FIND HOPPINESS: WEST COAST IPA

NEVER BE SURPRISED BY A KICKED KEG AGAIN

10 MUST-HAVE BREW GEAR ITEMS

BrewYour Own®

THE HOW-TO HOMEBREW BEER MAGAZINE

OCTOBER 2023, VOL. 29, NO. 6

GET TO KNOW YOUR BREWING INGREDIENTS & MAKE BETTER BEER

- SMaSH BREWING
- HOW TO EVALUATE BEER INGREDIENTS

www.byo.com

$6.99

10

0 71658 02485 4

CRAFTING YOUR OWN BEER RECIPES

CELLAR SCIENCE

PREMIUM BEER YEAST

- Available in 12G & 500G
- Direct Pitch, No Need For A Starter
- No Oxygenation or Aeration Needed
- GABF Winning Beers
- High Viable Cell Counts

YEAST STRAINS:

- CALI
- ENGLISH
- GERMAN
- HAZY
- NECTAR
- VOSS
- HORNINDAL
- ACID
- BAJA
- BERLIN
- KÖLSCH
- MONK
- SAISON

SCAN QR
TO LEARN MORE & START SHOPPING!

AVAILABLE AT
MOREBEER.COM

#CellarScience

contents

OCTOBER 2023, VOL. 29 NO. 6

features

Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for $34.99 per year by Battenkill Communications, 5515 Main Street, Manchester Center, VT 05255; tel: (802) 362-3981; fax: (802) 362-2377; e-mail: BYO@byo.com. Periodicals postage rate paid at Manchester Center, VT and additional mailing offices. POSTMASTER: Send address changes to **Brew Your Own**, P.O. Box 469121, Escondido, CA 92046-9121. Customer Service: For subscription orders call 1-800-900-7594. For subscription inquiries or address changes, write **Brew Your Own**, P.O. Box 469121, Escondido, CA 92046-9121. Tel: (800) 900-7594. Fax: (760) 738-4805. Foreign and Canadian orders must be payable in U.S. dollars plus postage. The print subscription rate to Canada and Mexico is $39.99; for all other countries the print subscription rate is $54.99.

Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE

departments

where to find it

RECIPE INDEX

RECIPE STANDARDIZATION

EXTRACT EFFICIENCY: 65%
(i.e. — 1 pound of 2-row malt, which has a potential extract value of 1.037 in one 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.

Brew Your Own — THE HOW-TO HOMEBREW BEER MAGAZINE

EDITORIAL & ADVERTISING OFFICE
Brew Your Own
5515 Main Street
Manchester Center, VT 05255
Tel: (802) 362-3981 Fax: (802) 362-2377
Email: BYO@byo.com

SUBSCRIPTIONS ONLY
Brew Your Own
P.O. Box 469121
Escondido, CA 92046
Tel: (800) 900-7594
M-F 8:30-5:00 PST
E-mail: byo@pcspublink.com
Fax: (760) 738-4805
Special Subscription Offer
8 issues for $34.99

Cover Photo:
Charles A. Parker/Images Plus

Q What are your best tips for those starting out a brew-in-a-bag system?

My first tip for getting into brew-in-a-bag (BIAB) brewing is to make sure you have a mash vessel (kettle or all-in-one electric system) with sufficient capacity and temperature control/heating power to brew the sized batches you want. You're typically doing full-volume brewing with BIAB and also need to factor capacity for whatever volume your grain bill will displace. For me, that has meant migrating to smaller batch 3-gallon (11.5-L) brewing for ease of mashing, boiling, chilling, etc., since I'm using a 120V electric system, but you can do 5-gallon (19-L) batches if you have ample firepower via either propane or 240V electric. Another tip is that you'll want to mill your grains finer than you would for your standard lautering/sparging all-grain process. You'll get better efficiency and there aren't the same issues with grain bed development or stuck sparges to worry about when using a bag. If you do full-volume 5-gallon (19-L) batches you'll also want to figure out a pulley hoist setup to lift your grain bag out of the mash. I can do it by hand using heat-resistant brewer gloves with the smaller batches, but the additional grains for a standard batch weigh a lot when they're still saturated. Speaking of... Be sure to let your grain bag drain back into your kettle and don't be afraid to squeeze! BIAB is an easy way to get into all-grain brewing and there's just one vessel to clean after the brew day.

For a brew-in-a-bag system, the most important thing up front is to get your water volumes correct. Since you will most likely be mashing with the entire volume of grain and water in the system, you want to estimate the water needed to include water absorbed by the grain and boil losses so you end up with the correct amount of wort when done boiling.

