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HE HOW-TO HOMEBREW BEER MAGAZINE

JANUARY-FEBRUARY 2024, VOL. 30, NO. 1

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Artificial intelligence is all around us. We use its recommendations when shopping and selecting shows to binge, rely on its answers to questions and to filter out spam emails. Why not use it to help in our homebrewing hobby? A technologist shares his experiences exploring the applications and potential of AI-assisted homebrewing that may be of service to beginners and longtime brewers alike.

by Luke Nyswonger

42 A SYNERGY OF OPPOSITES

A homebrewer shares his experience brewing a new IPA that crosses the positive attributes of brut IPA and milkshake IPA. The result is a dry, hoppy beer with a full mouthfeel, and it proved popular in its first commercial release after he was invited to help brew it at a brewery in Florida. by Joe Mongan

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Departments

8 MAIL

We supply a source for a hard-to-find part needed to build a can seamer, and readers share some love for a recent article to help brew a cult favorite holiday beer.

HOMEBREW NATION

Homebrewing can be a dangerous activity that requires handling heavy and scalding-hot objects. A homebrewer devised a hoist system for his homebrewery to help. Also, learn best practices when utilizing hydrometers and refractometers, and get the latest news, new products, and an upcoming event.

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A style that was one of the catalysts of the craft beer movement, witbiers are not as easy to find at breweries these days. A reader stumbled on a great rendition of one while in Ogallala, Nebraska, and asks the Replicator to share more about this beer.

IG TIPS FROM THE PROS

When it comes to the boil, addition timing of hops and other ingredients is often what gets the most thought. But the boil length itself can have a big impact on the resulting beer as well, as these two experts explain.

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While it is true that it is an unhopped beer that uses other herbs to add character, traditional gruit is a very narrowly defined and specific beverage that was highly regulated by various governments in the Middle Ages in northwestern Europe. Learn more about this concoction of lore.

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Craft beer has reached a reflection point. Financial wiz Audra Gaiziunas is here to sit down with nanobrewers to make sure they're doing a proper job in the bookkeeping department.

56 LAST CALL

There are many hobbies found within the hobby of homebrewing, such as brewers who search far and wide in the pursuit of novel microorganisms for fermentation. One homebrewer found his niche in producing beers made from unique water sources. Find out where it has taken him.



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RECIPE STANDARDIZATION

EXTRACT EFFICIENCY: 65%

(i.e. -1 pound of 2-row malt, which has a potential extract value of 1.037 in one U.S. gallon of water, would yield a wort of 1.024.)

EXTRACT VALUES

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

POTENTIAL

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

HOPS:

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

Gallons:

We use U.S. gallons whenever gallons are mentioned.

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Cover Photo: Charles A. Parker/Images Plus

Q

Is there a beer style you're most disappointed to not find on store shelves/tap lists these days?

I'm crushed by the fact that saisons . ahem "farmhouse ales" are sorely lacking on taplists and store shelves. Both the **Belgian and French** yeast strains add so much nuance to dinner pairings and just enough complexity and intrigue for that second or third pour. It's my favorite style to homebrew as well. Bring back

I féel like schwarzbier had a mini-moment years back, but now I'm just not finding it on tap lists or store shelves. When brewed properly, it's a well-balanced dark lager that is a unique offering to complement the lagers and IPAs currently dominat

ing the market.

the saison!

There are a few, namely porter, dark mild, Dortmunder, brown ale – many traditional styles. It's hard to find beers that aren't IPAS, Pilsners, or lactose beers these days. It's once again become a great time to be a homebrewer! PUBLISHER Brad Ring

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suggested pairings at **BYO.COM**

Raw Ales



A type of beer exists in northern Europe known as "raw ale." It is not so much a style, but rather a technique. The major feature that sets raw

ale apart is that it is never boiled. Learn the history, stories, and techniques behind raw ale. www.byo. com/article/raw-ale/

Big Batch BIAB



Think Brew-In-A-Bag (BIAB) is just for small stovetop brew days up to 5 gallons (19 L)? Think again. Here is the equipment

and other considerations to brew mega BIAB batches. www.byo.com/ article/big-batch-biab/

The Cool New Style: Cold IPA



Cold IPA is the latest IPA substyle sweeping the nation (and beyond). It features a grain bill that includes adjuncts to dry out the

dry out the finish and is often fermented warm with a lager yeast, making cold IPA the perfect style to showcase hops. A couple of pros, including the brewer who invented the style, share their advice and clone recipes for this cool style. www.byo. com/article/the-cool-new-stylecold-ipa/

Brewing Ancient Nordic Grog



A series of "Ancient Ale" collaboration brews were done that teamed up Sam Calagione of Dogfish Head Craft Brewery and Dr. Patrick McGovern from the University of Pennsylvania. One such recipe that was devised was for a 3,500-yearold Nordic grog. Learn about the process to recreate it yourself. www.byo.com/article/mc-govern dogfish-techniques/



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contributors

🗠 MAIL



CAN SEAMER ROLLERS

Could you tell me the measurements of the closing rollers for the can seamer build featured in the "Projects" column in the July-August 2023 issue of *BYO*? I can't find them anywhere because they're sold out everywhere.

Samuele Donadon • via email

Victor Andueza, who wrote the "Projects" column on his homebuilt can seamer responds: "The closing rollers have 44 mm of external diameter and 15 mm of internal diameter. It seems they are no longer available through AliExpress (which is where I mentioned in the article that I had bought mine). However, the first operation roller and second operation roller can still be bought direct from Kegland at these links:

• www.kegland.com.au/products/replacement-cannular-1st-oproller

• www.kegland.com.au/products/replacement-cannular-2ndop-roller "

OUR SPECIAL ALE APPRECIATION

I just wanted to take a minute to thank you for the excellent, timely, and informative article on Anchor's Our Special Ale in the November 2023 issue. Our homebrew club is doing a holiday beer exchange and this is the beer I modeled my entry after. I brewed my attempt at this beer at the beginning of September (prior to getting the November issue, unfortunately). As you know, they kept that one close to the vest. There wasn't much info out there about the recipe for Our Special Ale at the time, outside of the very basics like alcohol percentage, a guess at color, and IBU (and even that was hard to find). So, I am glad the brewer (retired Brewmaster Mark Carpenter) was willing to share, especially now that we can't get the beer anymore.

For my attempt, beyond what was known, some things I think were easy to guess, such as the inclusion of Northern Brewer hops and Wyeast 1272. I went a slightly different direction than your recipe. I basically used a Munich dunkel lager recipe as the base, taking inspiration from Rogue's Dead Guy Ale, which



Trent Musho's journey into the world of brewing spans over a decade, marked by a passion evolved from experimenting with wine and cider kits to beer making. His love for beer brewing came with the

accessible Brew-In-A-Bag (BIAB) method, eventually becoming the cornerstone of his expertise. With a background in cinematography and photography, Trent brings those skills to the internet through TheBruSho YouTube channel. There, he imparts simplified instructions, guiding beginner brewers through the process of creating exceptional beer effortlessly. Trent also has a passion for all things fermented and shares recipes for simple home fermentation projects like kombucha, kefir, and tepache.

Trent makes his *BYO* debut with a story explaining the appeal of BIAB and the nuances involved in this allgrain technique, which begins on page 30.



Luke Nyswonger, a seasoned software industry professional and provisional BJCP beer judge, is the founder of Homebrewing. ai, where he explores the innovative fusion of artificial intelligence with homebrewing.

With over ten years as a homebrewer, Luke is dedicated to the art and science of brewing, complementing his technical expertise with a deep respect for brewing traditions. As a U.S. Navy veteran, he is also committed to supporting fellow veterans transitioning to civilian careers. Luke believes in leveraging technology to enhance traditional practices, combining his professional skills with his passion for craft brewing. Follow his journey and join the conversation @homebrewing.ai.

On page 36, Luke shares why homebrewers should be open to incorporating artificial intelligence like ChatGPT in homebrewing and how to get the most from it.



Joe Mongan is a welder, metal artist, and homebrewer from Rockford, Illinois, now living in The Villages, Florida. He has been brewing since 2012, gaining knowledge from members of the local Forest City

Brewers Club, starting with extract brewing, and advancing to BIAB and 3-vessel brewing. Joe was President of the club from 2018–2020. When he moved to Florida, he started The Villages Craft Beer and Brewing Enthusiast Club, which has over 350 members.

In his quest to brew the best IPAs possible, Joe created a new beer style he's dubbing "hyperbolique IPA" that he is proud to have brewed with Devon Kreps of 7venth Sun Brewery. Hear the story of how this style was created beginning on page 42. Get the wireless range you need with



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is reputedly their Maibock brewed with ale yeast. For spices, I went with an extract spice blend called Sweet Spice from Apex Flavors, which manufactures flavorings specifically for the alcoholic beverage industry. I ended up going with an addition rate of 0.125%, which is just under a half ounce (14 mL) of the flavoring for my 3-gallon (11.5-L) batch. I even photoshopped copies of Our Special Ale labels for my bottles.

I have been brewing for 25 years and I have not been really big on spiced beers, brewing them few and far between. But I have to say, this one turned out better than I expected. I hope the other brewers participating in our holiday beer exchange will like it.

I agree with the theme of this article, we want to keep the tradition alive. I think I'll brew an homage to Our Special Ale again in 2024. Next time, I will probably give your published recipe a try.

As a sidenote: I've found many pro brewers to be homebrewer-friendly, especially with beers they are no longer producing. In 2022, Tröegs released a limited 25th year anniversary edition of their original pale ale. They called it Tröegs Birthday Beer. I was able to get some, as Hershey, Pennsylvania, is not far from me. I wrote and asked about it and they sent me a recipe, complete with water chemistry numbers.

Bill Wible • Oxford, Pennsylvania

BYO Author Dave Louw, who wrote the article on Anchor's Our Special Ale "Christmas Traditions," responds: "Great to hear! It was a challenging article to write as there is no fixed beer to actually clone! But I'm glad the spirit came through and you took it your direction, which is entirely the approach they always took."

From the *Brew Your Own* Facebook page, in response to the "Christmas Traditions" article:

Bill Floyd: We just got all the ingredients for this recipe. Looking forward to brew day.

Tom Dragonetti: RIP Anchor. Thanks for the annual tradition! Every year we bought this for my wife and I to drink while wrapping Christmas presents. Oh, and the brewery tour was fun too – loved the hop room!



BYO





WHAT'S NEW



SAFBREW DW-17

A new product from Fermentis consists of active dry yeast and enzymes that are meant to produce very dry beers. With an apparent attenuation of 98–102%, don't expect a sweet aftertaste t The yeast strain is POE+ (pheno

when using this yeast. The yeast strain is POF+ (phenolic off-flavor positive) and can lend fruity, woody, and slight acidic characters. Fermentis also recommends this yeast to ferment very high-density worts allowing a level of alcohol up to 17% ABV. The enzyme is a glucoamylase from *Aspergillus niger* (EC 3.2.1.3), which will chop up more complex sugars that the yeast will consume. DW-17 can be direct-pitched into wort and recommended pitch temperature is 68–90 °F (20–32 °C). Available in both 500-g bricks and 25-g sachets. www.fermentis.com/en/product/safbrew-dw-17/



SPIKE GRAIN MILL

A new grain mill from Spike Brewing has a simple dial to adjust the gap between rollers. An integrated motor is connected to hardened 1144 steel rollers via chain drive that won't stretch or

slip like a belt or create wear shavings like gears. Both rollers are chain driven and offset, which are turned at different speeds (1.3:1) as this helps to shear the grain husk. Available in two sizes are Home and Pro models. The Home model features a $\frac{1}{2}$ -hp engine that crushes about 5 lbs. per minute (2.3 kg/min.), weighs 25 lbs. (11 kg), and can hold up to 15 lbs. (6.8 kg) of grain in the hopper. The Pro model has a $\frac{1}{2}$ -hp engine, crushing about 12 lbs. per minute (5.4 kg/min.), weighs 40 lbs. (18 kg), and the hopper can contain about 60 lbs. (27 kg) of grains. www.spikebrewing.com/products/ spike-grain-mill



OMEGA'S DKO (DIACETYL KNOCK OUT) SERIES

A new series of yeast from Omega Yeast should make those sensitive to diacetyl rejoice. Their DKO series are popular strains of yeast that have been genetically modified to express the ALDC (alpha aceto-

lactate decarboxylase) enzyme, which is known to reduce diacetyl in beer to an undetectable level. This is helpful not just for those typical lager and ale strains that are known to produce diacetyl during normal fermentations, but also from hop creep. This is particularly useful when tank/fermenter space is limited as conditioning time can be shortened. Currently there are eight strains available and each maintain the identical fermentation behaviors and flavor expressions of their parental strains. www.omegayeast.com/news/ introducing-the-diacetyl-knock-out-dko-series



TASTES GREAT, LESS TILLING: INTRODUCING KERNZA[®] The US Department of Agriculture (USDA) is betting on a relatively new grain dubbed Kernza[®], a cousin of wheat, to pave the way toward a more sustainable future. Unlike wheat, it's a perennial grass, which means fields don't need to be tilled and planted every year. This saves farmers diesel fuel and time. Also, tilling is well-known to cause damage to the soil, hastening depletion of its nutrients. The soil would require less fertilizer as well. On top of those benefits, its roots can grow up to 10 ft. (3 m), which provides strong drought-resistance.

A native to the prairies of Asia, the grass is called intermediate wheatgrass (Thinopyrum intermedium). Researchers at The Land Institute, a nonprofit science organization based in Salinas, Kansas, named the grain harvested from intermediate wheatgrass Kernza[®] to give it a more marketable title. While still in nascent stages of development as a food crop, Kernza® can be used both as a grain or as a forage for grazing livestock. But there are drawbacks including the fact that the grain is much smaller than wheat or barley. Also, there isn't an established market yet for it. The USDA listed brewing and distilling as "high-value" markets that could best utilize the grain. Odell Brewing Co. was one of the first breweries to get their hands on the grain and have been happy with its capacity to produce beer having made a lager and a hazy IPA so far with it. www.kunc.org/news/2023-10-30/kernza-the-climate-friendlygrain-enticing-craft-brewers-and-distillers-in-colorado

Upcoming Events

FEBRUARY 9, 2024

Craft Brewery Start-Up Online Boot Camp Steve Parkes will walk you through the steps, planning decisions, and keys you need to know if you want to launch a commercial craft brewery.

He'll be joined by two experts to round out the



interactive, live online workshop: Audra Gaiziunas will discuss business plans and the key financial numbers you need to know starting up a brewery and Matthew McLaughlin will teach you the legal checklist any start-up brewery should have in hand. Learn from their decades of expertise and experience to help you achieve your dream of opening a brewery. www.byo.com/bootcamps/

BYO HOMEBREW NATION

BEGINNER'S BLOCK

BY DAVE GREEN

HYDROMETERS AND REFRACTOMETERS

B oth hydrometers and refractometers are tools that operate in a similar space, and both have pros and cons associated with them. Brewers need to understand their inherit flaws as well as how to best utilize them to glean the most accurate and insightful information from both.

Both instruments read dissolved solids in a liquid solution. This is important because it determines how much alcohol is produced during fermentation, when yeast turns simple sugars into carbon dioxide and ethyl alcohol. Hydrometers use density to measure the dissolved solids while refractometers use a property known as the refractive index (RI). Distilled water should measure 1.000 specific gravity on both a hydrometer and refractometer.

HYDROMETERS

There are many different types of hydrometers out there in the marketplace, but if you were to search "brewing hydrometer," a basic triple-scale hydrometer will dominate the results. Most will provide readings between roughly 0.990–1.160, but ranges can vary greatly among different hydrometers.

Hydrometers are simple devices that rely on a precise weight to measure the density of the solution it's floating it. As mentioned previously, in a solution of pure (distilled) water, weight in a brewer's hydrometer allows the tool to float to a determined marking labeled as 1.000 specific gravity (SG) or 0 °Plato at either 60 °F (16 °C) or 68 °F (20 °C). (Homebrewers prefers specific gravity while professional brewers prefer the Plato scale.) Please note the temperature calibration on the hydrometer you are using. Try to make sure your wort or beer is close to this temperature for the most accurate readings. Some hydrometers come with a thermometer in the bulbous base for confirmation and are typically called thermohydrometers.

Hydrometers are great for either original gravity (OG) or finishing gravity (FG). Just note that at FG there is some ethyl alcohol in solution and its concentration will affect your results. Common ABV calculators will disregard this affect, but know that ethyl alcohol is less dense than water and will skew the density reading too low. So, brewers typically see a slight rise in real ABV measurements versus many calculated with hydrometer readings, most notably with beers greater than 8% ABV.

Hydrometer readings can also be skewed with carbon dioxide dissolved in solution. Whether the beer has just finished fermentation or the beer has been carbonated, carbon dioxide is going to lift the hydrometer up in the cylinder and give a false reading. Leaving the sample out overnight, pouring the sample through a coffee filter, or shaking the sample will ensure a proper reading.

A final note about hydrometers, there are many different kinds available, even within the brewing realm. Brewer's hydrometers can be specialized for specific tasks like taking final gravity readings or taking mash gravity. No matter which you are using, be sure to always read the hydrometer at eye level.

REFRACTOMETERS

If you've ever stood shin-deep in a still body of water and noticed your leg appears to bend at the water's surface, you're seeing the effects water has on light: It bends it. Refractometers take advantage of this fact along with another aspect of RI, and that is that the more sugar dissolved, the higher the RI value of the solution. Ethyl alcohol also has a higher RI than pure water, so many brewers stop using a refractometer after brew day and rely on a hydrometer for FG readings.

