L) of water in the brew kettle; heat to 158 °F (70 °C). Place the grains in a mesh bag, and steep in the hot water for 30 minutes. Remove the mesh bag, then turn the heat off.

Add the malt extract and stir thoroughly to dissolve the extract completely. You do not want to feel liquid extract at the bottom of the kettle when stirring with your spoon. Turn the heat back on and bring to a boil. Boil the wort for 60 minutes, adding the hops at the times indicated in the recipe. Add the white sugar in the last 15 minutes of the boil.

After adding the final hops when the heat is turned off, let the wort stand for 20 minutes before chilling. Chill to 66 °F (19 °C).

Oxygenate, then pitch the yeast or sprinkle two packets of dried yeast. Allow the fermentation temperature to rise to no more than 72 °F (22 °C) until fermentation is complete. Rack and allow the beer to drop bright, using crash cooling or fining if necessary.

Prime and bottle condition, or keg and force carbonate.

Photo courtesy of Shutterstock.com

Big Beers for Winter

RECIPES

Imperial Stout

IMPERIAL STOUT

(5 gallons/19 L, all-grain)
OG = 1.097 FG = 1.027
IBU = 70 SRM = 100
ABV = 9.5%

INGREDIENTS

12 lbs. (5.4 kg) U.K. pale ale malt
3 lbs. (1.4 kg) Munich II malt (9 °L)
1 lb. (454 g) flaked oats
1.5 lbs. (680 g) U.K. roasted barley (~550 °L)
1.5 lbs. (680 g) U.K. chocolate malt (~440 °L)
1 lb. (454 g) Carafa® III special malt (~525 °L)
0.5 lb. (227 g) English extra dark crystal malt (~180 °L)
12 AAU U.K. Chinook hops (60 min.) (1 oz./28 g at 12% alpha acids)
1 oz. (28 g) Centennial hops (15 min.)
1 oz. (28 g) U.K. Golding hops (10 min.)
1 oz. (28 g) Chinook hops (dry hop)
1 oz. (28 g) Fuggle hops (dry hop)
Wyeast 1318 (London Ale III), Imperial A38 (Juice), or LalBrew Verdant IPA 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.

This recipe uses an infusion mash. Use enough water to have a moderately thick mash (1.5 qts./lb. or 3.1 L/kg). Mash in the pale and Munich malts and the oats at 152 °F (66 °C) and hold for 60 minutes. Add the three dark grains and crystal malt, stir, begin recirculating, raise the mash temperature to 169 °F (76 °C), and recirculate for 15 minutes.

Sparge slowly and collect 6.5 gallons (24.5 L) of wort in the brew kettle. Boil the wort for 90 minutes, adding hops at the times indicated in the ingredients list.

Chill the wort to 64 °F (18 °C), oxygenate then pitch the liquid yeast or sprinkle two packets of dried yeast. Ferment until complete, allowing the temperature to rise as high as 70 °F (21 °C). Dry hop for three days at room temperature.

Rack the beer, prime and bottle condition, or keg and force carbonate.

IMPERIAL STOUT

(5 gallons/19 L, extract with grains)
OG = 1.097 FG = 1.027
IBU = 70 SRM = 100 ABV = 9.5%

INGREDIENTS

11 lbs. (4.7 kg) Maris Otter liquid malt extract
1.5 lbs. (680 g) U.K. roasted barley (~550 °L)
1.5 lbs. (680 g) U.K. chocolate malt (~440 °L)
1 lb. (454 g) Carafa® III special malt (~525 °L)
0.5 lb. (227 g) English extra dark crystal malt (~180 °L)
12 AAU U.K. Chinook hops (60 min.) (1 oz./28 g at 12% alpha acids)
1 oz. (28 g) Centennial hops (15 min.)
1 oz. (28 g) U.K. Golding hops (10 min.)
1 oz. (28 g) Chinook hops (dry hop)
1 oz. (28 g) Fuggle hops (dry hop)
Wyeast 1318 (London Ale III), Imperial A38 (Juice), or LalBrew Verdant IPA yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Use 6 gallons (23 L) of water in the brew kettle; heat to 158 °F (70 °C). Place the grains in a mesh bag, and steep in the hot water for 30 minutes. Remove the mesh bag, then turn the heat off as the bag drips back into the kettle.

Add the malt extract and stir thoroughly to dissolve the extract completely. You do not want to feel liquid extract at the bottom of the kettle when stirring with your spoon. Turn the heat back on and bring to a boil.

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

Chill the wort to 64 °F (18 °C), oxygenate, then pitch the liquid yeast or sprinkle two packets of dried yeast. Ferment until complete, allowing the temperature to rise as high as 70 °F (21 °C). Dry hop for three days at room temperature.

Rack the beer, prime and bottle condition, or keg and force carbonate. BYO

Photo courtesy of Shutterstock.com

2022 LABEL CONTEST WINNERS

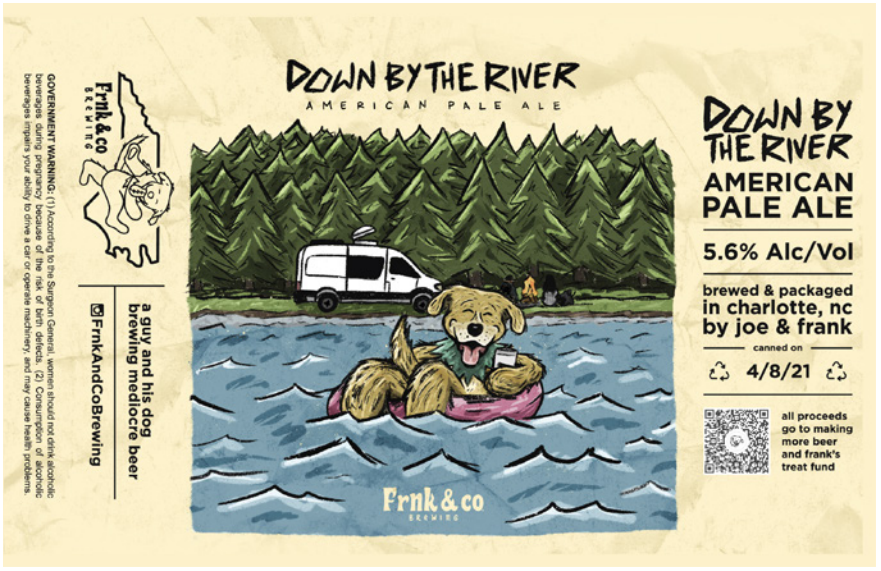
In its 27th year, the BYO Label Contest continues to grow not just in reach (which spans the globe) and number of submissions (that take us hours to organize for online voting), but, we'd argue, in quality as well.

With so many labels to look at, it is often the subtle elements that land labels on our list of top entries: Colors that complement each other, fonts that are sharp and easy to read, creative beer names, and on and on. But this year, judges also put an emphasis on original artwork. Not to say there is anything wrong with grabbing an image from the web for your homebrews, but originality really made our top prize-winning labels stand out. Each was created for the specific label it adorns, and it goes to show that artistic abilities go hand-in-hand with the art of brewing (at least for these homebrewers)!

We hope you enjoy the labels we chose as much as we enjoyed judging them. Keep the creativity flowing and we'll keep welcoming submissions for this annual contest. We'd also like to raise a glass to all of the sponsors who generously donated prizes for the winners; this competition wouldn't be the same without their support year-after-year!