Volume 29, Number 6: October 2023

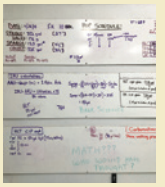
ADVERTISING CONTACT:
Kiev Rattee (kiev@byo.com)
EDITORIAL CONTACT:
Dawson Raspuzzi (dawson@byo.com)

BrewYourOwn
@BrewYourOwn
@brewyourownmag
@brewyourownmag

suggested pairings at BYO.COM

Understanding Base Malts

Though not as glamorous as hops and yeast, or even specialty malts for that matter, base malt is the backbone of beer. Learn what differentiates each base malt and when one may be better than another. https://byo.com/article/understanding-base-malt/

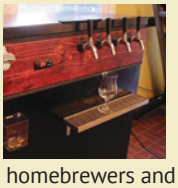


Recipe Development Tips

Finding a homebrew recipe isn't difficult — we have printed thousands in *BYO* over the years, for instance— but there is something about developing your own homebrew recipe that is always appealing. https://byo.com/article/tips-from-the-pros-dr-layout-2/

Hop Extracts

Substituting for hop pellets with CO_2 hop extract increases yields and can produce cleaner, brighter beer while maintaining hop varietal character. Learn more about how hop extract is made and how to use it in your brews. https://byo.com/article/hop-extracts/



Chest Freezer Kegerator

Converting a chest freezer to a kegerator is popular among homebrewers and adding a collar is the best way to make it convenient. Here is how to make it happen and make it look good. https://byo.com/project/chest-freezer-to-kegerator-keezer-collar-build/

MAIL

SCALING UP IRISH STOUT

My wife, Deneen, and I just returned from a wonderful 10-day trip to Ireland. We traveled the west coast and south, finishing in Dublin. While in the Galway, Dingle, Kinsale, and Wexford areas I grew to appreciate the Beamish-style stout. I'd like to brew something similar and in searching Google I came across Gordon Strong's "Style Profile" column on Irish stout (from the July-August 2022 issue, available online at byo.com/article/irish-stout) and the Beamish-style recipe he provides. Since it is a 5-gallon (19-L) recipe I will need to scale it up eventually to brew on our 4-barrel system at Turkey Creek Brewery. We have a 1-BBL (31-gallon/117-L) Ruby Street system we use for mid-scaling test batches progressing to the 4-BBL (124-gallon/470-L) system. We use Brewfather to manage our recipe development. In scaling up to 1 BBL there was a significant jump in the SRM from the 40 in Gordon's recipe to 60ish. I would believe the Brewfather scale-up is a simple parallel from the original to the scale being sized up to. I'm presuming the dark grains may not scale so well and do not need to be scaled equally from one size batch to another. I have taken liberty to make adjustments to the 1-BBL recipe to match your original SRM target, but I do not know what taste profile effect this will have on the final beer. Possibly you might provide me with your insight and suggestions going from 5 gallons (19 L) to 1 BBL to 4 BBL?

I am also looking for some tips on putting the finished beer on nitro. We do have a nitro tap we have yet to use.

Scott Wuest • *Hollister, Missouri*

Gordon Strong responds: "I wouldn't worry about color driving your decisions. Stouts should be black, and anything SRM 40 and up will be black. Higher numbers will just look blacker under stronger lights and in narrower containers. But in your average pint glass there is no problem with either.

"Flavor is a concern, for sure. But I tend to worry about the negative effects of dark grains more than the actual flavor. That is harshness, huskiness, acidity, etc. That's one reason I tend to hold those dark grains back until vorlauf. If you are using this method, I would go ahead and just scale my recipe and ignore any SRM complaints unless it doesn't look black. Estimating color from dark grains is hard anyway since it depends heavily on the maltster —

contributors

Jason Simmons has been in the brewing industry since 2003, having worked at several production breweries, brewpubs, and as a brewery consultant. He is currently the Head Brewer at Lindgren Craft Brewery in Duncannon, Pennsylvania. He is a retired firefighter and EMT with 11 years of service, much of which came while also working as a brewer during the day. Jason loves brewing with new ingredients and is an enthusiast of Pennsylvania-grown hops.

Even while brewing professionally, Jason has never given up his homebrewing hobby, which he often does to explore unique water sources, ingredients, and recipes. Beginning on page 28, Jason shares the 10 pieces of brewing equipment he finds necessary at both the craft brewery and homebrewery.

Dr. Brad Smith is the author of BeerSmith homebrewing software, BeerSmithRecipes.com, and host of the *BeerSmith Podcast*. Brad has been homebrewing for over 36 years. His BeerSmith software is approaching its 20-year anniversary, and Brad is also the author of the BeerXML recipe standard and BrewWiki.com website. He has written over 500 articles on brewing for his blog, newsletter, and various magazines, and is a popular speaker on brewing both domestically and Internationally. Brad is a retired Colonel in the U.S. Air Force where he ran various space programs. He holds a PhD in Computer Engineering, three Master's degrees in Engineering, Business, and Strategy, and was a fellow at MIT's Draper Laboratory.