Refractometers' greatest strength relies in their ability to quickly provide results with only a drop or two of liquid. Refractometers allow brewers to quickly find the density (SG) of their solution in seconds with only 1–2 drops of solution versus about 6 oz. (175 mL) with a hydrometer. This makes it especially handy on brew day when you might want to know the wort gravity during runoff, or pre-boil, or post-boil (or anytime). It's one of the best tools a brewer can acquire looking to fine-tune their beers.

There are several different types of refractometers available. We recommend purchasing from a reputable supplier of brewing equipment. There are some available with Automatic Temperature Compensation (ATC), which are handy if using in a hot or cold environment. Some also have an artificial light, but most rely on natural light to provide the needed backlight for refraction through the sample.

CALIBRATION

If you don't have a reverse osmosis system, keeping a jug of store-purchased distilled water will allow for calibration of both instruments. Refractometers generally have a knob to adjust the line to zero. Hydrometers cannot be reset to zero (1.000) but if you know that the scale is reading three points too high, then you can still use the hydrometer by making that 3-point correction to your readings.

For more advanced calibrations, you can do a second calibration with a known solution. An easy one uses distilled water and dried malt extract (DME), typically 2 oz. (56 g) of DME in 8 ounces (227 g) of water, and then measure that sample using both a hydrometer and your refractometer. This should read at 1.040 if done properly. My yeast starter medium is 100 g of DME dissolved into a total of 1 L of solution. This reads 1.035 and, when making a yeast starter, I can kill two birds with one stone when I'd like to make sure these instruments are calibrated.

READER PROJECT

HOMEBREW HOIST SYSTEM ERIC BAKKE • WEST CHESTER, OHIO

s is true with many other homebrewers, I started with a kit I received for Christmas of 1993. Over the years, always at 5 gallons (19 L) per batch, I progressed from extract brewing to all-grain. I have always kept my process very much hands-on. Brewing was mostly done in the kitchen with a Corona grain grinder, stock pots, plastic buckets, 2-quart Pyrex measuring cups, a homemade immersion wort chiller (hooked up to the kitchen faucet), a homemade rotating fly sparge arm, and gravity. I even measured my hops with an old-fashioned postal scale!

But I was intent on increasing my production capacity to 10 gallons (38 L). If a little is good, more is better, right? So, my hands-on approach had to have some modifications. I had already switched to 10-gallon (38-L) batches and acquired all the necessary equipment at that point. So the biggest challenge was still using gravity (no pump) while handling 10 gallons (38 L) of scalding wort. In 2020 I moved to a home with a second-floor deck and a concrete pad below, which gave me an opportunity to explore.

Utilizing a gap in the support structure of the second-floor deck, I ran a 4x4-in. (10x10-cm) beam across the joists of the deck. This is the backbone of the system for lifting and moving the full and hot pots. I fabricated the track from two pieces of thick-gauge



Track, trolley, and hoist

angle steel fastened together for the trolley track the hoist can roll on. This system can work for not only a 3-vessel gravity-fed system, but also for a Brew-In-A-Bag (BIAB)-style of system where hoisting a heavy bag may be required.

All brewing activity on my system takes place on collapsible painter platforms. When the platforms are not being used for beer production, they come in handy for all kinds of projects around the house. When dismantled, you cannot tell I was brewing beer here. Although I

have the space to have a static system, I still prefer to have one that can be broken down for entertaining or just to give a "clean" appearance to this space (especially for washing down).

I prefer a more intimate brewing process that exemplifies the miracle that is occurring to make my favorite beverage. There are so many ways that brewers make their system work, I hope this gives another option to anyone looking to get into the hobby with a lower budget in mind.



A look at the beam that provides support of my hoist. Both ends have 4x4-in. (10x10-cm) upright beams.



Plate chiller in action on the collapsible platform.



Holes in my kettles for carabiner spring clips.



DEAR REPLICATOR, I've always been a fan of a good classic Belgian wit, but it's a style that seems to have fallen off brewer's radars for a few years now. After getting the chance to spend some time in Second Chapter Brewing's unique taproom (it's a brewery in a former library), I was hoping to learn some tips for their process in brewing their witbier Witty Librarian. Any-thing you can find out would be appreciated, cheers!

any breweries have found themselves in unique locations, but few have found a location-based story as compelling as Second Chapter Brewing, found in Ogallala, Nebraska.

Husband and wife owners Richard Gibson and Lisa Kraus already had a vision in place when the city of Ogallala built a new library and began calling for proposals for the "best use" of the old library building. Having been homebrewing since 2009, Gibson and Kraus were ready to scale up. In early 2023, that dream became a reality when they opened their doors.

"It's not often you get the chance to own an old library," says Kraus. "Throughout the process, we also started to learn many of the other stories about the library and the building's prior uses — originally built as an American Legion Hall in 1927, it also served as a schoolhouse, war-time factory, and even a roller skating rink over the years. So, we love to tell those stories whenever we have the opportunity."

With such a unique building, Gibson and Kraus were determined to make the experience of visiting the brewery match. Filled with decor appropriate to the building's past life, the taproom offers a relaxing atmosphere full of books, card catalogs, as well as furniture from the former library. Their 5-beer flight boards are old card catalog drawers (see photo to the right). Gibson focuses on uniqueness with the lineup of beer as well, avoiding the all-in-on-IPA approach, to offer a wide variety of classic beer styles.

"With 12 taps, we strive to offer many different beers," Gibson says. "Our lineup includes mostly the classics, rather than trendy brews. We tend to gravitate towards the darker beers, Dan Crawford Denver, Colorado

whether ales or lagers, but we will try all styles. We appreciate something well-crafted. If it's clean and wellbrewed, any style can be great!"

As homebrewers, Gibson and Kraus had been fans of the Who's in the Garden Grand Cru recipe from Charlie Papazian's classic homebrew guide, *The Complete Joy of Homebrewing*, and began experimenting with their own riff on the recipe. As one of their favorite styles, they knew they had to bring a witbier to the taps at Second Chapter.

"When scaling and upgrading to the commercial side, we refined our recipe to be as true to a traditional witbier style as possible," Gibson says. "Having both the orange peel and coriander up front and noticeable was intentional. The citrus and herbal aroma and flavor are what we think makes a good witbier."

For the grain bill, Gibson feels that nailing down the proper ratio of wheat in the recipe adds a vital element of complexity, as well as a slight visual haze to the finished beer — a must for the style.

"Some brewers will use a combi-



nation of both malted and unmalted wheat, but in our research and recipe, we only use unmalted wheat," says Gibson. "We believe it gives better flavor and body."

Oats, Gibson adds, are a significant contributor to the profile of the beer as well, offering an important contribution to the mouthfeel. He falls into the camp that prefers malted oats over flaked for the style.

Finally, Gibson notes that finding quality orange peel is key to making this style shine. Orange peels can be either sweet or bitter. Which you prefer to use will come down to your own preferences in the end. Bitter orange peel contributes a more general citrus character to the beer and, of course, a slight amount of bitterness. Sweet orange peel, however, will add a more pronounced, intensely orange character. Bitter orange peel has classically been the choice for brewers when it comes to crafting a wit, but a brewer open to a bit of experimentation may find that they prefer to use a mix of both, combining the highlights of each approach.



SECOND CHAPTER Brewing's witty Librarian clone

(5 gallons/19 L, all-grain) OG = 1.052 FG = 1.013 IBU = 14 SRM = 3 ABV = 5%

INGREDIENTS

- 5 lbs. (2.3 kg) Pilsner malt 4.5 lbs. (2 kg) flaked wheat 1 lb. (0.45 kg) oat malt 0.5 lb. (230 g) rice hulls (optional) 4 AAU Hallertau hops (60 min.) (1 oz./28 g at 4% alpha acids) 1.5 oz. (43 g) fresh orange peel
- (5 min.) 0.4 oz. (11 g) coriander seed, crushed (5 min.)

Wyeast 3944 (Belgian Witbier), White Labs WLP400 (Belgian Wit Ale), or Mangrove Jack's M21 (Belgian Wit) yeast ¾ cup corn sugar (if priming)

STEP BY STEP

If using a false bottom or manifold system for lautering, then the rice hulls are recommended. Start by placing the rice hulls into the mash tun first. While they will get mixed in with the crushed grains at mash-in, the goal is to have more of the rice hulls at the bottom of the mash tun.

With the goal of creating a dextrinous wort, mash in with 3 gallons (11.4 L) of 166 °F (74 °C) strike water to achieve a single infusion rest temperature of 153 °F (67 °C). Hold at this temperature for 60 minutes, then start the lauter process.

With sparge water at 170 °F (77 °C), collect about 6.25 gallons (24 L) of wort. At start of boil, add Hallertau hops, then boil for 60 minutes. With 5 minutes left in the boil, add fresh orange peel and crushed coriander.

Chill wort to fermentation temperature, around 66 °F (19 °C). Pitch yeast. Hold at this temperature for the duration of active fermentation. After final gravity is achieved, chill to 60 °F (16 °C) and allow to condition for one week. Bottle and prime or keg and force carbonate to 2.5 v/v.

SECOND CHAPTER BREWING'S WITTY LIBRARIAN CLONE



LIBRARIAN CLUNE (5 gallons/19 L, extract with grains) OG = 1.052 FG = 1.013 IBU = 14 SRM = 4 ABV = 5%

INGREDIENTS

- 6 lbs. (2.7 kg) dried wheat malt extract
- 0.5 lb. (230 g) Carafoam[®] malt 4 AAU Hallertau hops (60 min.)
- (1 oz./28 g at 4% alpha acids) 1.5 oz. (43 g) fresh orange peel (5 min.)
- 0.4 oz. (11 g) coriander seed, crushed (5 min.)
- Wyeast 3944 (Belgian Witbier), White Labs WLP400 (Belgian Wit Ale), or Mangrove Jack's M21 (Belgian Wit) yeast ¼ cup corn sugar (if priming)

/4 cup com sugar (in primi

STEP BY STEP

Steep the Carafoam[®] in a muslin bag in 2 gallons (8 L) of water at 152 °F (68 °C) for 30 minutes. Afterwards, place the grain bag in a colander and wash with 1 gallon (4 L) of warm or hot water. Add water to reach a total volume of 5 gallons (19 L).

Bring liquid to a boil, then turn off the heat and carefully stir in the dried malt extract. Once fully dissolved, bring wort back to a boil. Add Hallertau hops and boil for a total of 60 minutes. With 5 minutes left in the boil, add fresh orange peel and coriander.

Chill wort to fermentation temperature, around 66 °F (19 °C). Pitch yeast, being sure to top off fermenter to 5.25 gallons (20 L). Follow allgrain recipe for fermentation and packaging instructions.

TIPS FOR SUCCESS:

When it comes to the spices, be sure that the coriander seeds are fresh. For the orange, use a vegetable peeler to remove just the outer layer of skin. There are several orange varieties that work like Seville, blood, navel, and cara cara, to name a few. Grab a peeler, a cheap macro lager, and try soaking the peels to see what works best for you. (970)





BOILING WORT

The impact time plays in the boil

Wort is boiled for numerous reasons, including sanitation, to eliminate undesirable compounds, to extract bitterness from hops, flavor development, and more. As no-boil brewing gains interest and extended boils remain popular for some big beers, we wanted to get the views of what these experts do when the heat is cranked under the kettle.

enerally, if I'm brewing a single all-grain batch of a style that's not going to be really bitter then I'll boil for 30 minutes with a slightly larger initial addition of a high-alpha hop to achieve the desired bitterness. If I'm brewing anything more bitter than a standard American IPA, I'm likely sticking with a 60-minute boil, as well as when I'm brewing two batches simultaneously only to save my sanity. I'm no longer convinced extended boils are necessary to reduce Dimethyl Sulfide (DMS), so no more boils of 90+ minutes for me. I'd stick to the shorter boils for most styles when doing extract batches as well, as the decision is based largely on isomerization of alpha acids, as well as convenience. While multiple exBEERiments have indicated the risk of DMS due to boil length is low when brewing all-grain, it's essentially non-existent when using extract, at least as a function of boil length.

We've conducted a number of boillength experiments that were documented on Brülosophy. When comparing an American pale ale made with pale and Vienna base malts where one was boiled 30 minutes and the other was boiled for 60 minutes, tasters were unable to reliably distinguish them. In a follow-up exBEERiment, tasters were also unable to consistently tell apart a Kölsch-style beer made with 93% Pilsner malt that was boiled for 30 minutes from one boiled 90 minutes. We sent samples of the beers from the latter exBEERiment to a lab for objective analysis, and those results indicated neither beer contained measurable levels of DMS. Given the results. I no longer worry about extended boils for the purposes of DMS mitigation. There may be other benefits though. I've heard

good things about extended boils when making certain Scottish ales.

In addition to length, we've done two exBEERiments looking at the impact boil vigor has on beer character, one on an American amber ale and the other a German helles exportbier, and both returned non-significant results.

Prior to completing the boil length exBEERiments, I definitely accepted what I'd been taught about the correlation between the presence of DMS and boil length, especially as it pertains to lagers made with a large amount of Pilsner malt. I no longer worry about this at all. Boil vigor is something I never really worried about, in part because I've never had an issue achieving a rolling boil, and the results of our exBEERiments only served to validate my lack of concern.

I've never made a true no-boil beer, but two past exBEERiments completed by Brülosophy contributors indicated tasters could reliably distinguish a noboil Berliner weisse from one boiled for 45 minutes and a no-boil Scottish heavy from one boiled for an hour. During the COVID pandemic, when we were unable to collect data from tasters, contributor and host of *The Brü Lab* podcast, Cade Jobe, replicated the no-boil exBEERiment on a hazy IPA and was unable to reliably tell those beers apart. Of course, the no-boil beer in all three cases had a lower OG than their boiled counterparts.

Another boil-related exBEERiment I want to do is comparing a Scottish ale boiled 60 minutes to one boiled for 3–4 hours where the amount of boil-off is compensated for. I've wondered if the characteristic caused by an extended boil is really due to caramelization and/ or the Maillard reactions, or if it can be better explained by extended boils simply producing a more condensed wort.

I'm no longer convinced extended boils are necessary to reduce Dimethyl Sulfide (DMS), so no more boils of 90+ minutes for me.



Marshall Schott began homebrewing in 2003. He started Brülosophy (www.brulosophy.com) in February 2014 as a place to share and discuss the results of the homebrewing experiments he was regularly performing. He lives in Fresno, California, with his wife and three kids. In a brewery, sometimes there are considerations for how you do things that have less to do with the beer itself and more to do with operating the brewery.



Van Havig is the Master Brewer at Gigantic Brewing Co. in Portland, Oregon. He became a professional brewer in 1995, first at Minnesota Brewing Co. and then at Rock Bottom Breweries in Minnesota, Maryland, and Oregon. As a brewer, Van continues to question convention in terms of beer style, brewing methods, and brewer dogma, among other things.

e boil for 90 minutes for any "standard" sort of ale or lager. Why? Because I've always done it. I know that's not a good answer from a technical brewing standpoint, but it is from a brewhouse process and consistency standpoint. In a brewery, sometimes there are considerations for how you do things that have less to do with the beer itself and more to do with operating the brewery. That 90-minute boil could easily be only 60 minutes, but when we're double brewing (two kettle fills in a day), the spacing of the first and second brew is a little easier with that extra half hour. It's all about the timing of knocking out the kettle and the second mash and vorlauf. When brewing a single, we still do a 90-minute boil for consistency. And consistency is of paramount importance in a commercial brewery.

An exception to this is our barleywine Massive! that is boiled for a minimum of eight hours, usually about nine. We mash in at 6:30 a.m. with a grist of 100% pale ale malt (we select a new malt every year for fun) and are typically into the boil around 10 a.m. with a 1.065 specific gravity (16 °P) wort. The goal is to boil this down until we reach at least 1.115 (27 °P). At that point we'll have reduced our wort volume by about ¹/₃. What you get is a richly mahoganycolored wort that's very attenuative. The all pale malt grist lautered to a reasonable gravity means that you get a wort comprised of a very favorable percentage of glucose and maltose compared to tri-glycerides. When you boil it for an extended period, Maillard reactions increase throughout the boil, leading to much more color generation and caramelization than in a shorter boil. The boil is so long that you actually get two hot breaks, an initial one and then another after about six hours or so. The long boil seems to also help break down some of the sugars more, leading to greater fermentability. When we ferment this wort, it will attenuate down to below 1.024 (6 °P), sometimes below 1.020 (5 °P). This makes the beer rich and strongly alcoholic, but not overly sweet and syrupy like a pastry stout. So long story short, the long boil gets you great flavor generation while at the same time creating an incredibly attenuative wort. I don't think there's another way to really get this flavor profile. To get the rich, caramelly, treacly character of the beer you'd have to use quite a bit of crystal malt, and then it wouldn't attenuate nearly enough, or alternatively it wouldn't be nearly strong enough.

The other exception to our 90-minute boils are kettle sours, which we typically boil 15–30 minutes, varying the time only to adjust gravity. Frankly that's because we just want to get on with our day after waiting nearly 24 hours since we lautered the wort. DMS is still an issue, but we have simple ways of dealing with that – namely a piece of copper right before the heat exchanger.