JOE SMALDONE

CHARLOTTE, NORTH CAROLINA



Joe and Frank are "a guy and his dog brewing mediocre beer," according to the label. We can't vouch for the beer, but there definitely isn't anything mediocre about the labels the duo are making! The winning label for Down by the River American Pale Ale won by unanimous decision. In fact, there was more discussion amongst judges choosing which Frank & Co. Brewing label deserved top honors than anything else. "Almost every label showcases some version of Frank with his dopey tongue hanging out, and almost every label has a backstory stemming from the past decade-plus that Frank and I have spent together trying to figure out life," Joe says. While there were many to choose from, there is just something about a dog enjoying a cold beverage while tubing down a river that connected with all of us at *BYO*. And don't overlook that van, down by the river.

Prizes: Gift card from **GrogTag**; Gift card from **High Gravity**; Brewer's Best® Holiday Ale AND Cider House Select® Hopped Apple Cider kits from **LD Carlson Company**; Reactor Stainless Steel Conical Fermenter from **Northern Brewer**; Gift certificate for hops from **Thyme Garden Herb Company**

RENATO GHIRALDI & GUILHERME VIEIRA

ROYAL OAK, MICHIGAN

Kong's Barrel Mayhem (the beer and the label) is part of a series. This version was brewed when Renato and Guilherme got their hands on an 8-gallon (30-L) whiskey barrel from a local distillery and filled it with their favorite imperial stout recipe. Wanting to do the beer justice, the homebrewers worked with a Brazilian artist to create the original artwork (the same artist had created a label for another version of Kong as well — both of which came out great!).

Prizes: 1-year AHA Membership® from the **American Homebrewers Association**; Brewvision Temperature Controller and Large Brew Gloves from **Blichmann Engineering**; Gift card from **GrogTag**

JEFF GREGORY

SULLIVAN, ILLINOIS

Beer, meet coffee. Coffee, meet beer. We think the two of you will hit it off just fine. Jeff comes up with the idea for his labels and then a friend of his son draws the image and his son brings them to life on a computer. The hop character is featured on many of Jeff's labels, often playing the drums as Jeff does. But even drumming hops gotta kick back with friends sometimes, even if those friends are coffee beans.

Prizes: Anvil Brewing Pump from **Anvil Brewing Equipment**; Gift card from **GrogTag**; Yeast Health Kit with Fast Pitch® from **Northern Brewer**

ALLAN WILEN

WIMBLEDON, ENGLAND

The original artwork for this label was created by Allan's son, James, and fits with the name he gave his homebrewery: The Whistling Frog. "Homebrewing is a fun, inventive, and creative activity . . . and the name epitomizes these characteristics. The amphibian is well-known for its love of hops and one that could whistle would be highly inventive!" James initially hand-drew elements of the label and then created the rest using design software.

Prizes: 1-year *BYO* Digital Membership from **Brew Your Own**; Gift card from **GrogTag**; Certificates for free yeast from **White Labs, Inc.**

★ READER'S CHOICE ★

AMY WIRTH
BELLEVILLE, MICHIGAN

Amy draws her label images in the digital illustration app Procreate and completes them in Canva. Pool Daze New England IPA was brewed for those hot summer days sitting around the pool with friends and the label certainly hits the mark for a beer with a summer vibe. Adding to the fun of this label, Amy says there are actually two labels for this beer — each four-pack has three cans with a pink inner tube and one lucky drinker gets the unicorn float.

Prizes: PBW Tablets from **Five Star Chemicals**; Gift card from **GrogTag**; Gift card from **High Gravity**

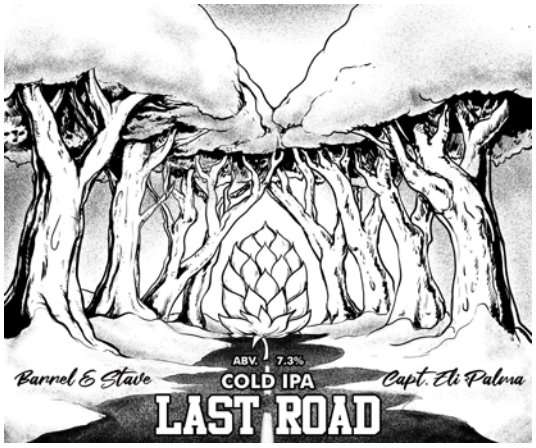
★ HONORABLE MENTION ★

Honorable Mention winners receive: Gift card from **GrogTag**

ALLAN KLAR HUNTLEY, ILLINOIS

BARBARA POSPIECH KRAKÓW, POLAND

BOBBY BAUGH MOUNT LAUREL, NEW JERSEY



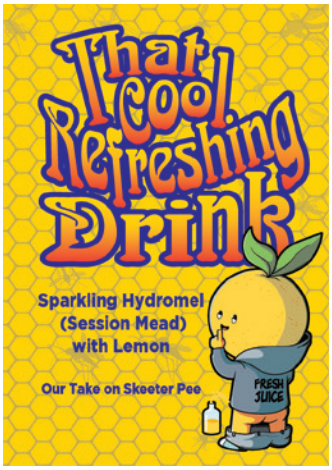
ELI PALMA SAN DIEGO, CALIFORNIA

GARTH WILKOSZ YOKINE, AUSTRALIA

GREG PATERSON SASKATOON, SASKATCHEWAN

JANET KUYPERS AUSTIN, TEXAS

KARL ANDERSON OCEANSIDE, CALIFORNIA



MADELYNNE PURSGLOVE AUDUBON, NEW JERSEY

MATEUSZ HABERKA KRAKÓW, POLAND

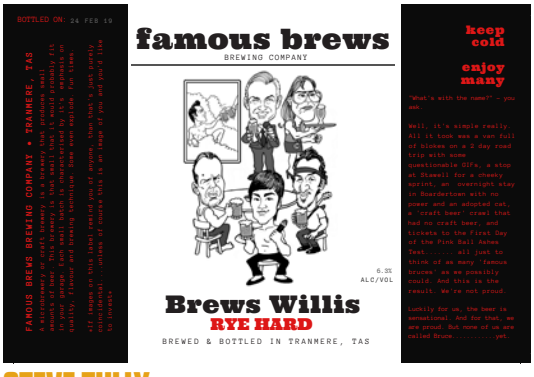
MIKE LANZAFAME SPRINGFIELD, NEW JERSEY

PIOTR PIETA WROCLAW, POLAND

STEVE MORREN HUDSONVILLE, MICHIGAN

RIKK DESGRES NORTHAMPTON, MASSACHUSETTS

Prize includes a gift card from **Conanicut Brewing**



STEVE TULLY TRANMERE, AUSTRALIA

Photo courtesy of Shutterstock.com

Hop Creep

Understanding the impact dry hopping has on attenuation

by Dr. Pattie Aron

During fermentation, beer typically reaches final attenuation or terminal gravity once the fermentable extract has been consumed by yeast, leaving behind unfermentable sugars, or real extract. Hop creep occurs when beer attenuation continues due to a dry-hop addition. Because most of the literature and research conducted over the past century focuses on lager and ale production of lowly hopped beers, the potential of hop creep in highly hopped beers was not fully realized until recently.