An expert in recipe development, Brad knows the secret is understanding every ingredient. Turn to page 34 as he lays out how to master ingredient evaluation.

Ryan Hansen is the Founder and Lead Consultant at Big Pop Brewery Consulting. Ryan holds an MBA and a Professional Brewing and Distilling certificate from the Brewing & Distilling Center in Knoxville, Tennessee. On top of 10+ years as an avid homebrewer, Ryan has experience running a 10-barrel brewhouse and taproom. He loves teaching and helping breweries with everything from marketing, business best practices, and beer quality and consistency. You can follow Ryan's brewing adventures on Instagram @bigpopbrewing and find out more about his consulting company at BigPopBrewing.com

Beginning on page 40, Ryan shares the benefits as well as tips for successful SMaSH (Single Malt and Single Hop) brewing.

there is no uniform scale, and if you are using different software that might have a different database of grains, that could account for discrepancies.

"I tend to prefer U.K. dark grains, so Fawcett, Crisp, Simpsons, etc. are all pretty good. Can't say enough good things about Fawcett chocolate malt.

"I don't brew at the 4-BBL scale; my system is a half barrel. Note that recipes in the magazine are adjusted to their assumptions, which includes a 65% efficiency and a 5-gallon (19-L) size. So I'm taking my recipes and adjusting them for publication. I expect brewers to take those as a starting point and work through software to match their own system. In general, when scaling recipes and moving between systems, I try to keep the grist percentages the same, and let the software deal with the efficiencies and such to hit the target gravities I need.

"I don't really have anything insightful to offer about nitro, sorry. It will produce a creamier mouthfeel, remove most of the carbonation from the beer in the glass, and create a really dense head. A lot of people like stouts served this way. I'm OK with them, but I also enjoy bottled stouts in Ireland and obviously those aren't nitro. Just don't serve it too cold. A lot of the malt flavor in beer is suppressed at cold temperatures and you need it to stand up to the bitterness in this style.

"I hope it turns out well for you. Please keep me in the loop on how it goes."

BOULEVARD TANK 7 YEAST CHOICE

Thanks for all you do! I recently tried the clone recipe for Boulevard Brewing Co.'s Tank 7 from the December 2019 cover story and I just wanted to offer my feedback that I think it really missed on the yeast. The recipe called for one of the Belgian ale yeasts, and I did that, and it just tasted "plain." It was missing that "saison flavor." I'm a fan of Tank 7, and I think trying to clone it without a version of saison yeast is not going to work well. Just my two cents. Thanks for listening.

Robert Bartholet • *via email*

Ashton Lewis, who wrote the story on Boulevard, responds: "Steven Pauwels (Brewmaster at Boulevard) did give me guidance on the yeast. I know for certain that Tank 7 does not contain a diastatic yeast and also know that all 'saison' yeasts are diastatic. Steven recommended the strain for the recipe but that certainly does not mean that he gave away the keys to the car! We suggested four different Abbey strains and I would not describe any of these as 'plain.'"

That said, if you try to clone the recipe using your favorite saison yeast, pick up a bottle of Tank 7 and taste them side by side. If you believe the results are closer, great!

WRITE TO *BYO*

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

BEGINNER'S BLOCK

BY DAVE GREEN

YOUR FIRST DRAFT

Pouring draft beer at home has clear advantages, but the money investment, space considerations, and techniques to do it well provide hurdles to some. The goal here is to make an easy and affordable path to kegging success so that your first home draft beer experience will be as enjoyable as any that follow it.

There are a few items that are necessary to obtain prior to your first home draft pour.

KEG SELECTION

Homebrewers have long enjoyed the amazing capacity that Corny kegs offer. Their ability to tolerate pressure that even Champagne bottles of sparkling wine seldom see, the Corny keg is up to the challenge for most anything homebrewers throw at them. They can serve as fermentation vessels, bright tanks (vessels for pressurizing beer), or serving tanks. While there are other options outside the Corny keg for serving beer on draft, we're going to focus on them because of their proliferation in the homebrew world.

The first decision is whether you want to invest in the pin-lock or ball-lock style of Corny kegs. Costs and availability may make the decision for you. Each has its own set of hardware and are not easily interchangeable. Threaded components (discussed more later) allow a certain level of interchangeability, but not something standard homebrewers care to do on a keg-to-keg level. Choosing one or the other is a wise decision before you jump in. Neither offer advantages, although most modern Corny kegs being produced for the marketplace are for ball-lock style kegs.