For many, the standard boil is 60 minutes for two reasons. Boiling for that amount of time pretty much guarantees you drive off DMS. Second, if you add hops at or before boil on a 60-minute boil you get close to the maximum amount of hop utilization that's possible. You'll get more in a 90-minute boil, but it's not a lot more - it is among the reasons the Germans boil for 90 minutes; however, what with their focus on efficiency. That 60-minute number comes from standard British brewing practice. And let's remember, American homebrewing comes from British homebrewing, which comes from British brewing practice. It all comes down to cost vs. time. Do you use a tiny bit more hops and boil for a little less time? You save some energy cost that way, as well as labor costs. Or you maximize your hop utilization, extra guarantee no DMS (much more important in lagers) at the cost of labor and energy. For homebrewers, I'd do what feels right to you. Frankly, I'd probably base my boil time on elevation (higher = longer) for DMS and hop utilization reasons.

Boiling is a process just like milling, mashing, and lautering. As such, how you go about it is important. Time can matter in terms of how the finished beer tastes. Also, how hot your kettle is before wort hits it can make large changes in flavor. Think of it as a process and how the sub-processes of hop utilization, caramelization, sterilization, etc., can affect your final beer. A sophisticated brewer knows it's not just putting sugar water in a kettle and heating it up.



CAN LED LIGHT SKUNK BEER?

Also: Step mashing efficiency and blending wine in beer

I WORK AT A GROCERY STORE CHAIN THAT FEATURES A BEER AND WINE BAR. RECENTLY A CUSTOMER ASKED WHY EVERY NON-ALCOHOLIC (NA) BEER HE'D HAD TASTED SKUNKED, INCLUDING THE ONE I'D JUST OPENED FOR HIM. I EXAMINED OUR "SINGLES" BEER SECTION AND FOUND THREE BRANDS, ALL OF WHICH WERE IN CLEAR OR GREEN GLASS AND ILLUMINATED UNDER WHITE LED (LIGHT-EMITTING DIODES) LIGHTING. AS A BJCP (BEER JUDGE CERTIFI-CATION PROGRAM) JUDGE, I KNEW THAT ONLY BROWN GLASS PROTECTS BEERS FROM THE LIGHT WAVELENGTH RESPONSIBLE FOR CONVERT-ING NORMAL HOP COMPONENTS TO THE CHEMICAL KNOWN FOR THE SKUNK CHARACTER. I SUGGESTED THAT THE CUSTOMER TRY TO FIND A NON-ALCOHOLIC OFFERING IN BROWN GLASS OR A CAN. FOR HIS NEXT SELECTION, HE LOCATED AN NA BEER IN A CAN. WE FOUND THAT IT WAS NOT SKUNKED. I'M GUESSING THAT WHITE LED LIGHTS CAN SKUNK BEER JUST LIKE FLUORESCENT LIGHTING. WHAT DO YOU SAY?

Beer bottled in green glass is only slightly better than clear glass when it comes to absorbing UV light.



LED lights have become common. The question is if they skunk beer like traditional lighting.

Before I jump into this great question, I want to confess that I am feeling a bit skunky for being a bit behind on this column because I have been traveling too much and writing too little! I am feeling so skunky, in fact, that I ducked into Mariano's Market in Chicago, Illinois, to lay down some copy while enjoying a cold pint beneath the bright LED and fluorescent lights inside of this beautiful store located down the street from the Siebel Institute where I just wrapped a full day of malt talk.

LED lights are, literally, cool devices; they can produce a broad range of colors while consuming a fraction of the energy, for a much longer time, and producing minimal heat output in comparison to incandescent and fluorescent lights. It's truly staggering that lighting accounts for about 20% of all electricity consumption and 6% of global CO₂ emissions. This is why Shuji Nakamura, Hiroshi Amano, and Isamu Akasaki were awarded the Nobel Prize in Physics in

TODD WENZEL RALEIGH, NORTH CAROLINA

2014 for developing a bright-blue LED light. Since that time, incandescent and fluorescent lights have all but vanished from new light fixtures across the globe. And in the process, the task of changing bulbs, the cost of buying replacement bulbs, and the investment in removing heat from homes, offices, grocery stores, and breweries caused by fluorescent and incandescent lights has plummeted. But concerns about skunky beer remain!

OK, that was a total dive into a rabbit hole that has nothing to do with skunky beer and fluorescent lighting. Beer lovers have a love-hate relationship with fluorescents. We love them because they illuminate many a beer store and help us beer lovers shop for beer. Seriously, who wants to shop for beer in the dark? But we hate fluorescents for producing UV light that catalyzes the reaction between iso-alpha acids and sulfur compounds in beer turning beer skunky. The question of the day is, "Do LEDs do the same thing?" And the short answer is yes; LED lights do cause beer to turn skunky. If one were to set about optimizing beer skunking, choosing UV-transmissible glass and a light source transmitting lots of light with wavelengths less than 400 nm (ultraviolet light) wins the race. The bad news is that most LED lights used for space illumination emit light in the 365 to 405 nm range and carry the skunky-torch handed off by fluorescent lights. Beer bottled in green glass is only slightly better than clear glass when it comes to absorbing UV light. Just to be clear, clear glass absorbs no light and exposes beer to whatever is bouncing about in the atmosphere. Shine sunlight, fluorescent, or LED light on beer in a clear bottle and skunk will soon follow.

Searching for beer sans skunk? Follow the great advice you offered the customer and look no further than beer packaged into cans, brown bottles, or kegs. The one downer about NA beers is that draft dispense is something currently not embraced by commercial brewers of all sizes because of the very real concern about the growth of pathogenic microorganisms in non-alcohol (<0.5% ABV) and low-alcohol (<3.5% ABV) beers. That's a discussion for another day!

I RECENTLY STARTED OMITTING A PROTEIN REST FROM MY MASHING PROCEDURES SINCE I HAVE READ THAT IT IS NOT NECESSARY WITH OUR MODERN WELL-MODIFIED MALTS AND IT CAN DETRIMENTALLY AFFECT HEAD RETENTION. I HAVE NOTICED THAT MY ORIGINAL GRAVITY (OG) IS CONSISTENTLY 10 GRAVITY POINTS LOWER THAN WHEN I INCLUDE A PROTEIN REST. I MEASURE OG WITH A REFRACTOM-ETER AND BREW WITH A SINGLE-VESSEL SYSTEM. I HAVE NOTICED THIS WITH BOTH GERMAN-STYLE LAGERS AS WELL AS PALE ALES, WHICH ARE THE STYLES I MOSTLY BREW. MY BASE MALTS ARE AMERICAN 2-ROW OR MARIS OTTER. IS THERE AN EXPLANATION FOR THIS?

> JOHN HENDERSON YAKIMA, WASHINGTON

I have a solid explanation of what may be causing your problem but must admit that what follows includes one very big assumption. And that assumption is that your mashes typically drop in temperature over time. Even if you are using an all-in-one system where wort is heated either in the lower section of the mash tun/ brew kettle or externally before it is returned to the mash, mash temperature often drops because these systems are not well-insulated.

Over the last three years I have brewed what I consider to be great beers using an all-in-one system. During this time of exploration, I have noticed things that are very different to what I became accustomed to during my 26 years of commercial brewing using mash mixers in a wide range kettle and controlling the temperature to the set point. I want to put that on hold because you may not be using this sort of system.

Let's assume you are mashing in a non-heated vessel like an insulated cooler and performing a protein rest versus a single-temperature mash. With the protein rest, you mash in at about 122 °F (50 °C) and rest for about 30 minutes. Now it's time to heat, and you add heat while stirring. The heat may come from hot water, hot mash if you are decocting, or external heat from a flame or electric element. Whatever you are doing, you are probably stirring your mash to keep the temperature uniform. And you are also exposing the starch being solubilized during the protein rest to beta and amylase enzymes.



It's critical for yield for alpha amylase to be active in the mash where it reduces mash viscosity and increases starch solubility.



of sizes. When a steam-heated mash mixer is used, mash temperature is uniform with a slow drop in temperature during rests. And when the temperature eventually drops below about 1 °F ($\frac{1}{2}$ °C) from the set point, mash is automatically stirred and heated back to the set-point. As cooking processes go, these temperature changes are slow to occur and tightly controlled.

My guesstimate about what is happening with your brews is that you mash-in at some temperature between 149–158 °F (65–70 °C) and hold for about 60 minutes before commencing wort recirculation. During your mash rest, you don't stir and may or may not heat. And even if you do heat using an all-in-one brewing system, your system is measuring the wort temperature in the bottom of the mash/ The same basic process is different when you skip the protein rest because you probably do not stir your mash during your mash rest. Simply stirring the mash increases extract dissolution. And stirring the mash during heating steps helps to maintain temperature uniformity; something that all-in-one systems don't do very well. Without jumping down a very deep rabbit hole, I have a few suggestions.

For starters, if you have an all-in-one system, measure the mash temperature and compare it to your set point. If there is a big difference, which I have seen in my own experience, determine the offset and increase your target temperature to provide enough heat from wort to make up for the mash heat losses to the environment. It's critical for yield for alpha amylase to be active in the mash where it re-



duces mash viscosity and increases starch solubility.

If you are not experiencing much heat loss during mashing, extend your mash time to account for the time reduction when you dropped the protein rest. While you're at it, give your mash periodic stirs to help move starch from your malt into wort. My gut tells me these details are the root of your issues. But because I work for a malting company, I would be remiss not to suggest checking your mill gap/malt crush, mash thickness (thinner mashes improve yield), and thermometer calibrations as part of this troubleshooting exercise. Hopefully this answer points you in the right direction in searching for those lost extract points!

I BOTTLE CONDITION ALL MY HOMEBREWED BEERS, WHICH ARE TYPICALLY SOURS AND BELGIAN STYLES. WE ALSO MAKE WINE AND HAVE SEVERAL PLUM AND CHERRY TREES AND A SIBERIAN KIWI VINE. TO BULK PROCESS FRUIT DURING HARVEST SEASON, I WILL OFTEN FERMENT THE FRUIT IN A 5-GALLON (19-L) BUCKET WITH A CHAMPAGNE AND SOUR YEAST, SUCH AS LALLEMAND PHILLY SOUR, AND THEN BOTTLE IT. I THEN AGE IT. IT IS GOOD AS IS, BUT I WOULD LIKE TO BLEND IT WITH OTHER BEERS AND WAS THINKING TO POUR SOME INTO BOTTLES WHEN I AM BOTTLING ANOTHER BATCH. BUT I WASN'T SURE IF THERE IS A BETTER WAY. SOME OF THE FERMENTED PLUM BOTTLES ARE SEVERAL YEARS OLD AND HAVE REALLY DEVELOPED A NEAT FLAVOR.

Sounds like you have access to some great stuff! Love the idea of blending fruit wine into beer and hope to give you some ideas on how to make this practical. Perhaps the easiest thing to do given the volume of fruit wine you seem to produce would be to use glass carboys to store and age your collection of blending wines for later use in brewing and bottling what you don't use. I can see how this idea may not be as flexible as using bottled product when you decide to use it, but it would reduce the complexity of "unbottling" and less prone to oxidation compared to pouring bottles of fruit wine into beer during blending. If this sounds like something practical, there is a lot written about how wine in carboys is used to top up barrels during aging and how to protect wine in glass from oxidation during this process.

I do like your idea of grabbing bottles of sour plum, sweet cherry, and dry cherry-kiwi fruit wine, for example, and blending into something like a Russian imperial stout before bottling. A relatively easy method to move your wine from glass to beer is to use a counter-pressure bottle filler in reverse. Assuming you have determined the blend and are ready to



SPENCER HOWARD CHATTANOOGA, TENNESSEE

start the process, begin by racking your base beer, the Russian imperial stout in this example, into a bottle container. Cornelius kegs are really the ideal vessel for the task. Begin by filling a Corny keg with a no-rinse sanitizer like Star San, push the sanitizer out of your keg with carbon dioxide, and rack your beer into the keg through the "out" connection on the keg while venting the gas out of the keg through the pressure relief valve. Now you're ready for the wine addition. Because kegs are not clear, it's important to know that there is sufficient headspace in the keg to accommodate the volume of wine that follows. Call me Mr. Obvious, but this detail should not be overlooked! Another important detail is to open the keg's pressure relief valve and leave it open until the next step of the process is complete.

Reverse filling a bottle, aka dispensing like a beer keg, is simple if you have the right sort of filler. Simply connect the fill tube of your bottle filler to the "in" post on your keg and the filler's carbon dioxide tube to a CO_2 regulator set to about 2 psi, as if you are preparing to fill. Open one of the bottles destined for the base beer, insert the fill tube into the bottle, open the gas valve on the filler as if you were planning to pressurize before filling, and you are now pushing wine out of the bottle and into the keg of beer with a nice CO_2 headspace. Except in this scenario, the gas valve remains open until the CO_2 has displaced the wine into the beer.

Now what?

I have assumed that the blend was determined before the mixing process above occurred. But this does not mean that tasting is not needed. At this stage of the game, close the pressure relief valve on your keg, add enough CO_2 pressure to seal the lid, invert a couple of times to mix, and take a small sample. If the blend tastes as expected, you have a few options. Depending on what you are producing, you could force carbonate and put the beer on tap, force carbonate and counter-pressure fill into bottles, or add some priming sugar and a fresh dose of priming yeast prior to bottling. Thank you for the fun question!



GRUIT A medieval unhopped ale

ost people have heard of gruit, but only to the point where it is described as some kind of beer that doesn't use hops for bitterness and has flavorings from a mix of wild herbs and spices. In modern times, it is almost synonymous with unhopped beer, but that isn't quite accurate either. Gruit is actually quite a bit more specific as it is tied to both a specific region (northwest continental Europe) and timeframe (first half of the second millennium).

Gruit was an early example of how excise taxation was applied to alcohol and how trade secrets were used to protect an industry. Gruit itself was the mixture of herbs used in brewing and what was actually taxed. Since the composition of the gruit was a trade secret, it had to be purchased — and this is where the tax was collected. The economic angle to gruit is often ignored, but it is intertwined.

Given the secretive nature of the gruit and the long time when it was being produced, there are few definitive records that can be used to describe the actual beer. As brewing technology and ingredients were also relatively immature at the time, attempting to recreate that beer is a job best left to historians. I think modern interpretations can be made that have the spirit of the original beer without being an outright attempt to reproduce the original. I have seen a similar approach in Finland with sahti and South America with chicha. and it is a good pattern to follow when updating historical indigenous beers.

Gruit is not a defined style in either the Beer Judge Certification Program (BJCP) or the Brewers Association style guidelines. The appropriate place for such as beer in both systems is Historical Beer category (BJCP style category 27), with the inclusion of a detailed description of the beer so judges can understand the brewer's intent.

HISTORY

In researching gruit, I found few sources in English that could give an authoritative explanation. The most frequently quoted book, Sacred and Herbal Healing Beers by Stephen Buhner, seemed more interested in the psychotropic and inebriating effects than the composition of the beer. Beer in the Middle Ages and the *Renaissance* by Richard Unger included some background on the regulatory and taxation aspects. Then I found some technical papers ("The Rise and Fall of Gruit," "Gruit Ale," and "Reconstructing Medieval Gruit Beer") written by researcher Susan Verberg, who consulted some primary Dutch sources in her quest to understand gruit. I highly recommend searching for her papers as they are guite informative and contradict some earlier writings by others.

Gruit was developed in the Low Countries (Flanders, the Netherlands, parts of western Germany) sometime after the Roman Empire fell (476), certainly by the 800s when Charlemagne ruled the Carolingian dynasty. It fell out of favor somewhere between the 1400s and 1600s, as hopped beers began to become more prominent. So, it is definitely a beer associated with the Middle Ages – the time between the fall of the Roman Empire and the Renaissance and Age of Discovery.

In the Middle Ages, states controlled the gruit but not brewing. So, governments were taxing the right to use gruit in beer. Just to be clear, medieval gruit could be the herbal mixture, the finished beverage, or the monopoly right to sell the ingredients, as well as the modern concept of an herbal beer without hops. In early times of making gruit ale, the gruit mixture could include the grain as well, although this later was changed to just the herbs.

Please don't try to tie the decline of gruit to the introduction of the Reinheitsgebot. Gruit was not made in Ba-

Given the secretive nature of the gruit and the long time when it was being produced, there are few definitive records that can be used to describe the actual beer.

GRUIT BY THE NUMBERS OG: 1.050-1.080 FG: 1.006-1.015 SRM: 5-13 IBU: 0 ABV: 4.7-7.9%



STYLE PROFILE RECIPE

GRUIT

(5 gallons/19 L, all-grain) OG = 1.058 FG = 1.015 IBU = 0 SRM = 4 ABV = 5.8%

INGREDIENTS

6 lbs. (2.7 kg) oat malt 3.5 lbs. (1.6 kg) pale ale malt 2.5 lbs. (1.1 kg) wheat malt 1 qt. (0.95 L) juniper branches, small branches only 1 qt. (0.95 L) fresh spruce tips, new growth only (60 min.) 10 g sweet gale (0 min.) 10 laurel berries (0 min.) 1 oz. (28 g) juniper berries (0 min.) 10 g caraway seeds (0 min.) Fennel fronds from 1 bulb (0 min.) White Labs WLP011 (European Ale), Wyeast 1007 (German Ale), or SafAle K-97 yeast ³/₄ 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 a step mash. Use enough water to have a moderately thick mash (1.5 qts./lb. or 3.1 L/kg). Put the juniper branches in the bottom of the mash tun. Mash in the malts at 131 °F (55 °C) and hold for 15 minutes. Raise the temperature to 144 °F (62 °C) and hold for 30 minutes. Raise the temperature to 158 °F (70 °C) and hold for 15 minutes. Begin recirculating, then raise the mash temperature to 169 °F (76 °C), and recirculate for 15 minutes.