The hop creep phenomenon is not new, in fact earliest reports go back over 130 years. However, its effects began to gain attention over the past decade when higher dry-hop loads and hazy beers started creeping up in popularity. In 2016 Allagash Brewing was experimenting with dry hopping an existing beer recipe to make a hoppy table beer. The brewers reported an unanticipated jump of CO_2 volumes from 2.6 to 4.5 in three weeks from the dry-hop addition. The brewery dumped its first 60-barrel test batch due to this deviance. Their story was told at the Craft Brewers Conference in 2017 in the seminar titled "Unintended Over-Attenuation from Dry Hopping Beers." A follow-up question from a brewer in the audience began with, "We are all slaves to the creep," in reference to the effect of dry hopping on final gravity reduction. The name hop creep stuck.[1]

Photo courtesy of Shutterstock.com

Large dry-hop additions can lead to hop creep where a beer continues attenuating due to diastase activity of hops. This means a lower final gravity and drier beer (impacting mouthfeel), increased ethanol, and increased carbonation, which can be dangerous in packaged beers.

Hop creep reduces the final gravity of beer and can lead to a beer that is drier than desired. More problematic than the shift in desired mouthfeel are the subsequent increases in ethanol, which can lead beer to be out of spec and exceed predicted labeling percentages. The other main by-product of fermentation is also problematic; the increased volumes of CO_2 produced can result in gushers or devastating safety concerns around exploding cans and bottle cap issues. In addition to this, the refermentation that occurs during dry hopping also creates a diacetyl spike. In order to mitigate the potential for the buttery off-flavor, brewers must extend tank residency time during cellaring, which further increases production time as well as costs for pro brewers.

WHAT WE'VE LEARNED ABOUT HOP CREEP OVER THE YEARS

One of the earliest records we have evidencing hop creep is from a paper written in 1893 by Horace T. Brown and G. Harris Morris titled "On Certain Functions of Hops Used in the Dry-Hopping of Beers." While the addition of a certain amount of dry hops to finished beer in cask had been widely practiced and generally recognized by the beer industry, "certain fundamental scientific principles" of the practice were not well understood: The distinct conditioning or "freshening" power of the hops to cask beer. While the clarifying and antiseptic properties of the "hopping down hop" (dry hopping) were well accepted, the freshening power (attenuation power) of the hop remained a mystery.

The authors performed a simple experiment by treating beer from primary fermentation with dry hopping and a control without dry hopping. The control showed little to no signs of fermentation for many days, however the dry hopped beer entered into a brisk "after-fermentation" in a very short time and attenuated rapidly.[2] The authors postulated three potential causes for this activity. The first was that hops contain fermentable sugar. The second that wild yeast were present (that could degrade dextrins), and the third that diastase (diastatic enzymes) could be present in the hops. While it was known that hops contain sugars of around 3.65%, at typical dry-hop loads for the day (½ to ¾ lb./barrel, or ~0.25–0.4 oz. per gallon), this amount of sugar would not produce the observed attenuation. The authors also ruled out the effect of wild yeast. Although known and proven to be present, studies conducted on the effects of wild yeast inherent to hops did not produce the same freshening power. These experiments left no doubt regarding the hydrolytic power of hops on starch. The hops act in the same way as malt-flour by hydrolyzing maltodextrins and converting them into fermentable sugar, which the yeast can then feed upon to make ethanol and CO_2. One of the questions that came up in this work was the source of the diastase. In 1893 hops typically contained higher seed content than they do today. Brown and Morris tested the diastase potential of hop seeds as well as bract. Their work revealed that seeds contributed largely to the diastatic activity of the hops, however, the bracts of the strobiles also had diastase activity.

The diastase activity of hops depended on variety. As for why some hops were less active than others? Brown and Morris suggested that perhaps hop tannins of some varieties were prohibitive of the diastase. More details about this study are in the sidebar on page 57.

Despite the many questions remaining on this dry hopping freshening power phenomenon, it was nearly half a century before findings from another study would be published.

In 1941, Janicki et al. published their findings entitled, "The diastatic activity of hops together with a note on maltase in hops."[3] The authors aimed to determine the relative diastatic power of hops by variety, origin (geography), and age. The

examination of 33 samples of seeded hops of different country, age (up to 3.5 years), and exposure to cold or warehouse ambient storage did not reveal much difference in diastatic power. However, their work corroborated the work of Brown and Morris in that seedless hops showed less diastatic power than seeded hops. However, whole seeds did not express diastatic activity, only crushed seeds displayed activity (one variety had up to 20% seeds!). The authors further confirmed that polyphenols were the likely inhibitors of hop diastase.

More recently, brewers at Russian River Brewing re-investigated the effect of seeds on hop creep. In a conversation with Luke Holderfield, Lab Manager at Russian River, Luke revealed that the investigation into seeds stemmed from their hop creep issues impacting tank residence time. Their tank residence time had increased by 8–10 days due to diacetyl uptick from 60–70 ppb at the day of dry hopping to 150–250 ppb in three days. While final gravity could be anticipated by playing with various levers in the brewhouse, such as mash time and temperature and liquor-to-grist ratio, the diacetyl uptick was beginning to create a bottleneck in production. In their studies, seeds were tediously extracted from whole cones by tearing open cones by hand and removing the seeds with tweezers. Seed ranges of their whole cone lots of two varieties, Simcoe® and Amarillo®, had varying seed content, 0.05% to 5.50% by weight respectively. The brewers conducted their experiments on Pliny the Elder prior to dry hopping and monitored changes in extract and alcohol from treatments. While their benchtop attenuation rates were less than what they typically saw at production scale, the results gave them some directional information. The presence of whole seeds does not seem to affect attenuation significantly while the presence of crushed seeds, as would be found in pellet hops, does influence hop creep attenuation, as was presented by Vinnie Cilurzo at the 2022 Craft Brewers Conference. This finding counters the results of Brown and Morris's tests on hop seed diastase activity that show whole seeds do contribute to diastase.

So how does hop creep happen? To start, you need residual dextrins in beer, which are the main component of real extract. (Dextrins + protein + minerals + ash = real extract.) Dextrins survive the brewing process to contribute sweetness, body, and mouthfeel, making them desirable in heavily hopped, bitter beers as they help balance out high bittering loads.