Sparge slowly and collect 8 gallons (30 L) of wort.

Boil the wort for 3 hours. Add the spruce tips with 60 minutes remaining in the boil. Add the remainder of the herbs and spices at the end of the boil, and steep for 10 minutes before removing.

Chill the wort to 64 °F (18 °C), pitch the yeast, and ferment at that temperature until complete.

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



(5 gallons/19 L, extract only) OG = 1.058 FG = 1.015 IBU = 0 SRM = 4 ABV = 5.8%

If you are unable to source the oat malt extract, you can steep 0.5 lb. (230 g) Simpsons Golden Naked Oats® malt and swap out the extract for 3.5 lbs. (1.6 kg) pale ale liquid malt extract. Steep the grains while the water heats up to 158 °F (70 °C).

INGREDIENTS

- 4 lbs. (1.8 kg) Muntons oat liquid malt extract
- 3.75 lbs. (1.7 kg) weizen dried malt extract
- 1 qt. (0.95 L) juniper branches, small branches only
- 1 qt. (0.95 L) fresh spruce tips, new growth only (60 min.)
- 10 g sweet gale (0 min.)
- 10 laurel berries (0 min.)
- 1 oz. (28 g) juniper berries (0 min.)
- 10 g caraway seeds (0 min.)
- Fennel fronds from 1 bulb (0 min.)
- White Labs WLP011 (European Ale) Wyeast 1007 (German Ale), or SafAle K-97 yeast

3/4 cup corn sugar (for priming)

STEP BY STEP

Use 6.5 gallons (24.5 L) of water in the brew kettle; heat to 158 °F (70 °C). Turn off the heat. Add the malt extracts and stir thoroughly to dissolve completely. Add the juniper branches. Turn the heat back on and bring slowly to a boil, removing the juniper when the first bubbles from the boil appear.

Boil the wort for 3 hours. Add the spruce tips with 60 minutes remaining in the boil. Add the remainder of the herbs and spices at the end of the boil, and steep for 10 minutes before removing.

Chill the wort to 64 °F (18 °C), pitch the yeast, top up the fermenter to 5.25 gallons (20 L) and ferment until complete.

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

varia and it was in decline long before 1516. Hopped beer was easier to produce, kept better, and did not require paying extra taxes. Unhopped, spiced beer was also made in other locations like England, Scotland, and Scandinavia, but this was not gruit – these beers had a different tradition (one example is Fraoch heather ale). Only in modern times do we attempt to lump these different beers together. Also recall that hopped beer and unhopped ale coexisted in England around the time of the decline of gruit. Hopped beer came to England from the Dutch, which is where gruit would have been most popular.

My summary of gruit is to think of it as an herbal ale from the Middle Ages in the pre-industrial times in the area around the Low Countries of Europe. It often used a different blend of herbs and spices depending on the city, but the composition and sale of the herbal mix was a highly regulated monopoly beyond the control of the brewer. It is a specific type of beer, not a generic name for an unhopped beer. Modern versions can re-interpret the style with current technology and ingredients, but these are not actual re-creations of the historical drinks.

SENSORY PROFILE

For this profile, I am relying primarily on the Brewers Association (BA) guidelines for koyt (listed as Dutch-style *kuit, kuyt,* or *koyt*), which I know was researched and submitted to the BA by Dutch judges and brewers. The herbal aspect of gruit is in addition to this base beer. Since gruit was made for a long time, the way it was made certainly changed, so a broad range of potential interpretations is possible.

Koyt has a predominantly grainybready flavor and aroma, with at most a moderate body. The color can be golden to copper, the dark colors coming from a longer boil. Perceived bitterness is medium-low to moderate, but the bitterness is not coming from hops in a gruit. Likewise, the low aroma is also coming from herbs, not hops. The fermentation profile can have a light fruitiness but should otherwise be clean. The strength can be average to strong, in the 4–8% ABV range. The beer can be hazy or cloudy. Even though a primitive beer, it should not have sourness.

The herbal character and bitterness will depend on what botanicals are used in the recipe, obviously. There could have been times when both hops and a botanical gruit mixture were used together, since hops began to be used as early as the 1200s. Earlier versions would not have used hops, but there is not much information available from those times. Books and printed records would not be common since the printing press wasn't invented until the 1400s.

One of the typical ingredients in gruit, bog myrtle (*Miricia gale*) is known to have a bitter, astringent flavor, and likely is what is being used in the bittering hop role. Other herbs could vary by region, city, or time period – Verberg identifies at least 11 different herbs and spices that had been used in various locations. However, most mixtures seem to have used between three and five ingredients. She identifies bog myrtle or marsh rosemary (*Ledum palustre*) as necessary, with laurel berries (*Laurus nobilis*, but not the bay leaves) and laserwort (*Laserpitium siler*) being most common. She also mentions resin frequently; this is likely pine resin that was boiled and clarified to release volatile turpentine gasses.

Sacred and Herbal Healing Beers says that gruit contained bog myrtle, wild rosemary, and yarrow, but Verberg convincingly explains how this is erroneous. Various modern herbs and spices such as juniper berries, ginger, caraway seed, aniseed, nutmeg, cinnamon, cumin seed, and the like are also less convincing, although they may sometimes be able to simulate the character of other more traditional, less common ingredients.

BREWING INGREDIENTS AND METHODS

Recreating gruit involves adapting something better known from the approximate time and place when gruit was made, in this case koyt from the Netherlands. Gruit existed many hundreds of years before koyt (which was made from approximately 1400–1550), but it's plausible that gruit herbs were used in a koyt-like beer during the time they did overlap.

In the pre-industrial era, mashing was an approximation at best. Boiling the mash for long periods, like a cooking process, was sometimes done, as were multiple mashes. Mashing and boiling could take place in the same vessel. The grist of koyt consisted of a mixture of malted oats, wheat, and barley, with oats constituting at least half the grain bill. Older versions of gruit probably contained mostly oats, with added wheat only. A modern approach would be to use a koyt-like grist, but with modern mashing techniques like either a single infusion mash or a step mash.

Selecting the gruit component is the hardest step. Use a bittering ingredient, either bog myrtle (sometimes called sweet gale) or marsh rosemary, but not both together since they historically were not found in the same area. Then select flavorings to add — as described in the Sensory Profile section. Sourcing these products can be difficult. Searching homeopathic product suppliers, health food stores, herbal tea companies, or seed companies might work, but some of these plants may need to be cultivated. When using wild or unusual plant-based products, take care to understand that you are using non-poisonous materials. Check packaging and labeling, or consult with local agricultural experts before using unknown (especially foraged) ingredients.

For those who are unable to procure traditional herbal ingredients, one alternative is to make the modern interpretation of gruit, which is to simply treat it as an unhopped, spiced beer. Simply select aromatic and bitter herbs and spices to season the beer. Note that the resulting product might not be as microbiologically stable as typical beer, so you may want to include a light dosage of low-alpha or aged hops similar to what is done when making lambic.

HOMEBREW EXAMPLE

This is a difficult beer to make since it involves sourcing a lot of unusual ingredients. The base grains should be relatively easy to find, although note that it requires malted oats not flaked oats. I'm going the koyt route for the base. When picking a pale ale malt, consider using one from the same general region as gruit. I selected a Belgian pale ale malt, for instance. I like to use a step mash when working with non-barley cereal grains. Even though clarity should not be important in this style, I don't want the beer itself to be overly heavy and thick. Note that koyt traditionally used a longer boil, which I'm using, and that should add some color. A shorter boil but using a decoction mash could also add color. None of these mash techniques are traditional for gruit, so any modern alternative is acceptable.

I'm selecting an ale yeast from the same general region, something like an altbier yeast. Other choices would be a Kölsch yeast, something called European ale, or possibly a Belgian strain. I worry about Belgian strains that are phenol-producers because of the interaction with herbs and spices. If I chose a Belgian strain, maybe something that would be used in a Belgian pale ale rather than a monastictype strain. If there was something that was more fruity than phenolic, that would also be a choice I would make.

I'm going to take some liberties with the herbs and spices because of what I am able to source. Sweet gale is pretty much required and is often found in homebrew shops (be careful, they can be old and stale). Laurel berries can be found online (Penn Herb Co. is one supplier I found). Laserwort and resin are problematic to source, but laserwort is in the same family as caraway and anise. I'll use some of those spices in its place. Alternatively, instead of anise, I might choose fennel, which has a similar licorice-like flavor. Historically, these were used in gruit from Cologne. Instead of resin, which I'd have to purify myself, I'll use various evergreen products (juniper and spruce) that I've used before.

Balancing the bitterness and spices can be difficult due to unknown freshness and potency, so be prepared to make infusions (teas) to tweak the balance once the beer is finished. This is a step I often use when making spiced beers, so it's part of my normal process. Think of it as tasting food and adjusting seasoning before serving, which is something any good cook would do.

Beers like these can be challenging to make and a very personal experience to drink – they are unusual and different, so not everyone will like them. You may wish to experiment with smaller batches or lower usage rates of herbs and spices until you determine your own personal preferences.



by Paul Crowther

Brewing no-boil New England IPA

rewing at its most basic is the transformation of starch into ethanol. An extremely simplistic look at the brewing process begins as the maltster malts the grain, unlocking diastatic enzymes. Brewers then must mash the grain, where the combination of water, heat, and enzymes break down the starch into simpler sugars. The process concludes with yeast fermenting these sugars into alcohol. Malting, mashing, and fermenting: The core processes of making beer. This, of course, leaves out one major step in the brewing process that every brewer will immediately recognize: Boiling the wort.

However, boiling wort plays no role in converting starch into ethanol, and historically boiling wasn't always part of brewing practices in different cultures. Traditional breweries in diverse regions of the world still keep up the old ways with styles such as Sahti in Finland, Kornol in Norway, Koduolu in Estonia, and Kaimiskas in Lithuania, all of which are all still being brewed without a boil.

At the most basic level, these styles are largely made in the same way as contemporary styles: Grain is malted, malt is mashed and sparged, and the wort is then collected and cooled prior to yeast being pitched (or in some cases fermentation is spontaneous, relying on wild yeast). They are the same basic steps modern brewers know, minus the boil. However, some of these styles then diverge further from most contemporary beers as most eschew hops altogether and many are flavored with juniper infusions. This ingredient substitution and divergence in process used in these unique beers are what often ties no-boil brewing together in the minds of many, and it has made them somewhat of a niche pursuit amongst homebrewers.

There are, however, a growing number of homebrewers that are using the no-boil technique to make modern styles of beer. The No Boil Raw Beer homebrewing group on Facebook has over 2,000 members, many of them taking the traditional Nordic brewing process and applying it to modern styles. Popular among them is one of the most ubiquitous craft beer styles at the moment: The New England IPA (NEIPA). Intrigued, I recently undertook the challenge of learning more about this process and brewing a no-boil NEIPA of my own.

ADVANTAGES OF NO-BOIL BREWING

The first question many will ask is "why?" Why would we take the noboil process and adapt it to styles it was never designed for?

I was interested in no-boil brewing (sometimes called raw brewing) because of time. Like many homebrewers, I lead a busy life: I have a 9-5, do a decent amount of freelance writing for magazines as a side gig, and have a family and three dogs; I fit homebrewing in wherever I can, but my free time is limited. Brewing a typical three-vessel, full-grain brew takes me about 7–8 hours from prep to clean up. I can either set the better part of a day aside or brew into the early hours of the morning. With a noboil brew I'm done in half the time; I can fit a brew in after I eat dinner and still get to bed at a reasonable time or only use my Saturday morning and still have the afternoon to spend with my family. Simply put, no-boil brewing means I can homebrew more and don't have to sacrifice a whole day for the hobby.

Another reason is cost. I never used to worry about boiling my wort for an hour but since the price of natural gas and electricity has risen dramatically in the past 18 months (especially so in Europe, where I live), my home energy bill has tripled and so I am increasingly conscious of the cost of my homebrewing. Cutting out the 80–90 minutes I'm heating the wort is no longer an insignificant cost saving. It also significantly cuts down on the carbon footprint of making your homebrew.

So there are time-saving, moneysaving, and sustainability reasons why we may look at no-boil brewing, but what are the drawbacks? Although not required, boiling wort does serve several purposes. *Brewing* by A. Chaston Chapman (Cambridge University Press, 1912) lists the five key objectives of boiling wort as:

- **1.** Sterilization of the wort.
- **2.** Arresting of the action of the diastase.

3. Extracting the flavor and preservative constituents of the hops.

- **4**. Precipitation of undesirable protein matters.
- Concentrating the

5. Concentrating the wort to the requisite point.

How do we still achieve these goals without a boil? Are there some of these things that don't actually need to happen? To help me understand how we can adapt a homebrew process to the no-boil method, I reached out to Ghost Monkey Brewery in South Carolina, which had made a commercial no-boil NEIPA called UNboiled (see the clone recipe on page 27), and spoke to their Head Brewer Khoi Nguyen about how they got around these issues.

Sterilization

Malt is absolutely covered in bacteria, wild yeasts, and molds. So it is thought necessary to boil the wort after the mash to pasteurize it and remove these microbes. However, 212 °F (100 °C) is not a magic number; bacteria are destroyed at much lower temperatures. The World Health Organization completed a study showing that 99.99% of a bacterial population are killed after exposure to 158 °F (70 °C) for one minute.¹ The industry standard for milk pasteurization in the U.K. is to heat the milk to 161.1 °F (71.7 °C) for at least 15 seconds before rapidly cooling it.²

In most Nordic no-boil brews this sterilization is done with a near-boiling sparge as the wort goes straight from mash tun to fermenter. Khoi said for UNboiled they added whirlpool hops anyway, so he just ensured that the wort temperature was raised to a high enough temperature for long enough during the whirlpool to pasteurize the wort at that stage.

Stopping Diastase

The purpose of mashing malt is to allow enzymes to break down starch into simpler sugars. Given enough time the enzymes will convert the vast majority of the starch into sugar. Boiling wort denatures (destroys) the enzymes, meaning any remaining starch and longer chain sugars that yeast can't break down will remain in the beer, which gives some styles their necessary body and mouthfeel. If we were to follow our normal brewing process for a no-boil brew, we would end up with a very dry finishing beer.

Luckily, enzymes denature at much lower temperatures than boiling, so if you're doing a very hot sparge, or whirlpooling in the case of UNboiled, you'll still denature the enzymes. So, similar to the previous point about pasteurization, boil temperatures are not necessary here.

Extracting Hop Flavor

While boiling hops in the wort is the most common way to extract hop flavor and bitterness, there are several other ways of extracting this that most homebrewers will find familiar. The most obvious is dry hopping post-fermentation, but we can also whirlpool hops, putting them in the hot wort after running off from the mash and stirring them for a time before cooling the wort. Hot wort at nearly 160-170 °F (71-77 °C) is still going to extract flavor and bitterness, although to a lower degree

than boiling.

The recipe for UNboiled takes advantage of exactly this. Khoi told me he wanted UNboiled to have a fairly high level of bitterness for a NEIPA and for the beer to sit between a West and East Coast IPA, so the whirlpool addition is enough to extract a decent amount of bitterness.

Some of the traditional no-boil brewers will brew a hop tea separate from the brew and will then add this extremely bitter hop tea to their wort in the fermenter. Khoi told me this technique may add some astringency and since NEIPA is a very hoppy style he prefers to extract the necessary bitterness from the whirlpool. If brewing a style with less pronounced hop aroma, a hop tea may be the way to go. Another option is liquid hop extract that you can add during the whirlpool stage.

Removing Proteins

Boiling wort causes soluble proteins to coagulate and drop out of the solution as a solid mass that can then be filtered. During a boil this is referred to as "hot break" and will manifest as foam forming on the top of the wort. This clears haze out of a beer, which for most styles makes the beer look true to style. Haze for a NEIPA, though, is actually desirable.

Khoi agreed with me that it's almost paradoxical to build a grain bill full of protein to then boil it out. Part of his reason for brewing UNboiled was not being happy with the haze he'd got in previous brews. Because a no-boil beer retains more protein haze, Khoi had been able to scale back high protein grains to about 30% for UNboiled and still get a fantastic haze and not worry so much about a stuck mash.

Concentrating the Wort

Boiling creates steam, therefore a certain percentage of water from the wort is removed by the boil and the gravity of the wort increases. This is why the pre-boil gravity reading is always lower than the reading as the wort goes into the fermenter. So, if you follow the same recipe in a no-boil batch as a batch that is boiled

you'll end up with a lower gravity and thus a lower ABV than you aimed for. You'd also have more wort than may fit into your fermenter. Of the five reasons to boil wort, I think this is the least worrisome as brewers can simply compensate for this in recipe development by building in more grain and reducing the sparge water.

Dimethyl Sulfide

Another worry I had with no-boil beers was Dimethyl Sulfide (DMS), a substance that causes a distinct off-flavor of creamed corn or cabbage in a finished beer. DMS is produced from the precursor chemical S-Methyl Methionine (SMM).

Khoi assured me he'd had no such issues with UNboiled. I'd spoken to Lars Garshol, author of *Historical Brewing Techniques*, about no-boil brewing before embarking on this article and he told me that the issue of DMS in no-boil beers is largely a myth. DMS is only formed in significant amounts at 185 °F (85 °C); if you're keeping your whirlpool temperature below this it shouldn't be an issue.