Real extract (RE), which is the calibrated amount of residual sugars, dextrins, proteins, and other components resultant from the mashing process typically remains steady during fermentation unless exogenous enzymes or amylolytic (starch degrading) yeast are present. Examples of such yeast are *Saccharomyces cerevisiae* var. *diastaticus* and *Brettanomyces.* While it has been postulated that the presence of amylolytic yeast in hops could be the culprit of hop creep, we have enough data from the literature to indicate that hops indeed possess their own diastatic power to break longer chain carbohydrates into maltose and glucose.[4] Hops possess amyloglucosidase, alpha-amylase, beta-amylase, as well as limit dextrinase.[5]

While different hop varieties possess similar diastase activity in a soluble starch solution, they behave differently in real-life dry-hopping trials.[4,6] Data suggests that amylase

Summarizing the Data from Brown and Morris

1. In their studies published in 1893, the authors found total sugars to be 3.65% (dextrose 1.55 + Levulose 2.10)
   a. This was determined by optical and reducing properties, 20 g of hops were extracted with ethanol (80%), and the distillate of this made up to 100 cc that was examined for sugars by polariscope and cupric reduction. Invertase and acid hydrolysis were used to test for other carbohydrates.
2. The complete fermentability of these sugars was shown by using yeast.
3. A large number of experiments were conducted to test hypotheses:
   a. Wild yeast are present but conditioning properties of hops is "long antecedent to the growth and development of these wild yeast forms and is quite independent of them."
   b. Initial extracts failed to show diastase.
   c. 5 grams of whole hops into 250 cc of a solution of soluble starch containing 2.5 g/100 cc digested at 86 °F (30 °C), with addition of chloroform (antiseptic) against a control (same preparation but boiled) = three days increased reducing power was found in test solution: 5 g of hops in three days had produced 1.640 g of sugar (as maltose) – ⅓ of the weight of the hops employed. This test extract was then fermented with yeast to yield alcohol equivalent to that produced from 0.475 g of maltose. The authors repeated this experiment using amyloins and monitored maltose production over 3, 11, and 27 days; revealing that more maltose was released over time — up to 2.539 g maltose per 100 mL of solution after 27 days.
   d. Follow-up studies looked at the ability of three U.K. and Bavarian hop varieties to produce maltose from soluble starch or amyloin solutions over 48 hours. These results confirmed that, under the right conditions, hops can produce up to 91% of their own weight of fermentable sugar.

activity of varieties is due to genetics. Of 30 commercially grown and kilned hop cultivars tested in pellet form, Amarillo®, Cluster, Fuggle, Nugget, and Perle displayed high activity. Azacca® and Cascade altered the alcohol and gravity levels more than Simcoe®, Centennial, and Citra®. Some varieties such as Crystal, Centennial, El Dorado, Hersbrucker, Summit, and Saaz seem to have lower diastatic activity. That said, the maturity (but not age) of the plant or cone, farming conditions, and handling and processing during and after harvest heavily impacts hop diastase activity. Brown and Morris noted that hops lost freshening power when subjected to steam for a very short time. The authors also warned that high kiln temperature may destroy the freshening power of hops. Researchers at Oregon State University recently looked at the effect of higher kiln temperatures on hop creep potential to confirm Brown and Morris's suspicion.[7] They found that higher hop kiln temperatures can reduce amylase enzyme activity, however increasing kiln temperature can be more costly and potentially impact overall aroma quality of hops. Researchers at OSU also looked at autoclaving hops to reconfirm the findings of Brown and Morris on the effect of steam or high heat on diastase reduction in hops. With so many factors at play from genetics to harvest, more data is needed to fully vet the most impactful cause of hop diastase activity.

APPLYING THIS INFORMATION IN THE BREWERY

While it has been suggested that hop creep is unanticipated, it seems clear that brewers can now at the very least anticipate its occurrence. Which levers are the biggest drivers and how can a brewer manipulate these to target predictable and consistent dry hop creep is, however, still a bit of a guessing game.

Unfiltered, highly hopped beers become problematic when three conditions occur simultaneously: The presence of unfermentable real extract (which is typical for most beers excluding extremely light lagers), active yeast, and hops of high diastase activity are used for dry hopping. To start, brewers can begin to dial in real extract in the front-side of the process by keeping the grain bill simple and limiting the amount of unfermentable sugars to achieve a consistent extract yield.

Jake Kirkendall, Hop Scientist and co-author of *The Freshening Power of Centennial Hops* recalls his experience at Bell's Brewery when variability in hop creep was a nagging issue that caused production headaches and would occasionally require blending batches to achieve consistency. Even within the same variety (Centennial), differences in diastatic activity resulted in varying degrees of hop creep and thus final ABV aberrations.[8] At Bell's, hop creep potential was found to be related to yeast (presence of), dry-hop timing, and dry-hop temperature. Early additions of hops on active yeast (day 1) resulted in an ABV% shift of 0.6% vs. late additions (day 9) augmenting ABV% by only 0.15%. Jake recommends dry hopping early to get the full effect of biotransformation, release of flavor volatiles from hops by yeast, and keeping methods consistent so that you can predict the dry-hopping effect. In this way, brewers can use the anticipated attenuation as a tool. Increasing dry hop temperature from 50 to 68 °F (10 to 20 °C) will also increase the effects of hop diastase. So combining temperature and duration on dry hopping will significantly increase hop creep, resulting in a much greater ABV% variance.

Overall, dry hopping practice is tied to hop creep. Hop cones and T90 pellets will augment hop creep, while the use of hop extracts, T45 pellets, or Cryo® hop pellets can be used to reduce hop creep.[9] The use of extracts and Cryo® pellets will also assist in diacetyl clearing. Lowering the vegetative material as well as the total dry-hop load will also assist in reducing hop creep.

Because the presence of yeast is necessary for the conversion of maltose and glucose to alcohol, dry hopping post yeast crash is also an option. However, this will also limit the amount of biotransformation that could be achieved from early dry hopping. For brewers looking to bottle beer, the only way to ensure that your packaged product is 100% safe is to filter and pasteurize. However, as filtration and pasteurization are not typical practices in a homebrew setting, your best bet at home is to monitor your fermentation by measuring changes in residual extract post dry hopping. In this way you can anticipate hop creep on the finishing side. If you miss your target the first time, you can try adjusting the hopping type, time, amount, and duration for your next brew. BYO

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BY DREW BEECHUM & DENNY CONN

PLAYING WITH EXTRACT

Sometimes simple can be better

Demographic studies show that all of the fuss and fight that you dear readers (and us) go through, doesn't matter to the majority of homebrewers. Overwhelmingly, the world's homebrewers practice the fine art of extract brewing. Surely, they're not all in the search for cheap booze and nothing else?

Yet, extract brewing carries that stigma of: "It's not real brewing," "It makes bad beer," "It has a twang to it."

We reject these notions.

The most prevalent reason that an extract beer turns out to be of lower quality is because of the number of new brewers using the stuff. If you get an experienced brewer making beer with extract, you'll get great beer! You just need to know how to put its best foot forward.

Quite simply, malt extract producers are more proficient makers of wort than the whole of our readership. This is what they do and they have the gear and the knowledge to make it happen. Companies like Briess and Muntons can make a better wort than you or I and probably many of our beloved breweries.

Extracts are definitely not just for freshmen brewers. Experienced brewers focusing on yeast strain, specialty malt, and hops experiments can benefit from the time savings. And brewers focusing their efforts on giant bases for playing with fruits or adjuncts will also enjoy the convenience of extracts.

That's one of the great powers of malt extract — they've taken one of the most tedious and technically involved parts of the brew day and freed us from it. We happy weird few take great joy from all the minutiae, but spending that much time and effort isn't the optimum spend to happiness for most.

For starters, extract allows you to focus on the other fundamentals of brewing. There's so much to understand about the boil, chilling, sanitation, fermentation, and packaging that not having to deal with the mash is a blessing. It's also the reason why, even in this day and age of cheap and easy brew-in-a-bag setups, we still recommend people start with extract.

Water worries become about flavor impacts and not about biochemical impacts to your mash regime. In a world where a lot of all-grain and even professional brewers treat minerals like salt and pepper, it's nice to have one place where that's true.

Fighting to maintain stable mash temperatures isn't a thing. No need to worry about lautering and waiting for gallons of water to drain from pounds of grain. Just fire and go.

Speaking of which, that's the best reason to use extract — time. We've talked extensively about trading time for money. Normally we talk about this in reference to automation, but buying extract is borrowing the maltsters automation for our time gains. Even with all the fancy gear that we have — a quick all-grain brew day is 4-ish hours. With extract, a two-hour brew is no sweat.

Let's not forget the idea of a bonus beer. We're big believers in the idea that there is no such thing as too much hot water on a brew day. In fact, Drew usually ends up with a few gallons leftover in his hot liquor tank (HLT). If it's not being used for cleaning (or watering the plants after cooling down), then why not use it to make beer? After finishing the boil for one beer, Drew's used the leftover HLT water to make a bonus beer with the extract he keeps on hand.

If you've paid attention to all your time playing around in the brewery, if you understand your yeast mechanics, your sanitation, etc., extract just becomes a wonderful short cut to great beer. There are some ground rules to follow:

That's one of the great powers of malt extract — they've taken one of the most tedious and technically involved parts of the brew day and freed us from it.

Pairing extract with steeping grains allows brewers to explore a wide range of styles.

> **Take what the extract gives you: Don't expect to make the palest and driest beer you can imagine with extract.**

- Buy the fresh stuff. The biggest sin you can commit when using extract is buying old extract. Like most food products, time is not your friend. Liquid malt extracts, in particular, will oxidize and produce terrible beer. Old extract is often the source of the "cidery" beer flavor that people think of in bad homebrew.
  - Buy the freshest extract you can find and from places that turn over a lot of extract, quickly. Drew's local homebrew store – The Home Beer Wine Cheesemaking Shop in Woodland Hills, California, sells from bulk drums that are flushed with nitrogen. Unless you're certain the extract you're getting is equally fresh, use dry extract. That's all Denny uses. (Also, dried extract keeps like a champ.)
  - Drew is usually, possibly unfairly, suspicious of most extract "can kits." Really scan the dates on those.
- Plainer extracts are better in our opinion. You'll see lots of options for extracts of different colors to, say, make a "stout." In our experience, it's far better to buy a pale or extra pale extract or a Maris Otter or rye/wheat extract. Then add the extra color and flavor via steeping grains. Speaking of which …
- Add fresh grains. Just like adding fresh ingredients to store-bought broths can make things much better, adding steeping grains is a must for more flexibility and better flavor.
- Take what the extract gives you: Don't expect to make the palest and driest beer you can imagine with extract. (Although – an experiment we haven't tried – maybe some of the leftover enzymes from the Brut IPA days might help). Yes, you can make pale beer and dryish beers with extract, but an all-grain mash will always have the advantage of not having gone through the concentration process that does ultimately have an effect on the wort.
- Boil at full volume. Instead of boiling 3 gallons (11 L) and topping up with a couple of gallons of chilled water, boil all 5 gallons (19 L) together. It makes your hop calculations more accurate and hop usage more efficient and seems to lend a less "cooked" taste to the beer.
- Because of the way extract is made, it often has a little higher finishing gravity and more body than all-grain brews. You can adjust that by replacing a bit of the extract with good old table sugar. Replace ¼ lb. (113 g) of dry extract with the same amount of sugar. Replace 5 oz. (150 mL) of liquid extract with ¼ lb. (113 g) of sugar.

On that last point, one of the chief things you can do to up your extract game is to add it late in the boil. Most recipes will instruct you to bring your water to a boil, shut off the heat, stir in all the extract and bring back to a boil. Don't do that! You only need to boil the majority of your extract long enough to sanitize it.

Instead, we recommend you add roughly ⅓ of the extract when the liquid comes to a boil. Doing so provides a chemically appropriate environment for things like hop compound extraction. Proceed as normal and then before you get to the end of the boil, add the remaining extract and stir like the dickens to get it to dissolve before returning to the boil.

How long? The safe and sane rule of thumb says at least 15 minutes, but we've seen some folks push that down to 5 minutes under the theory that they'll stay above pasteurization temperatures for much longer while chilling.

Trust us – if you combine late extract additions with all of the wonderful skills you've developed as a brewer to make a clean, sanitary, and well-regulated sugary pool for yeast, you can produce fabulous extract beer in a fraction of the time. It will be good enough for your summer party, your late-night tap raids, and even a competition best-of-show table!

Photo by Michael Tonsmeire

There are several reasons to brew with extract, but the timesaving factor is probably the biggest for most people with a busy schedule.

LAZY DAY BLONDE ALE

(5 gallons/19 L, extract with grains)
OG = 1.038 FG = 1.010
IBU = 20 SRM = 4 ABV = 3.6%

This is the lightest, and simplest, extract beer we've ever made. You can get in and out and have a tasty beer in no time flat. What kind of beer? The beer-flavored variety, naturally. If you're feeling fancy, use a W34/70 style lager strain and ferment cooler for a pleasant drinking lager. Also feel free to play around with the finishing hop addition but we like the simple spicy and woody components that Willamette hops provide to this beer. (Reproduced from our book, Simple Hombrewing*)*

INGREDIENTS

5 lbs. (2.3 kg) Pilsen or golden light liquid malt extract
0.5 lb. (227 g) Carapils® malt
0.5 lb. (227 g) aromatic malt
4.6 AAU Magnum hops (60 min.)
(0.33 oz./9 g at 14% alpha acids)
0.5 oz. (14 g) Willamette hops (5 min.)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale), SafAle US-05, or LalBrew BRY-97 (American West Coast Ale) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Steep the malt with 3 quarts (2.8 L) of 170 °F (77 °C) water for 30 minutes. Rinse the malt with an additional 3 quarts (2.8 L) of 170 °F (77 °C) water. Add 4.5 gallons (17 L) of water to the resulting liquor. Add 1 lb. (0.45 kg) of extract to the kettle and bring to a boil.

Total boil time is going to be 60 minutes. Boil for 45 minutes, adding the first hop addition at the beginning of the boil. After that time, add the remaining extract — off the heat and stir well! Boil an additional 15 minutes adding the second hop addition with 5 minutes remaining.

Chill the wort down and ferment at room temperature (~68 °F/20 °C). You can look to package the beer after 10 days. Feel free to add a little dry hops a few days before packaging if you so desire, but we don't think it's necessary. Carbonate the beer to 2.5 v/v if force carbonating.

All-grain option: While it flies in the face of what this article is about, if you have the time and want to create your own wort with an all-grain recipe, here is the conversion: Simply swap out the liquid malt extract with 7.5 lbs. (3.4 kg) of your favorite pale malt. And just like with the dry hops, you could look to add a little extra component (like flaked corn) to the all-grain version, but we don't feel like it's necessary. Sometimes simple can be better. BYO

BY AMY TODD

DON'T FORGET YOUR LINES!

How and why you should clean your draft lines

Remember your favorite dive bar in college? The floors were slightly sticky and the foosball table gathered a crowd. Your favorite macro was always on tap although it tasted slightly different than when you drank it from a can. But you weren't a beer snob yet so you didn't think much about it.

Now that you're a brewer you tend to frequent a different type of establishment. Brewery taprooms, craft beer bars, and brewpubs are more of a draw than the happy hour specials.

You're also focused on getting folks to your brewery and trying your beers at craft beer bars and restaurants. Not only do you need to get customers in the door but you want them to keep coming back.