Khoi also designed the grain bill to mitigate any risk of DMS. SMM is created during the malting process, but a significant amount is eliminated in kilning — the higher the kilning temperature the lower the SMM. This means Pilsner malt, with its lower kilning temperature, has a higher risk of DMS, while higher temperature kilned pale malts have a much lower risk of DMS character.3 UNboiled uses standard 2-row pale malt, but Maris Otter and Golden Promise would both be great choices too. Using a Vienna or Munich malt as your base would lower the risk even further, but perhaps be too dark for a NEIPA to remain to style.

References:

¹ World Health Organization. "Boil Water," 2015. https://apps.who.int/ iris/handle/10665/155821

² Dairy Council, Northern Ireland. "Pasteurisation." www.dairycouncil. co.uk/who-we-are/ni-dairy/fieldto-fridge/pasteurisation

³ Mallett, John. *Malt: A Practical Guide from Field to Brewhouse.* Brewers Publications, 2014.

NO-BOIL RECIPE

GHOST MONKEY BREWERY'S UNBOILED CLONE

(5 gallons/19 L, all-grain) OG = 1.069 FG = 1.012 IBU = 57 SRM = 4 ABV = 7.1%

The recipe pulls together all the lessons discussed in this article. Pasteurization and diastase arrestation is achieved through a 20-minute whirlpool, but with the temperature kept low enough that it doesn't form DMS (Dimethyl Sulfide). The haze from the flaked wheat and oats are not boiled out through a hot break. Assertive hop flavor and bitterness are obtained through a huge whirlpool addition, supported by dry hopping. When I brewed this recipe at home it took me about four hours and saved about an hour of energy from not boiling. It's got all the hop brightness you'd want from a NEIPA with a little nod to West Coast IPAs with its bitterness and slight notes of pine.

INGREDIENTS

10 lbs. (4.5 kg) North American 2-row pale malt 2.5 lbs. (1.1 kg) flaked wheat 1.25 lbs. (0.6 kg) flaked oats 10 oz. (280 g) Carapils[®] malt 3.2 oz. (90 g) melanoidin malt 1.6 oz. (45 g) acidulated malt 2.4 oz. (68 g) Columbus hops (hopstand) 2 oz. (57 g) Citra[®] hops (hopstand) 2 oz. (57 g) Galaxy[®] hops (hopstand) 2 oz. (57 g) Amarillo[®] hops (hopstand) 1.2 oz (34 g) Mosaic[®] hops (hopstand) 0.8 oz. (23 q) Mosaic[®] hops (dry hop #1) 1.6 oz. (45 g) Amarillo[®] hops (dry hop #2) 1.6 oz. (45 g) Galaxy[®] hops (dry hop #2) LalBrew New England, White Labs WLP095 (Burlington Ale), or Imperial A04 (Barbarian) yeast ²/₃ cup corn sugar (if priming)

STEP BY STEP

Clean and sanitize all brewing equipment. Mash at 152 °F (67 °C) and hold for one hour. Sparge at 175 °F (80 °C), using half a gallon/1.9 L (or whatever your standard boiloff would be) less water than you would normally. Run off into your brewing kettle, then bring wort up to 182 °F (83 °C). Add the hopstand additions and maintain this temperature for 20 minutes.

Cool wort to 68 °F (20 °C) and pitch yeast. Once vigorous fermentation is detected, add the first dry hop addition. Once final gravity is reached add second dry hop addition. Leave

to condition for at least three days and then rack as normal. Keg and force carbonate to 2.3 v/v or prime and bottle.

Partial mash option: Replace 8 lbs. (3.6 kg) of the pale malt, the flaked wheat, and acidulated malt with 3 lbs. (1.4 kg) extra light dried malt extract, 3 lbs. (1.4 kg) Bavarian wheat dried malt extract, and a ¼ tsp. 88% lactic acid. Place the crushed grains in a muslin bag and submerge in 2 gallons (7.6 L) at 152 °F (67 °C). Add the lactic acid and hold for one hour. Remove grains, place in a colander and wash with 1 gallon (3.8 L) hot water. Off of heat, stir in the dried malt extracts, and add hot water until there is 5.5 gallons (21 L) in the brew kettle. Bring the wort up 182 °F (83 °C). Add hopstand additions and maintain this temperature for 20 minutes. Follow the remainder of the all-grain recipe for the fermentation instructions. (***)





Prost to a Special Week in Bavaria! BYO readers experience Bavaria's historic beer culture

With visits to 26 breweries, a hop farm, and a malt house, 18 homebrewers from North America were lucky to experience the incredible beer culture of Bavaria firsthand during *BYO*'s Brewery and Hiking Adventure in mid-September, 2023. The week was filled with unique beer experiences including going back to school with a lecture on yeast from the head of the university brewing program at Weihenstephan and touring their teaching brewery before heading next door to tour and taste at their large commercial brewery. We also had the opportunity to taste fresh tank samples poured by the brewmasters at world-class breweries Ayinger and Schlenkerla while they answered brewing questions from the group.



From Bamberg's famous rauchbiers to the wonderful unfiltered kellerbiers of the countryside to crystal-clear helles in Munich, it was a special chance to enjoy so many classics at the source at both small and larger breweries. And the local brewers we visited enjoyed sharing their tips with the group of homebrewers on the keys to brewing the styles that make this region so famous.

Each day we hiked to different breweries starting in the Munich area and working our way north to the Franconian city of Bamberg. During our hikes we visited several monastery breweries and small, local breweries where the only place you could enjoy their beer was onsite at their biergarten. It was a treat to walk through Munich visiting both traditional breweries such as Augustiner as well as the new wave of small craft breweries pushing the beer limits. We hiked along the ruins of an ancient Celtic wall in the middle of a beautiful forest to emerge looking across the Danube River at Kloster Weltenburg with their famous dunkel and doppelbock waiting for us. We even spent an evening sleeping only a few floors above a small brewery in a village where swans and beer trucks made up most of the morning traffic.

The group also got up close and personal with local brewing ingredients known worldwide during the week-long trip. We saw hops being harvested, processed, and kilned at a small family-owned hop farm in the famed Hallertau region and also had a tour of Weyermann Specialty Malts in Bamberg, visiting the germination beds and drum roasters that produce the backbone of wonderful beers brewed around the world.

All that beer had lots of hearty Bavarian food served alongside, giving plenty of fuel for hiking to the next stop. We enjoyed multi-course beerpaired dinners, pork and beef in every form during biergarten lunches, pretzels at every stop, and also wonderful weisswurst sausages for breakfast.

We were warmly welcomed by all those we met from the the local beer industry. It was a week made all the more special by sharing it with fellow homebrewers passionate about beer and exploring the incredible cities, countryside, and beer culture of Bavaria and Franconia.

All three *BYO* trips scheduled for 2024 (Czech Republic; Bend, Oregon; and Ireland) are sold out. A list of up-coming trips is at byo.com/trip. We hope that you can join us on a future adventure. Prost! (870)





The simplicity of BIAB

It's in

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by Trent Musho

eeting a stranger from the internet can be a scary thing. And yet I found myself driving an hour and half to meet up with someone I barely knew to teach them a different way to brew beer than they were accustomed to. Luckily this guy wasn't a serial killer, he was a YouTuber who goes by "CH" from Homebrew 4 Life. And while he had a lot of experience brewing beer, he had never tried brew-in-a bag, or BIAB, as people call it. CH had seen my small YouTube channel and

noticed I used BIAB often and was hoping I could share my knowledge to teach him the way. I was more than happy to, as BIAB greatly improved my brewing experience and completely changed the way I brewed beer just a few years earlier.

I got my start brewing beer like many others; a beer kit that turned out horribly, but nevertheless I was bit by the brewing bug. I began reading every beer book I could get my hands on and watching hours of BrewingTV videos on You-Tube, trying to absorb as much as I could so that I could make better beer. However, at the time it seemed like in order to make better beer you needed to brew all-grain and that required a three-vessel system with all kinds of fancy stainless gear. All of which would never fit in my one-bedroom apartment in Chicago. But





Unlike two-tier or three-tier brewing systems that require a lot of equipment, the brew-in-a-bag technique relies solely on a kettle and brew bag.

the more reading and watching I did, I eventually stumbled upon a different technique called brew-in-a-bag.

In this new (to me) method, you don't need three vessels, you just need one. Thanks to a mesh bag, you can mash all-grain batches in this single kettle, remove the grains by pulling out the bag, and then bring it to a boil. This revelation helped open the door to all-grain brewing without breaking the bank and without compromising space. I was sold and I immediately dove in on more research.

Brew-in-a-bag's origins trace back to Australia, pioneered by Patrick Hollingdale, amongst a few others about 20 years ago. Hollingdale did years of research and trials to develop the process. He is also the one that really helped spread the word of BIAB and it didn't take too much convincing for many homebrewers that were looking for a simplified way to make beer, myself being one.

The simplicity is what really drew me in. When you take a step back and look at BIAB it's very much like making a giant batch of tea. You put the grains into a bag and steep them at a certain temperature for a certain amount of time, and then pull that "teabag" out (similar to all-in-one brew systems like the Grainfather, BrewZilla, and others, except instead of a bag they use a basket). The rest of the BIAB brew day is the same as any other brewing method beginning with the boil. All-grain brewing seemed unattainable to me but all of a sudden it made sense and I could start making high-quality wort; I just needed a few pieces of equipment to get started.

BIAB EQUIPMENT

The first piece of equipment you need is the kettle. The kettle size is dependent on the size of the batch you want to make. If you're looking to make the typical 5-gallon (19-L) homebrew batch, a 10-gallon (38-L) kettle is perfect. But BIAB is also great for small experimental batches, so something like a 2-gallon (8-L) kettle is ideal for 1-gallon (3.8-L) small-batch beers. The reason you need a kettle about twice the size of the batch is because you'll be adding in all the grains and water at once, so you'll want plenty of space to avoid an overflow. You can get away with using smaller kettles, and I'll share some tips on that in the sidebar on page 33, but if you're in the market for a new kettle, spend the few extra dollars for the bigger size.

Next, and probably most importantly, is the brew bag. These days there are companies that make brew bags specifically designed for your kettle dimensions, but when I started brewing with this technique the only thing I needed to worry about was not getting one too small. Too big is no problem; many of these mesh strainer bags have strings that you can cinch to keep them tight on the kettle. Or you can always use some binder clips or a bungee cord on the lip of the kettle to keep the extra fabric tucked away. The bags can either be made from cotton or food-safe polyesters and, thanks to the power of the internet, they're very easy to find. The important thing is that it's reusable and can hold the weight of the crushed grain when wet without it ripping. I personally never concerned myself with "microns" or how small the holes in the bag are. If it works, it works!

That's all you need to get started, but some other useful things are a thermometer to check the temperature and a spoon or something to stir the mash. And of course, you need some way to heat the kettle. Electric heat works, as does a propane burner for large batches. Smaller batches can even be done on a stovetop in the kitchen. If you've brewed a beer before you likely already have everything required for BIAB besides the bag.

BIAB TECHNIQUES

From the first beer that I made with BIAB I knew I was onto something. The quality of wort I was able to get was beyond the extract and partial mashes I was used to. And the brew day was so simple I felt like I had put in some cheat codes or something to make brewing easier. All without sacrificing taste, it was just as good as what my friends were making on their big systems. So I kept on brewing in a bag, learning little quirks and tricks along the way and eventually started making videos all about BIAB on You-Tube. That's how my fellow YouTuber CH found out about the technique and decided to reach out.

CH had for the most part been a three-vessel brewer, usually utilizing homemade systems. While he has dabbled in some of the all-inone systems that have become popular more recently, I think he was still looking for an easier way to brew. A lot of the brewers I've talked with over the years that have given up or slowed their brewing down often cite time being the thing that kept them from brewing. Whether that was the time it took to set up to brew, the time it took to clean up, or just the investment time in maintaining their system. And to me BIAB is the ultimate timesaver because you're only setting up, cleaning, and maintaining that one pot. The bag may get worn with time, but they are inexpensive enough to replace when needed.

Luckily, CH had all the tools needed and just had to shop for a new bag. We started our brew day like every brew day — we heated some water up in our kettle to strike mash temperature. For this, you want to be a few degrees above your desired mash temperature as the grains will lower the temperature a bit. Once we were in the right range, we killed the heat and stirred in the crushed grains, little by little to avoid any clumps or dough

Common BIAB Questions

Having made a few videos on the topic of brew-in-a-bag, I get a lot of questions. So I thought I might share some of the most common ones I get in case you are wondering the same things.

What if I have a smaller kettle (8-gallon/30-L), can I still make a full 5-gallon (19-L) batch?

Absolutely, you'll just need to do a "pseudo-sparge" when you pull the grain bag. The way I like to think about it is to build my recipe for the full batch using brewing software to see how much total water I need. Then I'll use about ³/₄ of that amount in the main mash, or however much you can use without overflowing the kettle. Then at the end of the mash I pull the bag out, resting it on a cookie rack over the kettle, and pour the remaining water over the bag slowly. This rinses the grains, dripping into the kettle, and helps get any trapped sugars from the grains into your wort while simultaneously raising the volume to the right pre-boil volume for the full batch. If you're one to check mash gravity it will be a bit higher since it's a more concentrated mash, but once you add the water you should be back on track!

What about grain crush size?

You can crush the grain as finely as possible with BIAB. In fact, this is another way to help with the general low efficiency of BIAB. I tend to set my mill gap as tight as it can go and while it might take longer to mill the grain you should end up with super fine particles. This would be an issue in other systems that can lead to a stuck mash or sparge but in BIAB it's no issue since we are manually pulling out the whole bag. And if you want you can try double crushing; I haven't seen a drastic improvement if your first crush is already quite fine, but it may help boost efficiency slightly. As Denny Conn says: "Crush until you're scared!"

How do I clean up a BIAB setup?

Once I pull the grains and have squeezed the bag like it owed me money, I set the bag aside to cool for a little bit. Once it's cool enough to handle I'll dump out the grains into the compost and then give the bag a wash down with a hose. I like to hang my bag up outside to air dry and once it's dry give it a good shake to get any remaining grain bits off. That's pretty much all I do with the bag unless it's looking a bit nasty or I let it sit too long with the grains, then I might give it a PBW soak. But don't be afraid to replace the bag if it's really looking weathered or has holes in it.

For the kettle it's like any other brew kettle — give it a soak and a scrub with PBW and it's ready for the next brew day. All-in-all, BIAB gear is pretty low maintenance.



Invest in a quality pair of heat-resistant gloves and then don't be afraid to squeeze as much wort as you can from your brew bag back into the kettle when the mash is complete.

balls. After making sure it was well mixed, we placed the kettle lid on top.

One negative of BIAB is that unlike other methods that might use a cooler to help insulate and regulate temperatures, the quality of your kettle will greatly impact how well it holds the mash temperature. Cheaper kettles in some cases might drop about 10 °F (5 °C) over an hour mash. To combat this you have a few options.

You can do what I did for many years and turn the burner back on when the temperature dips too low. Just be careful to stir the mash during this to help disperse the heat evenly. There is also a concern of scorching the brew bag if you have the burner on while the bag is in the kettle. I've never had that issue in all my time, but I've heard of it happening so just keep the burner on for a short time to be safe or lift the bag off of the bottom of the kettle while the flame is on. For this method it might be a matter of turning on the burner for a minute or two every 15 minutes if you have a thin-walled kettle.

The other method is to try and insulate the kettle. Sleeping bags or blankets held in place using bungee cords is an option that doesn't involve an investment. Obviously make sure the heat is off and that whatever you are using to wrap the kettle won't burn if it touches anything hot, but the idea is to wrap up the kettle tight to keep the heat in. It's not a perfect solution but it works surprisingly well. Reflectix or other rolled insulation is another option homebrewers often use. Another creative insulation option was detailed in BYO back in 2015 and uses expanding spray foam to form a mold. Plans for building this are found online at www.byo.com/ project/keep-mash-tun-insulated/

The best options of all are to invest in a quality brewing kettle with thicker walls or a temperature-controlled all-in-one system, but we're trying to keep it cheap and easy here!

After the mash timer is up it's time to remove the grains. In other systems you'd likely be removing the wort from the grains and transferring it into a boil kettle. Here we're doing the opposite. At this point you'll need



If you need to turn the heat back on to raise the temperature of the mash, be sure to stir the mash to disperse the heat evenly and avoid scorching the grain.

some way to remove the bag safely. A pulley makes easy work of it, especially if you have difficulties lifting 11+ pounds (5+ kg) of grain plus any water that's holding on (which will bring the weight to above 30 lbs./13 kg). When I started, I opted for some heat-resistant gloves, like the ones people use for grilling, and a strong cookie rack. This allowed me to pull up the bag without scorching my hands, then slide in the cookie rack so that it rested on the lip of the kettle, giving me the perfect spot to rest the dripping bag right above the kettle. With some practice you'll get good at it, so you don't have to lift the heavy bag so high. This also gives me the chance to squeeze the bag and get every last drop of wort out that I can.

That's exactly the trick I taught CH on our brew day together. I remember he didn't have a cookie rack but I looked around his brewery and saw he had an empty metal storage shelf. He popped it off and we made it work.

Speaking of squeezing the bag, you might have heard it releases tannins if you do this. From my experience I've never had that happen and I tend to squeeze the living heck out of the bag. I want to get as much wort out as I can because of probably the biggest downfall for BIAB — efficiency.