According to Andrew Coplon of Secret Hopper, "The ultimate taproom experience exists at the intersection of quality beer, memorable atmosphere, and engaging staff."

Today we're going to focus on the quality beer portion of the taproom trifecta, and more specifically, what comes out of the faucet.

There are plenty of ways to improve the quality of your beer, to get started you can check my "Top 5 Ways for a Nano Brewer to get Started in Quality Control," found on byo.com for free. But what happens once the beer leaves your brewery, either to venture into the outside world or take the short trip out to your own brewery taproom? Making great beer isn't just choosing the best ingredients and honing your skills, there's a whole quality control component and it doesn't end when the beer is packaged. Consistency is important not only from batch-to-batch, but also from the first pint to the last pint of each keg you pour through.

You spend all this time and energy making the best beer you can and if that beer goes on tap with dirty lines, all that hard work is being wasted. When beer quality declines, so does your customer base.

Do you monitor or validate how clean your tap lines are? Are you on a regular cleaning cycle? When your beer goes to another bar, do you ask about their draft line cleaning regime? Taproom breweries must implement a cleaning schedule, follow proven cleaning methods, and validate cleaning. And if you distribute draft beers to other bars, you need to ensure your beer is flowing through properly maintained lines.

Every pint served might be someone's first experience with your beer and if they don't like it, they might not give it another chance. It doesn't matter if the problem is the draft line and not your beer, the customer only knows they didn't enjoy that pint.

So how do dirty draft lines ruin a beer?

Things that like to grow in beer lines are the same things we worry about in the rest of the brewery. Just as it's important to keep our brewing and fermentation equipment squeaky clean to avoid unwanted bacteria or wild yeast from growing, we need to make sure our beer dispense equipment isn't introducing any unwanted off-flavors due to microorganism or beer stone buildup.

Mold can grow in faucets and vent holes or on the mouth of a keg and once tapped that mold can travel through the line and even end up in a glass.

Consistency is important not only from batch-to-batch, but also from the first pint to the last pint of each keg you pour through.

Photo courtesy of William Jablonski/DraftNauts

Even the best brewed beer in the world can be ruined in moments when sent through a poorly maintained draft system.

> **Lines should be cleaned with caustic every two weeks with a quarterly acid cycle to help remove beerstone buildup.**

Pediococcus, Lactobacillus, Pectinatus, and *Acetobacter* can all produce lactic or acetic acid imparting various sour notes to your beer. They might also introduce turbidity or a ropey texture to the beer, leaving regular customers to wonder if they were served the correct beer or not. *Pediococcus* can produce diacetyl leaving you with a buttery beer and a rotten egg aroma might be due to *Pectinatus*.

Wild yeast can be introduced to draft lines from infected or intentionally wild beer going on tap before your new beer and sticking around for a while. Yeast is everywhere and it can be found on faucets and kegs from the air and build up over time without proper cleaning. If left unchecked, beerstone can flake off and end up in your beer, never an appealing sight.

When biofilms or beerstone are allowed to build up they affect the balance of the dispense system, which can leave you with foamy pours and wasted beer.

The Cicerone® Certification Program, which has become an industry standard, teaches their students just how easy it is for a great beer to be damaged by improper storage, handling, or service. Those who seek certification are tested on not only proper draft line cleaning techniques, but the goals of cleaning, safety concerns for consumers and operators, and detailed criteria for a proper clean.

If you can't see that there's anything wrong with the lines, and often you can't (unless the lines have really been neglected) you don't know you have a problem. You can't see yeast and bacteria cells with the naked eye and even if beerstone and biofilms have had the chance to build up in the line, that's also out of sight and out of mind.

Line cleaning takes time and it wastes beer. You have to flush out all that beer in the lines. The process may warm up your lines leaving you with foamy glasses once you get beer back in the lines. And you have to run more beer through the lines when you're done. It's expensive to invest in the equipment needed to clean lines. You'd rather spend that money on something more useful for the brewery or ingredients for the next batch. Yes, cleaning your lines takes time, but so does getting new customers!

How do you clean your lines?

First you'll want to write a standard operating procedure (SOP) detailing how to clean the lines. This should include information on who will be cleaning the lines, why it's important, what the procedure is, safety precautions and personal protection equipment needed, resources, and revisions. Following a standard protocol will help ensure the draft lines are safely and effectively cleaned on a regularly scheduled basis.

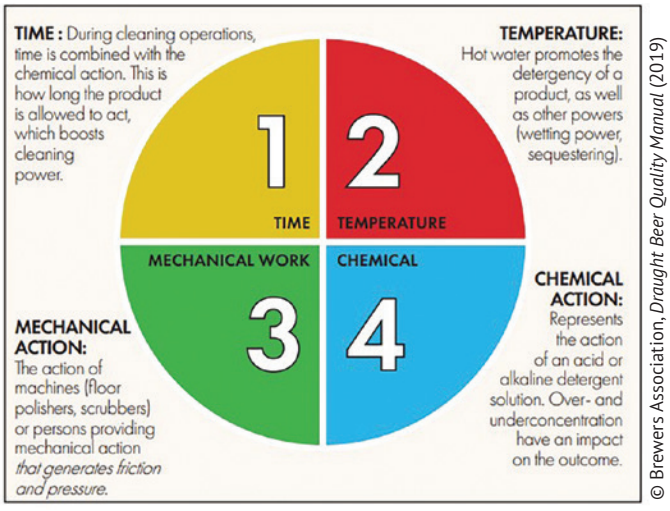
You need to know exactly what chemicals you will be using and have the Safety Data Sheets available and reference them before you start. Consult your chemical supplier for proper use and storage such as temperature and contact time.

Typically you'll be using a caustic solution to clean your lines. When handling this make sure you are wearing personal protective equipment (PPE) including safety goggles (Note: Goggles and not glasses). You don't want anything dripping into your eyes or splashing up the sides. You'll also want gloves, pants, and close-toed shoes.

Once you are safely attired you may get to work. Make sure you let everyone near you know you'll be working with caustic and put signs up on the tap handles. There are plenty of horror stories and lawsuits from people accidentally ingesting caustic when lines are being cleaned because they weren't properly labeled. It can lead to severe and permanent damage to your throat and stomach.

The two most common ways of cleaning draft lines use either a circulating pump or a cleaning canister. The Brewers Association, and most others, recommend a circulating pump since the mechanical force does a much better job at removing beer stone and buildup in the lines. Another plus with the circulating pump is that you can't accidentally serve a customer caustic while you're cleaning the lines because the faucets need to be removed and linked together. More details on the circulating pump method can be found later in this article.

After you've taken care of safety precautions like signage and putting on PPE, you'll need to disconnect the beer and rinse the lines with water. Follow the "Sinner's Circle" for a successful clean, which means that you're using the right chemical at the right concentration, for the



© Brewers Association, *Draught Beer Quality Manual* (2019)

Following the Sinner's Circle guide to cleaning best assures taproom draft systems will undergo a successful cleaning cycle.

correct length of time, at the right temperature, and with mechanical action.

Typically you're using a 2% caustic solution that is run through the lines every two weeks for 15 minutes at a rate of 1.5–2 gallons (5.7–7.6 L) per minute. If you're using a cleaning canister or pressure pot you'll need more time since the caustic is stationary. Check the chemical manufacturer's recommended temperature range and keep in mind that if your glycol can't be turned off that's going to cool your cleaning solution. Also be careful about using too hot of a temperature that may ruin your lines; 80–100 °F (27–38 °C) is usually the sweet spot. Don't forget to run the solution both forward and in reverse with your pump to really clean your lines.

Once the cleaning process is done, rinse the lines with water and use a pH meter or a pH strip to make sure the pH has returned to neutral and ensure all the cleaner has been rinsed from the line. Then you can bring beer back over and remove any cleaning signs.

Lines should be cleaned with caustic every two weeks with a quarterly acid cycle to help remove beerstone buildup. Don't forget to also clean keg couplers, faucets, and any foam-on-beer, or FOB, devices.

MAKE CLEANING A PRIORITY

Denise Jones, who has held roles as Brewmaster at Third Street Aleworks and Moylan's Brewing, and the Master Distiller and a staff Brewmaster at Weyermann Specialty Malts in Bamberg, Germany, stresses the importance of line cleaning, "It's a sacred chore . . . My crew knew it was a morning chore and they made it a priority before bar staff came in. Beer tastes better with clean lines and I slept better with dreams of clean draft lines."

Make good beer, clean your lines, and keep your customers coming back for more.

RESOURCES ON DRAFT LINE CLEANING

The ultimate free resource on all things draft-related is the Brewers Association's *Draught Beer Quality Manual*, which can be found at www.brewersassociation.org/educational-publications/draught-beer-quality-manual/

A hard copy of the manual can be purchased as well. A few spin-offs of this robust resource include a BA Collab Hour webinar on cleaning draft lines www.crowdcast.io/e/BACollabHour-CleaningDraughtBeerLines

And there is also a draft line safety course. All of which are free resources for both members and non-members of the Brewers Association.

A "Basic Guide to Line Cleaning and Maintenance in Draught Beer Systems" by Keith Lemcke is available to members at www.mbaa.com/publications/tq/tqPastIssues/2016/Documents/TQ-53-4-1118-01.pdf and check out the Master Brewers Association's podcast episode on draft line cleaning www.masterbrewerspodcast.com/027

BY CHRISTIAN LAVENDER

THE FLAVOR ENHANCER

A Randall-style hop filter

As a homebrewer and kegerator operator, I am constantly asking myself, "How can I make my draft brews hoppier?" I want that hop aroma to leap from the glass as soon as I open the faucet just like when you open a can or bottle of a favorite IPA.

I use Corny kegs as my secondary (and sometimes tertiary) fermenting vessels when brewing. With the right timing and a spunding valve, kegs allow my brew to self-carbonate with the malt sugars left over from the main fermentation. I recognize oxygen as the enemy of hop aroma compounds. Once the beer nears the end of fermentation, I don't want any oxygen to get near my beer. So I can add dry hops near the beginning of fermentation or again when I transfer into the keg. The problem with my process of conditioning and dispensing within a closed keg system is that there is not a good opportunity to introduce additional post-fermentation dry hops. So after some careful consideration, I decided that filtering hops within the draft system was going to be my answer.

I had read about the original Randall the Enamel Animal, a Dogfish Head Brewery invention, and many other different types of hop filter builds online and from friends, but I wanted to build a hop filter that was going to be kegerator-friendly, easy to detach and clean, and cost-effective. I call it a hop filter because that was the original intent of the device. But, just to be clear, hops aren't the only thing that I can add to this filter system. If doing a porter, you can add some coffee beans and/or mashed cherries to the filter. How about strawberries and a vanilla bean with that creamy IPA? The nice thing is that if the flavor mix doesn't work out, you haven't ruined the entire keg; just take the filter offline. Also, if you are ever pouring your beer at a beer festival, the filter can be a great talking point and allow you to basically add another beer to your pouring repertoire.

After assembling the hop filter, getting it installed, and pouring my first homebrew, I have to say I could really taste a difference in the hop profile of the beer. The additional blast of hop oils just prior to hitting my glass made an impact. One small addition to the kegerator has made an already smooth operator into a smooth hoperator!

But, just to be clear, hops aren't the only thing that I can add to this filter system.

Photos by Christian Lavender

Tools and Materials

- GE Household Pre-Filtration System. Model # GXWH20S
- Weldless kettle screen with ½-in. thread and 12-in. (30-cm) long
- (1) ½-in. male pipe thread to ⅜-in. male barb connector
- 4 small ⅜-in. O-rings
- 3 clamps
- (1) ½-inch female pipe thread to ½-in. female pipe thread coupling
- 2 Firestone liquid posts with ⅜-inch female pipe thread
- (2) ⅜-in. male pipe thread to ½-in. male pipe thread reducers
- (2) ¾-in. male pipe thread to ½-in. female pipe thread bushings
- 2 Quick-disconnect fittings for ball-lock kegs with ¼-inch MFL (threaded)
- (2) ¼-in. swivel nut to ¼-in. barbed end sets
- 4 ft. (1.2 m) of 3/16-inch inner dimension PVC tubing
- Teflon tape
- Filter wrench
- Adjustable wrench
- Flat head screwdriver
- Metal snips
- Measuring tape
- Bolt cutters

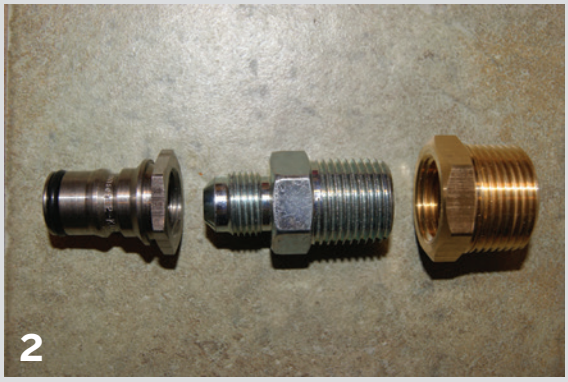
1. GATHER YOUR SUPPLIES

I have a mountain of spare homebrew parts scattered around my home, as most homebrewers I know do, and was able to track down most of the fittings including the clamp, coupler, reducers, and bushings. Before I got started on the assembly, I needed to take inventory of my tools and supplies to make sure I could finish what I started and, lo and behold, I was missing a vital piece that sent me back to the homebrew shop. I had overlooked getting a second quick-disconnect fitting to connect the "out" on the hop filter to the "in" on my tap tower. It's always a good rule of thumb to lay down the game plan before you get started with any project. When I returned home my good buddy Brew (my golden retriever) had taken it upon himself to play tug-o-war with the beer line I had purchased to connect the hop filter and tap tower together. So yep, you guessed it, back in the car and back to the homebrew shop. This time I bought a bushel of beer line.


1

2. ASSEMBLE THE FITTINGS

Before you get started assembling the fittings for the quick-disconnects, make sure to clean and sanitize all the parts. You will need to lay out the three parts (¾-in. male pipe thread to ½-in. female pipe thread bushings, ⅜-in. male pipe thread to ½-in. male pipe thread reducers, Firestone liquid posts with ⅜-in. female pipe thread) for each side and wrap the male threads of each fitting with the Teflon tape. (I used a mixture of brass and stainless steel fittings, but I suggest using all stainless steel fittings when possible.) After you get all of the fittings tightly screwed together you can insert the ¾-in. male pipe thread of the bushing into the ¾-in. female pipe thread on the filter housing. Repeat this on the other side of the filter housing to finish assembling the quick-disconnect liquid posts for use with the quick-disconnect fittings for ball-lock kegs.