Mash efficiency takes a major hit when it comes to brew-in-a-bag. Trying to hit 90%+ efficiency is a goal for many homebrewers I know, who may scoff when I tell them that I'm often hitting 65-70%. I am willing to sacrifice this numbers game for the overall simplicity. I can usually make up the difference and still hit my desired original gravity by adding a few more pounds of grain, which is a few more dollars worth of ingredients. I have noticed that when I am on my A-game, keeping the mash temperature right where I want it and even extending the mash for an extra 30 minutes, I can boost that efficiency up to 75%. But at that point I'm adding time, and time is money. These decisions come down to personal preference, but must be considered when building out recipes and planning brew days.

Speaking of which, I can't say enough about how thankful I am for recipe calculators and apps. Talk about simplifying the process! These days all the major beer recipe apps have BIAB equipment profiles that automatically help determine how much water and grain you'll need to hit a desired gravity.

After wrapping up my BIAB brew day with CH I knew he was hooked. He was reiterating all the things I loved about it: The simple setup, the laidback brew day, and the quick cleanup. And for a while after, he too was brewing in a bag. Anything to simplify the brew day, especially if you are simultaneously filming the brew day, is a win. It also meant he could pair down his setup a bit, get rid of old coolers and gear that he wasn't using anymore, and free up some space.

Maybe you're a homebrewer looking for a way to ease the work required on a brew day. Or maybe you're more like me when I started, looking for a way to upgrade to all-grain with minimal equipment. BIAB is really an easy and inexpensive way to make beer. There are a few cons to work out, but for the most part the pros greatly outweigh them. And as long as it means it gets you into the brewery and you can keep making amazing beer to share, then it's absolutely worth giving BIAB a try. **(FO)**

by Luke Nyswonger

s a passionate homebrewer, I've found one of the most exciting aspects of this hobby is the constant innovation and evolution of a practice that is thousands of years old. And as a curious technologist I love incorporating new gadgets and software to enhance the enjoyment of my hobby. When ChatGPT landed on the scene in 2022, I was eager to start exploring the intersection of Artificial Intelligence (AI) and homebrewing and found this technology to be a welcome utility to the craft. So much so, that I created the website homebrewing.ai, which is dedicated to exploring and evangelizing the intersection of artificial intelligence and homebrewing.

In this article, I'll explore the applications and potential of AI-assisted homebrewing and dive into creating a winter seasonal beer recipe using ChatGPT. So, with an open mind and a homebrew in hand, let's embark on this thrilling AI-assisted brewing adventure.

PRESERVING TRADITION WHILE EMBRACING INNOVATION

Brewing is a timeless practice that has been refined over thousands of years, with each generation of brewers adding their unique touch and contributing to the vast knowledge base we have today. It blends the art of intuitive decision-making with scientific precision, carefully measuring ingredients and respecting the biochemical processes during fermentation. Experienced brewers can predict how even a small alteration can affect the flavor, aroma, and mouthfeel of their beer. Their intuition, honed over countless brewing sessions, is the secret ingredient that turns a potential good beer into a great one.

As we explore this intersection of AI in homebrewing, it's crucial to remember the significance of these traditional brewing skills. AI can provide interesting insights and suggest novel combinations, but it will never replace the intuition and expertise of the brewer. Instead, AI should be seen as a valuable tool in the brewer's toolkit, offering new

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possibilities for creativity and innovation, all guided by the brewer's hand.

In our modern digital age, the widespread influence of AI is evident across various domains, from powering virtual assistants like Siri and Alexa to aiding in complex medical diagnoses. Among the intriguing branches of AI, generative AI stands out as a source of considerable excitement. Unlike traditional AI models that follow predefined rules, generative AI can create new and unique content, spanning from music compositions to written works and even beer recipes. By analyzing extensive datasets and learning underlying patterns, generative AI models, like ChatGPT, have proven to be powerful tools for encouraging creativity and novelty in diverse fields — including the craft of brewing.

Artificial intelligence has the potential to transform the homebrewing hobby if embraced, opening up a realm of possibilities for both novice and seasoned brewers. For beginners, AI can serve as an interactive and intriguing gateway into the hobby. It helps break down the barriers of entry by providing not only a set of instructions but also an opportunity to understand the intricate balance of ingredients that go into each brew. Not sure why a recipe would recommend a malt you've never used before? Just ask. Moreover, it complements the existing array of learning resources available to aspiring brewers. AI provides yet another valuable way to learn and experiment, adding a digital dimension to the traditional avenues of knowledge sharing.

On the flip side, AI opens an exciting new frontier for veteran homebrewers to venture into. It has the power to generate unique and outrageous combinations, often surpassing what a human mind may conceive, thereby pushing the boundaries and defying traditional brewing norms. For instance, in a recent experiment, I utilized ChatGPT to design a brew inspired by a McDonald's campaign celebrating Grimace's birthday. The AI concocted a "Grimace-inspired Purple Milkshake IPA," a recipe that not only challenged the conventional brewing paradigms but also brought to life an imaginative palette of color and flavors, reminiscent of the cherished character. For seasoned brewers, AI acts as a catalyst to step out of their comfort zones, inviting them to fine-tune and perfect the recipes curated by the AI. This infusion of technology can reignite a deep passion for a craft they have cherished and honed over the years. As an avid homebrewer myself, I once held reservations about milkshake IPAs. However, my curiosity led me to leverage ChatGPT, resulting in the whimsical Grimace's Pride Milkshake IPA recipe with blackberries (you can read all about it at www.homebrewing.ai/post/brewingup-pride-designing-a-grimace-in spired-purple-milkshake-ipa-withchatgpt).

Beyond recipe design, AI technology like ChatGPT offers a multitude of possibilities for homebrewers. It can serve as a valuable tool for troubleshooting and diagnosing brewing issues, exploring various beer styles, suggesting food pairings, providing insights on brewing technology and techniques, and even assisting in label and logo design for your homebrews. For instance, on the /homebrewing subreddit, it's common to see community members sharing images of their brew at different stages, seeking advice or feedback. With the advent of visual AI capabilities in ChatGPT, the system could further enhance this community-driven troubleshooting. By analyzing images of your brew, visual AI could identify issues such as mold growth, unusual sediment, or color inconsistencies, providing a more precise starting point for community discussions or personal troubleshooting. Additionally, with ChatGPT's ability to analyze water profiles, you could get interactive insights into the water composition and how it affects your brew, facilitating a more informed brewing process. The possibilities are vast, and AI technology adds a whole new dimension to the homebrewing experience.

Skeptics might argue that AI in homebrewing is just another gimmick in a world saturated with technology. Yet, it's much more than that. AI is not about replacing the human touch in brewing, but enhancing it. It's a tool designed to inspire, not to take over. AI prompts, like the one that created the recipe found later in this article, are starting points, ideas to springboard off. They provide a basis that brewers can then build upon, modify, and perfect based on their intuition, expertise, and personal preference.

TIPS FOR HOMEBREWING WITH CHATGPT

Before we start designing a recipe, let's explore some essential guidance on working with this technology. Mastering the art of AI-assisted homebrewing involves striking a delicate balance between providing specific directions and embracing open-ended creativity. As you integrate models like ChatGPT into your brewing journey, it's crucial to recognize that these models are imperfect. Occasionally, they may generate "hallucinations" or errors, necessitating careful review and human insight to harness their full potential. In designing a unique witbier once, ChatGPT suggested I use 7 lbs. (3.2 kg) of flowers to infuse the colors I was looking for! To achieve optimal results, consider the following pointers for crafting effective prompts:

1. Clarity and Precision: The quality of AI's output is largely dependent on the quality of your input or prompt. Be clear and explicit about your desires. If you want a recipe, specify the style of beer, your brewing method (e.g., all-grain, extract), batch size, desired ABV, and any specific ingredients you're inclined to use. For example, you might prompt the AI with, "Create a recipe for a 5-gallon, all-grain IPA with an ABV of 6.5%. I want to use Cascade and Centennial hops for a citrusy character."

2. Providing Context: While AI is an impressive technology, it lacks personal experiences and cannot interpret subjective statements as humans do. So, phrases like "a perfect summer beer" or "a stout like the one I tasted in Dublin" may not provide desired results. Instead, try to describe these experiences in terms of specific flavors, ingredients, and emotions to provide a clearer context.

3. Flexibility and Creativity: AI should be seen as a tool to inspire creativity, not a final authority. You can utilize AI to explore novel flavor profiles or generate initial drafts of recipes that you can then modify based on your brewing knowledge, ingredient availability, and personal preferences. For instance, you might ask, "Generate a recipe for a Belgian dubbel with an unusual twist by incorporating a fruit not typically used in this style." Or, "Design a beer recipe inspired by the cult classic movie The Big Lebowski paying tribute to the lead character's beloved white Russian drink. How about a creamy white Russian-inspired stout with notes of coffee and chocolate?" You can then take the output and adapt it to your unique taste and style.

DESIGNING A WINTER SEASONAL BEER USING CHATGPT

To illustrate the potential of AI in homebrewing, let's look at an example where I used AI to design a winter seasonal beer specifically for this story. The winter seasonal beer style, as defined by the Beer Judge Certification Program (BJCP), has an overall impression of a stronger, darker, spiced beer with a rich body and a warming finish — a fitting accompaniment to the winter season. It carries a balanced aroma that's malty, spicy, and fruity, subtly reflecting the holiday theme. The taste of dark or dried fruit often plays a part, and the hops usually remain understated. Alcohol is typically present but smoothly interweaved, providing supportive warmth without overpowering the other flavors.

To get started, I leveraged ChatGPT for the initial inspiration and provided a prompt to begin the process. Instead of offering a rudimentary prompt like "craft a recipe for a winter warmer," I provided a detailed, specific prompt. The prompt was designed not only to align with the BJCP's description of a winter seasonal beer but also to em-



The resulting beer from a recipe ChatGPT started, which are bottled with AI-generated labels as well.

phasize my personal preference of a pronounced chocolate note:

Prompt: "Design a recipe for a winter seasonal beer that showcases a robust malt backbone and a pronounced chocolate note. Let's also include traditional British hops. I'd like a wintery touch, so some warming spices such as cinnamon and nutmeg would be wonderful. However, it's essential to ensure the spices aren't too dominant and they harmonize with the other ingredients. Design this for a 5-gallon all-grain brewing system and aim for 7% ABV."

Having only brewed this style a few times in my 10 years of homebrewing, I approached the AI-generated output with curiosity, unsure of what to expect or how I would fine-tune it. ChatGPT swiftly presented the name "Chocolate Winter's Embrace," followed by the recipe and brewing process. Intrigued by the name, I decided to "embrace" it as a starting point for this winter creation. The recipe contained an interesting mix of Maris Otter pale malt as a base, with accents of caramel/crystal malt, chocolate malt, Munich malt, and a hint of roasted barley. To this, the AI added Fuggle hops, common in many traditional British ales, and rounded out the recipe with cinnamon and nutmeg for winter spices and cacao nibs for more chocolate depth, per my request.

As an experienced homebrewer, I know the value of adapting and fine-tuning a recipe to better align with my brewing style and palate. While it could have been brewed as presented, I chose to make several adjustments to the original AI suggestion. I changed the yeast strain, added yeast nutrient, and increased the base malt by a few pounds to strengthen the beer's backbone. Additionally, I made tweaks to the water additions for the mash and modified the spice amounts and hop additions to better suit my own water profile and tastes. Once I entered the recipe into Beer-Smith and tailored it to my system, I was ready to embark on the brewing journey without the assistance of ChatGPT. (Although, a little AI magic for cleaning up the mountain of brewing equipment after the brew day wouldn't hurt — ChatGPT, where's your brush when you need one?)

When it came time to taste the resulting brew, I was met with a rich malt character, underpinned by a pleasing chocolate note. The winter spices were present but not overpowering, providing a warming finish. The adjustments to the yeast and water seemed to have worked well, yielding a beer with a satisfying balance and depth of flavor. While the recipe may have been intended for a winter seasonal beer, the flavor profile and ingredients suggest that it could also produce a delightful and satisfying porter-like brew.

Like any brewer with a new recipe, I had thoughts on potential adjustments for the next iteration. Maybe a bit more spice at the end of the boil, or even in the secondary, or perhaps a different hop variety to draw out unique elements of the malt and spice combination. I'm sharing the recipe I brewed, to the right.

THE FUTURE OF HOMEBREWING WITH AI

Creating Chocolate Winter's Embrace alongside ChatGPT was a fun experience, allowing me to step outside my usual brewing comfort zone and explore a style I don't often venture into. The AI-generated base recipe served as a springboard for my creativity, as I adjusted and refined it through a delightful back-and-forth process, seeking feedback and making improvements along the way.

As we peer into the future of homebrewing, the exciting potential of AI stands out. You may find yourself brewing beers with novel flavors, ingredients, or processes that you hadn't previously considered thanks to the power of generative AI models like ChatGPT. The future of homebrewing is now entwined with AI, yet it remains a craft that is wonderfully human at its core.

AI-GENERATED RECIPE CHOCOLATE WINTER'S EMBRACE

5 gallons/19 L, all-grain OG = 1.078 FG = 1.014 IBU = 22 SRM = 29 ABV = 7.4%



INGREDIENTS

13 lbs. (5.9 kg) Maris Otter pale ale malt
1.5 lbs. (0.68 kg) crystal malt (60 °L)
1 lb. (450 g) Munich malt
8 oz. (225 g) chocolate malt
4 oz. (113 g) roasted barley (300 °L)
6 AAU Fuggle hops (60 min.) (1.5 oz./42 g at 4% alpha acids)
2 AAU Fuggle hops (10 min.) (0.5 oz./14 g at 4% alpha acids)
0.25 tsp. ground cinnamon (5 min.)
0.25 tsp. ground nutmeg (5 min.)
8 oz. (225 g) cacao nibs (secondary 7–10 days)
0.5 tsp. yeast nutrient (10 min.)
Imperial Yeast A10 (Darkness), White Labs WLP004 (Irish Ale), or SafAle S-04 yeast
⁴₃ cup corn sugar (if priming)

STEP BY STEP

Crush grains and mash in with 4.5 gallons (17 L) of water at 156 °F (69 °C). Mash for one hour before collecting wort for boiling. Boil 60 minutes, adding hops and spices at times indicated. Cool the wort, oxygenate if using a liquid strain, and pitch the yeast. Once fermentation is complete, rack into a secondary on top of the cacao nibs and leave for 7-10 days (or to your liking). Bottle or keg the beer as usual.

NOTES FROM THE BREWER:

This recipe was originally designed by ChatGPT. The initial output suggested the use of 10 lbs. (4.5 kg) of Maris Otter, Wyeast 1098 (British Ale Yeast), and 1 tsp. each of cinnamon and nutmeg. However, I decided to enhance the malt profile with an additional amount of Maris Otter and opted for Imperial Yeast's A10 to contribute unique characteristics. I also dialed back the spices and added brewing salts based on my water profile, which you may consider as well.



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A SYNERGY OF OPPOSITES

Hyperbolique IPA combines sweet with dry

by Joe Mongan

have a plan. And before you snicker, scoff, or track me down to throw a shoe at me, just hear me out. I found two beer styles that are revered by many (and appreciated by others!) and believe I found a way to improve on both by combining them. I've read all of the jokes about brut IPA — here yesterday, gone today — and have seen the message boards from homebrewers and beer snobs decrying what milkshake IPAs and the like have done to "beer-flavored beer." I'm not going to argue, too hard, with either take.

But, there are aspects I'm not afraid to admit I like about both. With that in mind, I believe I may have stumbled upon a new style that I — and a handful of others I've shared it with — believe could catch on. And at least one of those who are on board is a pronounced, well-respected pro brewer who has brewed the style herself. Intrigued?

(HOME) BREWING UP A NEW STYLE

Let's backtrack. To be clear, I didn't just brew a batch, declare it the next new sub-style of IPA with my friends, and then write an article for *Brew Your Own*.

I started homebrewing in 2013. Like many homebrewers at the time, I began with extract brewing. I moved to Brew-In-A-Bag (BIAB) after about a year's worth of experience, around the same time I joined a homebrew club in Rockford, Illinois. I embraced learning about different techniques, equipment, and ways of approaching things from others in the club and gained a ton of brewing knowledge there as well as through this very magazine and other outlets. The styles I brewed most from the beginning were hoppy beers — IPAs and pale ales. And this still holds true today.

I generally consider myself more of an old school IPA homebrewer. I prefer the style of a West Coast IPA, known for its high bitterness and bold citrus and piney aromas and flavors. Truth be told, the modern West Coast IPA that no longer wants to compete in the IBU challenge of a decade ago is right up my alley.

In recent years I've embraced the benefits of adding more late-addition and whirlpool hops and propping up the hoppy flavor and aroma of my West Coast IPAs instead of just focusing on bitterness. This adjustment in my own West Coast IPA got me thinking at some point about what it is I really like about West Coast IPAs. Maybe I really desired a version that was hoppy, smooth, and less bitter?

The truth is, I'm a hophead and if the label says IPA, I'll try it. So, when milkshake IPAs started becoming more mainstream, I gave them a try. They were never my thing, but I understood the appeal for those who dig them. Then in 2018 when the trend first hit beer publications I started hearing about brut IPAs. I liked the idea of a dry, light beer base that lets the hops shine. I brewed my first brut IPA in July of 2018. It was good, but not going to replace West Coast IPA as my go-to.

Now, a few years later, I thought back to the brut IPA style that sort of came and went. Why didn't it remain popular? Why didn't brewers expand on that style? You would have thought (at least, I believed) creating more brut IPA styles would have been what was coming next. This is what got me to thinking about possibly brewing something new. Oh no, not another IPA style!





The author tries the beer he co-brewed at 7venth Sun Brewery with Owner Devon Kreps.

For those who missed the craze, brut IPAs are a very pale, very dry, highly effervescent variant of American IPA, usually highly hopped with aromatic hops, but with far less bitterness. What made it different was the addition of the enzyme amyloglucosidase that eats up otherwise unfermentable sugar, resulting in a drier beer. The aroma is moderate to intense, featuring one or more characteristics of American or New World hops including citrus, floral, pine resinous, spicy, tropical fruit, stone fruit, berry, melon, etc.

I believe the reason the style was more of a flash in the pan than one that stuck is that the beer lacked body and mouthfeel. It was, of course, brewed to be a very light-bodied beer, but the dryness also added to that perception and took away from the mouthfeel of the beer. The higher carbonation level enhanced those characteristics. True to the design that it was intended to be, of course.

Fast forward to the summer of 2022 and I'm thinking about how I could give the brut IPA what it was lacking (based on my own preferences, at least). Milkshake IPAs are of mid- to high-sweetness. Even more so when fruit is added. But they tend to have lots of body and mouthfeel because of the lactose added. I find lactose enhances the hops in this style as well. Then a bell went off in my head.

What if I add lactose to a brut IPA? The idea was intriguing, so I took the recipe for that brut IPA I brewed in 2018 and made some minor tweaks plus the addition of lactose. The grains stayed the same — 2-row, flaked rice, and flaked corn, but for the hops I went with El Dorado[®], Citra[®], and Mosaic[®] — some of my favorites! I also used Omega Espe Kveik yeast this time since I now brew in Florida, which makes cooling wort down to yeast-pitching temperature in August a challenge. So after brewing I cooled the wort to around 85 °F (29 °C) with an immersion chiller, pitched the yeast, and put the fermenter in my temperature-controlled chamber to keep it at that temperature.

The next day there was a brewery bus trip with a craft beer club I started in The Villages, Florida, called The Villages Craft Beer and Brewing Enthusiasts. The trip brought us to a few establishments in Dunedin, Florida. This is where I met Devon Kreps, Owner of 7venth Sun Brewery. It was a chance meeting for both of us as she was not supposed to be in that day and there were numerous breweries in Dunedin for us to choose from for our brewery stops. After the rush for beers died down a bit, Devon came out and started chatting with us. I explained a bit about our club and what we do and told her I have been a homebrewer for many years.

Not thinking anything of it, I mentioned a bit about the new style I had been thinking about and just brewed — basic details really. I was hesitant to fully describe this beer until it was done and I had a chance to taste it. As the group chatted with Devon we had the pleasure of sampling a couple of her special beers that were off-menu, and had an all-around great time. Afterwards, those of us from the tour headed to our next stop on the tour.

I was shocked when I received a message the next day from Devon. She told me that if I liked the beer I had brewed, that I should bring it to her Tampa location for her to try. If she liked it, she added, she might brew it.

GOING BIG

Turns out, the beer I brewed was in fact good and I was very happy with how it turned out. About two weeks later I loaded up my Corny keg and headed to Tampa. I feel from the instant she tried the beer she knew that she wanted to brew it, and by the end of our sampling we were determined to find a day to do just that.

Up to this point I thought I did a pretty good job brewing. My friends always like my beer. At the same time, I figured they are getting free beer so why would they say anything else? I have entered a couple competitions before, but I mostly just brew what I like to drink. To think that a beer of mine would be brewed on a large scale at an award-winning brewery was exciting to say the least.

After working around some scheduling issues on both of our ends, brew day finally arrived on February 20, 2023. The plan was to brew 465 gallons (1,760 L) of this new beer style. This, from a total of one 5-gallon (19-L) homebrewed batch of this style as a pilot brew we're basing things on. Well, let's go all in!

We brewed a normal brut IPA recipe adding the amyloglucosidase enzyme in the mash of 2-row malt, flaked rice, and flaked corn. We mashed in at 140 °F (60 °C) for 90 minutes, followed by a 60-minute boil time.

We made a few tweaks from my original homebrew recipe based on Devon's experience and to better suit the brew system at 7venth Sun. We cut out the bittering hops and made all hop additions Citra[®] and Mosaic[®], which were added near the end of the boil and at the whirlpool stage after flameout.

The lactose was added with 15 minutes left in the boil. After chilling the beer and transferring to the fermenter we pitched Omega Espe Kveik yeast and that concluded the brew day.

Then the wait was on. It was hard for me to not wonder what was going on while the batch fermented and I probably sent more texts than I should have during that time. Fermentation was a bit slower than we expected, but we wanted it to go low so we waited patiently. Anything near 1.010 final gravity (FG) or lower would be great.

In my homebrewed batch, I added 0.5 oz. (14 g) of Amylo[™] 300 near the end of fermentation to make it go even a bit drier. But adding the enzyme at the end of fermentation seemed to scrub some of the hoppy aroma. My homebrewed batch finished with a final gravity of 1.004. At 7venth Sun we didn't add any enzyme after the mash in the big batch recipe as we wanted to maximize aroma. The commercial version that was named False Readings (the story behind the name is with the clone recipe on page 46) finished just slightly higher, around 1.006.

The beer was released at 7venth Sun about a month later, and my beer club of course returned for the debut. The feedback was phenomenal, not just from members of our club, but from regular patrons as well. In fact, during another visit to the brewery a couple weeks later I looked around and observed close to half of the patrons were drinking False Readings. The beer was dank, citrusy, and smooth, with all of the characteristics I like best about brut and milkshake IPAs in one glass, and leaving behind the attributes of these styles that make them so divisive.

A NEW STYLE IS BORN?

So, what exactly are the characteristics of this hybrid style we named hyperbolique IPA (the sidebar on the top right of this page explains the name)? Well, with just a few batches brewed, I'm certainly not going to say it has yet been defined, but the characteristics are exactly what you would imagine from a cross of a brut IPA with a

Bringing a homebrew to the masses

I'm not going to lie, I have tried a lot of homebrewers' beers over the years and have reason to be wary; some have been award-winning but others not-so-much. When I met Joe back in August 2022, I was so intrigued by this new style he was describing that I told him if his batch tasted good, I'm always looking for something inventive and would love to take his creation to our brew deck.

The idea of it jumped out as highly unique because in essence he took two extremely opposing styles and blended them together. But they also have something in common — with bruts the point is to go dry, but it often throws the beer out of balance, lacking mouthfeel; milkshake IPAs are usually thick, heavy, and sweet, with way too much body. That said, when you combine the essential components of these two styles together, you get something very balanced and beautiful.

So why are we calling the creation a "hyperbolique IPA?" Well as two extremes, I thought the beers on their own are the most of the most: Hyperbole; but I have a background in French and love to employ the use of that language to give it a twist. *Hyperbolique* is the French translation of hyperbolic, *et voila*!

> - by **Devon Kreps,** Owner, President, and General Manager, 7venth Sun Brewery



False Readings was released in both cans and on draft at 7venth Sun Brewery.

milkshake IPA: Tropical hops complemented by yeast; a dry malt backbone making it highly drinkable, but with plenty of body; with citrus, tropical, and even piney qualities from hops that I believe all work great together.

Opting for low protein adjuncts, corn or rice are used to balance the high protein malts and to increase drinkability. You can go as high as 30% with the adjuncts.

There certainly seems like a lot of room for experimentation when it comes to yeast, and I've yet to really explore those possibilities.

What else I think is neat about this new adventure I'm on working with this general "style" is the possibilities of incorporating aspects of it into existing IPA recipes. Take your favorite American IPA and consider the additions of lactose and amylase glucosidase. The results likely won't go as low in final gravity as a grain bill that incorporates adjuncts like flaked rice or corn, but some of the attributes will be incorporated. You may question the use of lactose in this situation. Yet, I think even without the adjunct-laden brut grain bill, lactose has benefits. If you think about a New England IPA, there's a lot of vegetative matter from what goes into the kettle and dry hopping. When you add lactose to your boil, it helps the flavors and aromas in the hops to shine while adding mouthfeel and body to the finished beer. This means you can use less but get more flavor and aroma from the hops used. I'll take that!

Let's be honest, I am only a couple batches into this style, but it has piqued an interest. Are you reading this because you are also intrigued? I believe creativity and experimentation are the drivers when new styles are created, and approaching ideas with an open mind are the only ways to find out if that idea has merit.

By exploring this idea I have brewed a couple of beers I really enjoyed drinking, and also have been given the opportunity to co-brew a beer on a large commercial system. In my book, that's two boxes checked that any homebrewer would appreciate. For now, the only way to know for sure if you'll enjoy this style as well is to brew your own!

HYPERBOLIQUE IPA **7venth Sun Brewery's False Readings clone**

(5 gallons/19 L, all-grain) OG = 1.054 FG = 1.006 IBU = 39 SRM = 4 ABV = 6.3%

False Readings is the first commercial attempt at the so-called hyperbolique IPA, a cross between a brut IPA and a milkshake IPA. From the can: "What's in a name? False Readings is both a nod to the perplexing nature of this style, but additionally on collab day, Joe's gas gauge told him he had half a tank, when in fact it was empty, leaving him stranded on the side of the road. Takeaway: Don't judge a book by its cover; it's a mistake to put things into boxes ... so go ahead and think outside of them."

INGREDIENTS

8 lbs. (3.6 kg) North American 2-row pale malt 1 lb. (0.45 kg) flaked corn 1 lb. (0.45 kg) flaked rice 11 oz. (312 g) lactose sugar (15 min.) 5 mL Amylo[™] 300 (amyloglucosidase enzyme) 7.7 AAU Citra[®] hops (10 min.) (0.6 oz./17 g at 12.8% alpha acids) 6.8 AAU Mosaic[®] hops (10 min.) (0.6 oz./17 g at 11.3% alpha acids) 14 AAU Citra[®] hops (1 min.) (1.1 oz./31 g at 12.8% alpha acids) 12.4 AAU Mosaic[®] hops (1 min.) (1.1 oz./31 g at 11.3% alpha acids) 2 oz. (57 g) Citra[®] hops (dry hop) 2 oz. (57 g) Mosaic[®] hops (dry hop) Omega OYL-090 (Espe Kveik), Imperial A44 (Kveiking), or LalBrew Voss yeast ²∕₃ cup corn sugar (if priming)

STEP BY STEP

Mash at 140 °F (60 °C) for 90 minutes, adding the amyloglucosidase at the start of the mash and mixing well. Raise mash up to mash-out temperature of 168 °F (76 °C) and lauter as normal.

Total boil time is 60 minutes. Add lactose sugar with 15 minutes left in the boil and the first addition of hops with 10 minutes remaining (although you may want to throw in a few pellets at the start of the boil to help break up the foam). In the final minute, add the next hop addition, then turn off the heat and give the wort a long stir to create a whirlpool, then let settle for 20 minutes before chilling.

Chill wort to 85 °F (29 °C), aerate if using a liquid strain, then pitch the yeast. Ferment at 85 °F (29 °C) until signs of activity have ceased. Two days after fermentation is complete, add the dry hops. Allow three days on dry hops, then remove or rack off into a keg and force carbonate to 2.2 v/v or bottle and prime.

Partial mash option: Replace 6 lbs. (2.7 kg) of the pale malt with 3.5 lbs. (1.6 kg) of extra light dried malt extract. Place the crushed pale malt with the flaked grains in a large muslin bag. Mash grains along with amyloglucosidase for 30 minutes in 1.5 gallons (6 L) at 140 °F (60 °C). Then add 2 gallons (8 L) of hot water and stir in the malt extract. Hold for another 30 minutes at 140 °F (60 °C). Wash the grains with 1 gallon (3.8 L) hot water. Bring wort to a boil and follow the remainder of the all-grain instructions, being sure to top off the fermenter to 5.25 gallons (20 L) once chilled. 9





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BIÈRE A LA CAFÉ MOCHA

Infusing chocolate and coffee to your brew

here's little in the way of flavors that a brewer can't add to their beer these days. The seemingly endless variety of candy, fruit, and other flavors that you can find in Goses and pastry stouts proves the point. But sometimes the classics are still the best and when you have your fill of sour mango cheesecake, you can always find the warm hug of coffee and chocolate.

These two exotic flavors, along with their somehow labeled "plain jane" cousin — vanilla — have been barn burner sensations since their introductions into Western cuisine. In beer, that truth still holds!

WHAT DO WE WANT FROM COFFEE AND CHOCOLATE?

This becomes one of those problems of, "how do you describe the color blue?" What do we want? Well, the flavors of coffee and chocolate. The flavors of dark bite-y roast with sweet berries and cherries, earthy and leathery tones.

Because you're adding these flavors to a large batch of other flavors, you want to make sure you're adding potent punches of coffee or chocolate (or both). This is not a time for subtlety. We'd also suggest you avoid getting spendy with your ingredients. Invest in good quality, but don't go overboard with your expense. (Save the really expensive stuff for separate enjoyment.)

FORM FACTORS

As with any fundamental foodstuff, there are endless form factors available to us and each choice impacts the flavors that you'll get.

Coffee Forms

Whole beans: Coffee in its purest form and easy to use. We recommend using

them like you would dry hops. One of Drew's favorite applications is from his friend, Kevin Baranowski, who serves a sweet stout on draft through a Randall with whole-bean for an intense last-minute hit of coffee.

Grounds: Mostly used in the kettle or to make brew for additions – Drew finds that if you add the grounds to the kettle, they're best added off the boil as a whirlpool addition to avoid extracting additional bitterness.

Instant: Added to the fermenter, a decent quality powdered coffee provides a quick jolt with minimum fuss.

Brewed/espresso: Drew's favorite way of adding coffee flavor is to use a strong brewed coffee. (Drew uses cold brew coffee concentrate as a way of adding potent flavor without adding a ton of water.)

Chocolate Forms

Cacao nibs: The root of chocolate, little nuggets of fermented, but unprocessed cacao beans. You can buy them raw or roasted. They provide more of the deep earthy flavors.

Cocoa powder: The intense essence of chocolate, but a real pain to incorporate outside of the kettle. Neither of us are generally a fan of cocoa powder, both for its difficulty to dissolve in beer and in flavor prediction.

Solid chocolate: The final product of an amazing amount of work by chocolatiers. Because the cocoa butter is incorporated with the product, we're generally not in favor of using this. (That includes baking chocolates like Baker's German's Baking Bars.)

Liqueurs and Extracts

There are many different concentrated forms of coffee and chocolate flavors in these forms. Usually, we don't favor extracts that we don't make ourselves

Because you're adding these flavors to a large batch of other flavors, you want to make sure you're adding potent punches of coffee or chocolate (or both).



Often used to enhance roast characteristics found in darker beers, both coffee and chocolate have found their way into lighter beers too.

If you want to use an extract, Drew tends to make his own to control the flavor and strip the fat.

because we prefer to control the ingredients and Denny particularly objects to the heat of alcohol in many commercially purchased tinctures.

Having said that, many brewers find success with these products and they are an easy way to inject flavor to your beer by simply adding them to the finished beer. Beware of the added sugar content and what they can do with refermentation in the package.

SOME THINGS TO WATCH OUT FOR

As with all ingredients, coffee and chocolate both carry negatives that we need to account for when using these components. The first is that both contain oils that can be detrimental to the foamy collar that we desire in our pints. Handling fresh coffee beans, the oils are clearly visible on the bean's surface. And chocolate obviously contains an extraordinary amount of fat.

We'll cover how to deal with the fat in chocolate on page 50 and we usually don't worry about the oil from coffee ... it just is what it is.

To us, the more important bit is remembering and adjusting for the bitterness and tannic bite that chocolate and coffee can impart. This is where tasting comes into play. With coffee, we'd recommend making a strong brew with your choice of coffee and blend it with a representative beer of the style you want to make (or one you've already made).

Chocolate is tricky because the flavors are hard to predict until you actually add them. (We'll address that in a moment as well), but if you use cacao nibs you must be aware that exposure time will change your flavors drastically. Chocolate contributes its positive flavors quickly without a need for long soak times.

THE BEST WAY TO ADD YOUR FLAVORS

As we've stated many times over our columns here in *BYO* (and other writ-

ings), we're generally fans of processes that give us both more flexibility and assurance of the final product. Generally, that means additions as late in the process as we can so we can adjust our additions to the flavor of the beer we produced and not the one we thought we were making.

It's important to know the structure of the beer that we're flavoring so we can choose important characters and adjust flavoring amounts to the beer in



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the glass. Plus, doing it this way allows you more beer variety if you leave a beer half "plain" and half "flavored."

So yes, the column is nominally about chocolate and coffee, but the reality is that whatever flavor you're adding, use this as a guide! (This is a place where most professional brewers have a real advantage – they have more beer to play with and have more repeatable experiences with their beers and flavorings.)

PROCESS FOR TASTING THE BEER AND FLAVORING

If you're doing a post-fermentation addition (i.e., adding it for bottling or kegging), we recommend this process to finetune the amount to add:

- Pour a measured sample of the beer into a glass (example, a 12 oz./355 mL pour of stout).
- Measure a small amount of your flavoring (example, ¼ oz./7 mL of extract).
- Mix the flavoring into the beer and evaluate. Assess where you're at on the spectrum. Do you need more? Do you need less? Right in the Goldilocks zone?
- Make another adjusted sample, if needed. (We usually only need the one and adjust from there.)
- Determine the amount of beer to be flavored. Say you have 4.5 gallons (17 L) remaining after racking off the yeast. That's 576 oz. (17,000 mL) or 48 of your example 12-oz. (355-mL) glasses. If your ¼ oz. (7 mL) was on the money, that means you need to add 12 oz. (355 mL) of your flavor to the beer to recreate the experience.
- Add the flavor to the bottling bucket or keg and make sure it gets evenly mixed into solution.