2

3. KETTLE SCREEN MODIFICATION

Measure 7 in. (18 cm) up from the crimped end of the weldless kettle screen and cut with your metal snips. Make sure to reshape the snipped tube back to its original shape with a pair of pliers. On the half with the threaded fitting use your bolt cutters to cut off the permanent clamp and remove the fitting. Remove the ½-in. threaded fitting and insert it into the end of your newly cut 7-in. (18-cm) screen. Slip on a stainless steel adjustable clamp and tighten. Next, screw on your ½-in. x ½-in. female pipe thread coupling and then screw the ½-in. x ⅜-in. male barb connector into that. Slip on the (4) small ⅜-in. O-rings until they are about midway down the barb. When you have completed these steps you should have something that looks like the modified screen in the picture.


3

4. INSTALLING THE SCREEN

Slowly twist the screen assembly into the opening on the inside of the filter assembly cap. The O-rings you used on your barb fitting should twist in and be quite snug. The purpose of this design is for making cleaning of the hop filter as easy as possible. When ready to clean the filter you will just slowly twist out the filter assembly from the filter cap. During dispensing, the psi in the filter housing will force the screen up and create a natural pressure seal. These filters are designed to withstand up to 125 psi, so you do not have to worry about its pressure capability because most beers are dispensed between 5 and 15 psi. Tightly secure the clear filter closure to the filter cap with the included filter wrench.


4

5. COMPLETE THE ASSEMBLY

Once the filter is assembled we will now be ready to attach it to the rest of the kegerator dispensing system, right? Wrong. Make sure you clean, clean, clean this filter. The last thing needed at this point is for your beer to be contaminated by an unclean "filter." Use regular brewing sanitizer and baptize your new hop filter. After you have cleaned you are ready to add the filter to the system. The beer should flow from the keg, through the hop filter, and then to the tap tower. Assemble your beer line jumper out of the two quick-disconnect fittings, ¼-in. swivel nut x ¼-in. barbs, clamps, and the PVC beer line. Connect the beer line jumper from the keg's beer line "out" to the hop filter's line "in" liquid post. Then connect the tap tower quick-disconnect to the hop filter's line "out" liquid post. You now have completed the connection and have another important step at this point: What kind of hops to use?


5

6. TEST DRIVE

I used Centennial whole leaf hops for the first run through the filter. My homebrew on tap at the time was a Black Rye brewed with Columbus and Centennial and then dry hopped with Amarillo® and Centennial. I turned on the CO_2, set it to around 8 psi and watched the hop filter fill with beer. As the beer traveled down and then back up through the screen I watched for leaks around all of my fittings. Success! No leaks and the beer made it all the way out and up to the tap tower dispenser. I closed the kegerator door and let the temperature come back down to 38 °F (3 °C) before dispensing to minimize foaming. The first beer was foamy, but quickly settled and I could see some particulate had made its way through the filter. After a few beers the particulate matter cleared and I was left with a noticeably hoppier brew. BYO

6

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BY ROGER BRIDEAU

BY THE PINT

Enjoying traditional British ales for 50 years

During my final year of undergraduate study in 1976 I had the opportunity to tour the Molson Brewery on Rue Notre Dame in Old Montreal, Canada, with my Industrial Microbiology Class from the State University of New York at Plattsburgh. That Molson location established in 1786 is the oldest continuous brewery in North America to this day. At the end of the tour we entered the Hospitality Room. Free beer for thirsty students of legal drinking age and my most memorable beer was Molson Porter. Although the fresh 6% Molson Export Ale wasn't too shabby. So different from the Schaefer, Ballantine, Schlitz, and Budweiser beers I had cut my baby teeth with. Thus began my love of dark beers and ales.

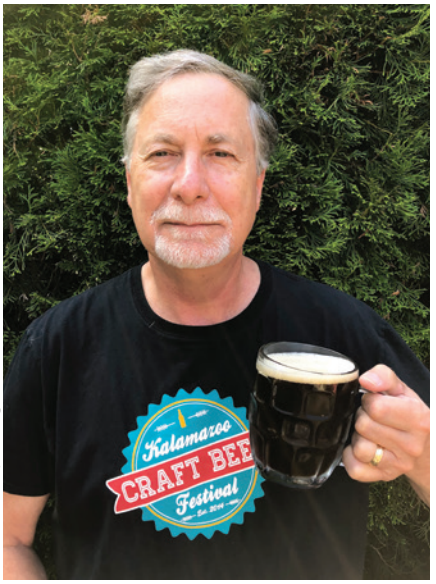
Move ahead a few years to 1978, and I was now in Oxford, England, completing graduate studies when I fell in love with traditional British ales. Most notably, local Best Bitter from John Morrell Brewing and various brown ales from the south of England. Like all smart microbiology students I, along with my newlywed wife Vickie, began to homebrew while in Oxford. It was easy to do as the local Boots pharmacy had cans of hopped liquid malt extract and packets of British ale yeast. Just add a bit of water and sugar and then wait a few days using a plastic bag as a batch fermenter in a pasta pot. Along with poor sanitation, we made 8–10% alcohol brews that were very rough. The bomber bottles were conditioned using plastic snap-on beer caps. Yes — a few would open in the night in our airing cupboard, which was the only consistently warm spot in our flat, and we would smell spilled brown ale upon waking up to the start of the day. No waste allowed as we just recapped the bottles for the remainder of the day to carbonate.

Once we were back in the U.S., and living in Kalamazoo, Michigan, of all places, I took a position as a research scientist. Homebrewing was illegal in the U.S. at that time but a man named Larry Bell had recently opened a homebrew shop there. That same gentleman later started Bell's Brewery in 1985 and I was a fortunate enough to have an easy walk to Bell's Eccentric Cafe. Things were rough for Bell's at first as the equipment was rudimentary. Bell's eventually added a wonderful Best Brown and collection of stouts — way before Oberon and Two-Hearted Ale hit the scene.

We had later moved to Ann Arbor, Michigan, and after an early retirement I began work at a new taproom called The Beer Grotto, as a part-time bartender. I had access to wonderful beer from the U.S. and Europe. Plus, the crowd was always entertaining as the craft experience for many of them was just beginning. This was fun to watch, indeed. But most traditional British-style beers were ignored except for a few very well-made American porters. Still, I remained in love with those traditional British ales having participated in and gained awards at local, state, and national contests for homebrew.

My approach to brewing, like in science, is to keep it simple. This has served our homebrewery, Empty Nest Brewing, well. The beers that we have produced are both pleasurable to make and enjoy. Wherever we live our neighbors like us. Always fun to share craft beer and conversation. Today, we live in the north Seattle area and I have enjoyed seeing the "youngsters" including my son and daughter and their spouses begin to enjoy simple bitter, pale, and brown ales from places like Machine House in Seattle. Many U.S. craft breweries now have at least one bitter or brown and a porter or stout available for their customers on tap. Younger drinkers have also discovered lower-alcohol, simply made, quality beer from the multitude of brewers here in the States. Cheers! BYO

Like all smart microbiology students I, along with my newlywed wife Vickie, began to homebrew while in Oxford.



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