CHOCOLATE TIPS

When it comes to chocolate, Drew really prefers to use cacao nibs as they're less processed and more complex without added sugars and a manageable fat content. (And these days you can find nibs in just about any good grocery store — which you couldn't say 10 years ago.)

There are two primary ways to use the nibs. You can treat them like dry hops and add them directly to the secondary or keg, or brewers can create a tincture/extract with them. If you plan to add them like a dry hop, a hop bag is recommended to contain the nibs. Keep an eye on this though too much time and the beer will begin to extract tannic/ astringent character from the nibs. Unless you like that mouth-puckering drying sensation, we recommend checking the beer around day four of aging and removing the nibs from the beer when you get the flavor you want.

Drew accidentally left a beer with nibs in a keg for two or so weeks once. The chocolate porter was so puckeringly astringent that it was rendered undrinkable. Not one to waste a beer — Drew added a full bottle of Razzmatazz liqueur to the keg, gave it a shake and the beer settled into a wonderfully balanced chocolate raspberry cordial porter. The keg was promptly drained at a party before the sugar got fermented.

If you want to use an extract, Drew tends to make his own to control the flavor and strip the fat. (He has a whole cabinet of various flavored tinctures that he makes for fun.) At the strength he normally makes, it takes about 3 oz. (90 mL) in a 5-gallon (19-L) batch to achieve a strong but not obnoxious chocolate presence. Here's the recipe:

BASIC CACAO NIB TINCTURE

Creates 6 oz. (175 mL) of extract

6 oz. (175 mL) vodka

- 3 oz. (85 g) cacao nibs (roasted or raw)
- 1. Mix the vodka and cacao nibs in a tight sealing jar like a jelly jar or mason jar. Shake every day, several times, for 4 days.
- 2. Strain the nibs out of the dark extract. Discard.
- 3. Place the extract in the freezer overnight.
- 4. In the morning, carefully scrape out the fat cap of cocoa butter and discard. Remove any remaining bits and then store the extract for up to a year.

If you prefer to use cocoa powder (since the fat is removed), grab a good quality cocoa powder and use about 8 oz. (230 g) in the kettle near the end of the boil. Be warned, there will probably be a bit of scrubbing afterwards from the mess left behind since it doesn't dissolve and sets like mud. And please, no Hershey's chocolate syrup. Just look at the ingredients list for our reasoning there.

COFFEE TIPS

Coffee we're not as strict about the whole "not in the kettle" thing, but it's still generally a good guideline. Our favorite way is to simply brew up really strong coffee and use that in the beer. In general, the less heat the coffee sees during the extraction, the better. We've seen recipes where someone goes to a coffee shop, buys 12 shots of espresso and adds it to the kettle. The espresso is a good idea, but the kettle will be brutal to any of the less overt characters.

- **Drip coffee** it's your standard joe, but for the purposes of beer making, it's fairly weak and watery.
- **Espresso** dark, roasty, and bitter. This is what you use when you want the coffee to read like "*coffee!*" and carry a bite. If you structure the beer to deal with any harshness, this can be the way to really drive home the coffee point.
- **Cold brew coffee** now available at your grocery store, coffee that never sees heat as part of the brewing process. The flavor is different, both more intense and more mellow, less acidic. Be aware in the store, you'll often see "cold brew" coffee in a ready to drink format. For brewing purposes, Drew prefers to use (or make) a cold brew concentrate. (Use about 1:3 of coarse ground coffee-to-water and let it sit overnight before straining so 1 cup of coffee bean grounds to 3 cups of cold, filtered water).

If you want to brew with kettle coffee, Drew actually prefers adding about a cup of fresh grounds in the mash. You'll get a coffee kick, but you'll lose a lot of the nuance, but who needs nuance if you're dropping coffee into your latest Russian imperial stout at 12.5% ABV?

BY AUDRA GAIZIUNAS

NANOBREWING

SELF-AUDITING Embracing the challenge of current financially relevant trends

his past year was a tough one for breweries, including nanobreweries. From a financial perspective, 2023 was a year of realization that certain economic models were no longer working, a year of reckoning as cash flow from our various governmental agencies that had been intended to serve as temporary sources of relief ran out, and a year of being forced to take decisive action as taproom traffic in many areas of the country wasn't returning to previous 2019 levels.

For the first time in over two decades, craft beer sales are down or flat. Closings are on the rise while openings are slowing. And as an industry, we've now entered what economists call a mature market. Yet, we're not adapting quickly enough with both eyes open, as many brewery owners still don't have a firm grasp over their financial statements or are missing key pieces of information needed for decision making by running things from too analog of a perspective.

As a CFO, I witnessed many nanobreweries operating in 2021 and 2022 without a budget of any sort. EIDL (Economic Injury Disaster Loan) money was being spent on capital improvements, taproom expansions, and even second location openings, while guidelines tied to return on investment and return on asset expectations related to those expansions were sorely lacking. PPP (Paycheck Protection Program) funds were being spent on wages, payroll taxes, and benefits, but were lacking corresponding sales figures the brewery would have to hit to support this level of payroll once those temporary funds ran out.

At the same time, brewing raw materials saw price increases at least twice by suppliers in 2022 and packaging costs increased for many in 2023, but the majority of nanobrewers I interviewed neither tweaked their recipes nor adjusted pricing to the consumer quickly enough. Rather, they absorbed these increases instead. Brewers were essentially running faster to stay in the same place.

It felt industry-wide, as if too many of the standard operating procedures related to finance, cash flow, and administration, had taken a back seat once the pandemic hit in 2020. But when things started opening back up they never returned, even years later.

Panning out a bit to add some additional context, in September 2023 the Brewers Association's Chief Economist, Bart Watson, posted an insightful summary of aggregated data, including multiple charts and graphs covering the shift of consumer purchasing trends over the past two years. When we look at the general sales trend within approximately 600 grocery stores, for example, total sales for the same store set were slightly higher in 2023 compared to 2022 (up 2.6% January-May), with both 2022 and 2023 significantly stronger than the first portion of 2021. However, year over year (YoY) Consumer Price Index (CPI) averaged 5% in January-May, so in real terms, we're looking at a slight decline in sales.

When digging further into the composition of sales by type (beer, food, apparel, other beverages, etc.) at those same stores, there is clear and persistent decline in beer sales (both draught and retail) from January '21–May '23. So, what's making up those sales if beer is declining as a percentage? There isn't one answer, but food and other alcoholic beverages are big contributors. Food is the number one growth item – averaging 18.4% of sales in March–May 2023 versus 15.8% in March–May 2021. Another part of the story is other beverage alcohol.

For the first time in over two decades, craft beer sales are down or flat.



Staying on top of your cash flow and overall costs are key to long-term planning for nanobreweries.



While those sales still are small compared to beer, they are consistently growing. In summary, inflationary pressures over the past two years, combined with the rising prices of food, have caused people in grocery stores to spend less on beer. Understanding that, consumer behavior tells us that the opportunity for growth may not exist in spaces outside our taprooms at this time and we should perhaps rather focus on what we can offer within our taproom space. This is a positive insight for us nanobrewers, as our revenue predominantly comes from within our taprooms in the first place.

When we turn our attention to average prices per pint nationwide (this sample set comes from Arryved point-of-sale data of approximately 2,000 breweries), they started at \$6.05 in January 2021 and increased to \$6.74 by May of 2023. When we crunch the numbers year-over-year, the pricing growth is slightly below the numbers we've been seeing from the CPI for beer away from the taproom. The CPI index was 1.5% higher in August than it was in May, so current prices are likely a bit higher on average. Higher prices are generally going to mean larger absolute increases, but what we see is that higher-priced states generally took less price in percentage terms.

Looking at May 2021 to May 2023, the states that took on the most price in percentage terms were Texas, Florida, and Georgia, states that averaged \$6.00 a pint in 2021 and \$6.74 in 2023. The three lowest in percentage terms were all Eastern states, Pennsylvania, Virginia, and New York, starting at \$6.42, but ending May 2023 at \$6.83. While we'd need a much more rigorous analysis to say more definitively, this may suggest that our taprooms are seeing upper bounds on how much they can push price. We as nanobrewers may be hitting the ceiling on our ability to ask our consumers to pay more per pint.

To provide an overview of the current trends affecting nanobreweries financially, we can look at various aspects such as market growth, consumer preferences, technological advancements, and financial challenges. Here's a summary:

1. **Consumer preferences and focusing on where we can grow:** In 2023, there was a continuing trend towards purchasing hyper-locally produced craft beer and flavored malt beverages. Nanobreweries benefit from this trend due to their size, taproom focus, and ability to be nimble as consumers seek unique, locally produced beers with diverse flavors. Breweries should continue to innovate and explore new categories and flavor options. Rather than being all things to all people, focus less on what's growing industry-wide and more on what you as the specific nanobrewer can grow. Perhaps that's a focus on appealing to a more diverse crowd through one's offerings or on inclusivity via the types of events that one hosts in the taproom.

The current craft beer demographic can only take the craft beer industry so far without yielding diminishing returns at some point in time. The customer experience within the taproom is a place we can truly shine as a differentiation point, so allocating a set budget for marketing and events alongside measurable metrics to gauge the success of those dollars spent should be an area we explore. Women, people of color, younger generations, and anyone who might not currently identify as a beer drinker could be a future beer drinker with a new approach to sales, marketing, hiring, and community-building.

- 2. Sustainability and eco-friendliness: There continues to be an increasing emphasis on sustainability being placed across our industry. Nanobreweries are adopting eco-friendly practices in production, packaging, and distribution, appealing to environmentally conscious consumers, as well as improving their efficiency within their standard operating procedures.
- 3. **Technological advancements:** The use of technology in nanobreweries is becoming more prevalent, with innovations in brewing equipment, fermentation technology, and digital marketing tools. This includes the use of automation to improve efficiency and consistency in beer production using inventory management software.
- 4. Direct-to-consumer sales and online presence: With the rise of e-commerce and changes in alcohol distribution laws, many nanobreweries are shifting towards direct-to-consumer sales models beyond the taproom. This includes online sales, subscription services, and local delivery options, enhancing their reach and customer base.
- 5. Local collaboration and community engagement: The strong trend of local collaboration, where nanobreweries partner with local businesses, participate in community events, and engage in local causes, continues to thrive and grow. This not only helps in marketing but also strengthens community ties and supports the local economy.
- 6. **Financial challenges and funding options:** Nanobreweries continue to face financial challenges, including rising ingredient costs, competition from larger breweries, and shrinking access to capital from more traditional funding sources such as regional banks. However, there's a trend towards the development of more creative funding options in the areas of crowdfunding, within local investment groups, and small business loans tailored to small-scale breweries. Approach your local CDFI (Community Development Financial Institution) to explore some of these options. Leases have been increasingly difficult to negotiate and are often cited as a reason for brewery closure in our current environment.
- 7. **Regulatory changes and challenges:** In many regions, there's ongoing evolution in the regulatory landscape affecting alcohol production and sales. Staying compliant with these changing regulations remains a challenge for nanobreweries for a multitude of reasons, one of them being our inability to afford keeping an alcoholic beverage attorney on retainer to watch over us at all times.
- 8. Niche and experimental brewing: Nanobreweries are increasingly experimenting with niche and unconventional beer styles, catering to a segment of consumers seeking novel and diverse beer experiences. As the consumer has been seeking out double/triple imperial or session beers full of flavor, we've been forced to stay creative without breaking our batch cost goals.
- Impact of global events: Ongoing global events, like economic fluctuations, supply chain disruptions, and changes in consumer spending habits, continue to impact nanobreweries requiring adaptability and resilience.
- 10. **Community-based marketing:** Marketing strategies are becoming more community-focused, leveraging social media,

local events, and word-of-mouth to build a loyal customer base. Encourage reviews from loyal customers.

These trends indicate a dynamic and evolving industry where adaptability, community engagement, and a focus on unique product offerings will be our keys to success as nanobrewers in 2024.

One actionable way we can appropriately position ourselves for these trends is by elevating our financial literacy and by truly understanding our cost structure as it applies to our financial goals for 2024. In the January-February 2019 issue, I penned the article "Crunching the COGS: When it's not a hobby anymore" where I covered cost components per product, the four types of costs every brewery encounters, as well as the calculation of the breakeven formula. I strongly suggest revisiting that article first before delving ahead. www.byo.com/ article/crunching-the-cogs-when-its-not-a-hobby-anymore/

Next, I recommend the following step-by-step exercise to understand what your current cost structure and breakeven looks like:

- Review your annualized income statement line by line, labeling each cost as "fixed" or "variable" AND "direct" or "indirect."
- Add up the totals of each of those four buckets: Fixed, variable, direct, and indirect. Your check is that you should get a total that is exactly 2x your total expenses.
- Divide your indirect bucket by the number of BBLs you sold last year and/or the number of BBLs you project you will sell in the current year. That is your overhead rate per BBL.

- Divide your variable bucket by the number of BBLs sold over the past year. That is your VC (variable cost) component for your breakeven formula.
- Keep your fixed bucket as a \$ total. That is your FC (fixed cost) component.
- Divide your total beer sales \$ by the number of BBLs sold over the past year. That is the S component for your breakeven formula.
- Set your financial goal in \$ for the year, then solve for x. In this case, x is expressed in BBLs.
- S(x) VC(x) FC = your set financial goal

Once you rearrange your income statement in this sort of way, you'll gain a greater understanding of your fixed overhead, or the costs that you must cover regardless of how much beer you produce. Be sure to include the overhead rate per BBL in your analysis going forward when creating pricing scenarios. Likewise, your attention will then shift to the VC category, a realm where you have greater control to influence cash outflow.

For 2024, be sure to create a monthly profit and loss and cash flow projection. For those who would like to learn more, I encourage you to check out the online Boot Camp where I give in-depth tips to manage craft brewery financials: www.byo.com/bootcamps/

Financial literacy is not just about mastering numbers; it's about gaining the wisdom to make informed decisions. It's this literacy that will keep propelling us nanobrewers forward. @



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I began brewing beer from bodies of water that have historical or cultural significance just as an idea that I thought would be fun.



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1960s-era Michelob bottles were used by the author for his Woodstock Wheat, a beer brewed with water from the famous concert grounds.

HEADWATERS

Finding unique water sources

am always looking for something unique and different to create my brews. In the fall of 2019 I brewed a beer using water from Camp Crystal Lake in New Jersey, the original filming location of Friday the 13th. This brew day would lay the foundation for a number of unique, natural-water homebrews. I began brewing beer from bodies of water that have historical or cultural significance just as an idea that I thought would be fun. Each brew water goes through a filtering process that consists of an activated carbon and zeolite, then a final finishing filtration pad. The inherent wort boil will provide the necessary sanitation to take care of any residual microbes prior to fermentation.

I have now brewed beer using water from Camp Crystal Lake/Friday the 13th, all five of the Great Lakes, and the Little River from the Tennessee Smoky Mountains, and each has brought some amazing stories and memorable encounters. Sure, I enjoy the simple craft of making beer as well as their accompanying labels, but it's the journey that makes it so special. Each beer label is unique and details why the chosen waters are important, what goes into them, or what historical value they hold. I want to tell a story with each beer. Every beer is given away to friends and family as a way to share my experience through beer – this is a labor of love after all and I honestly feel these are stories told through a bottle.

In early June 2023, I was able to make a visit to a bucket list location that I have wanted to see for many years: The site of the 1968 Woodstock music festival. It was something to behold knowing what that piece of ground represented. In my research on how to get there, I happened to see that Filippini Pond was directly adjacent to the rear of the stage site, which was used during the concert, as many will

recall seeing the photos of skinny-dipping hippies. The idea was born then: I wanted to make a brew from those very waters. I knew I had to make this one something for the ages to capture the greatness of the concert itself. I was able to find a small trail and gathered about 8 gallons (30 L) of genuine Filippini Pond water with which I created my Woodstock Wheat beer.

The labels were a grueling effort that had its ups and downs, but in the end came out great. There are many symbolic nods and small easter eggs for the keen eye, most of which represent the times or specific artists I have an appreciation for. The purple wax is a nod to Jimi Hendrix and Purple Haze, to which I added some white "Pearl/ Pearlescent" wax to the mixture as a nod to Janis Joplin. The caps are a tribute to Max Yasgur and his dairy farm who worked out a deal to allow the festival to take place on his land and the circular cap obviously lends itself to the peace symbol so that was a perfect choice for the stamp to complete the look. The bottles had to be special and in my looking for the ideal bottle for such a historic event I came across the old Michelob bottles, which just happened to be vintage from the 1960s.

The original front label didn't fit the vintage bottles, so on my search for a new label I found a guitar picture label and knew that was the one - it just fit all too well. The lava lamp shape is clearly evident and a perfect representation of the psychedelic nature of the 1960s. I later thought up the stainless steel shot glass and inverted it on top for the cap and the concept was complete. This has been my most ambitious and most rewarding project to date, and I couldn't be more at "peace" with the finished brew.

You can find the recipe for my Woodstock Wheat brew at: www.byo.com/ article/headwaters (1979)

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