Corny kegs also come in a wide array of sizes, starting as small as ½-gallon (1.9 L) to up to 10 gallon (38 L), while the 3-gallon (11.5-L) and 5-gallon (19-L) are the most commonly found. What size you choose depends on your desired use, typical batch size, and/or space restrictions.

Once you have your keg(s), get a wrench and disassemble the poppets (gas-in and liquid-out posts). Give everything a good soak in PBW (or OxiClean) followed by a sanitizing step with something like StarSan. Also, give the outside a good scrub down.

CO_2 TANK & REGULATOR

While forced carbonation is not necessary, the ability to push the beer for serving will require an outside supply of CO_2. Also, purging kegs with CO_2 prior to filling them with beer is a recommended task and is most easily accomplished with an outside source of CO_2. Local homebrew shops and gas supply stores are two places to start your journey. The most popular tank here in the U.S. is the 5-lb. tank. Before hooking into your system, always open a tank's valve a crack to blow out any dust or particulate in the mouth of the tank.

Obtaining a CO_2 regulator specific to carbon dioxide delivery is the next piece of equipment to look into. These can be fairly simple with just one body and one gauge to control the flow of gas, to more complex multiple bodies, each controlling kegs at varying pressures and each with their own gauge. Starting with a single body to control one or two kegs (with a t-splitter) along with a dual gauge is great starting place. These can be modified with new bodies further down the road if varying pressures are desired. Also, don't go cheap here. This is a piece of equipment that is best to get a quality one. Just be sure to always store the tank and regulator upright and in a secure spot. If liquid CO_2 gets into the regulator, it can ruin it.

FAUCET AND COMPONENTS

Picnic faucets are a great way to dispense your homebrewed beer at the start. Even if you plan on building your own bar with stainless steel faucets, having picnic faucets on hand is never a bad thing. They're cheap, easy to maintain, and perfect for whenever you may want to take some kegs on the go. Treat them well and they will last a lifetime.

While there are many options available, vinyl hosing is cost-effective, easy to work with, and ideal for getting your draft system off the ground (you can easily upgrade later too). I utilize ¼-in. vinyl hosing on the gas side and 3/16-in. hosing on the liquid side. Also, I like to use clear hosing so that I can always see exactly what's going on inside. You will also need disconnects for both the gas-in post and liquid-out post. These are specific to whether you have purchased ball-lock or pin-lock kegs. I greatly prefer the threaded disconnects over barbed ones because of their quick-change capacity, but barbed work fine in parts of a draft system where little to no changes occur (such as my seltzer keg).

Now that you have all the pieces, it's time to put them together. Hot water should be utilized to get hosing onto barbs since hosing will often be snug and may even be 1/16-in. smaller in diameter vs. barb size to preclude leaks.

BALANCING ACT

Most homebrewers serve their beers at roughly 2.5 volumes of carbonation (use an online carbonation chart to find corresponding regulated pressure). The length of your liquid-side hose is very important. Using vinyl tubing and a picnic faucet requires roughly 6 feet (~1.8 m) but this is highly dependent on what carbonation level you desire, temperature of the beer, hose diameter and type, and if there is any vertical distance between the keg and where it's being served. Utilize a draft hose length calculator online to find your ideal length before cutting.

MATEUSZ HABERKA • KRAKÓW, POLAND

I'm a homebrewer from Kraków, Poland. I started my hobby back in 2014 and from then on I'm mad about creating new batches, changing ingredients, and doing my own interpretations of classic styles. All in all, thanks to the informative stories in *BYO*, I'm becoming a better homebrewer each year (in 2022 I won the biggest homebrewing contest in Poland).

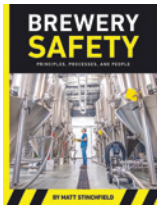
Coming back to the aim of these labels, I always wanted my beer bottles to be "signed" with my own, creative and sometimes funny, beer labels. Whenever I think of another batch, I try to figure out what to present on the bottle. I always try to find the connection between beer style and the picture I present on the label. My dear friend, who is more into graphic design, helps me with transferring my ideas on paper and that's how it goes.

In my homebrewing I mainly focus on brewing classic styles, especially lagers. Baltic Porter is one of my favorite ones, so I wanted to present an old fishing boat that reminds me of our beautiful Baltic Sea. "Perła Bałtyku" translates to "Baltic Pearl" in English.

WHAT'S NEW

SOLO PANEL

Ready to make the jump from propane to electric? The new Solo Panel from Spike Brewing allows for an easy transition with no auto-tuning required, a 3.2-in. (8.1-cm) LCD screen, and plenty of mounting options. Available in 120V and 240V options, it can handle up to 3000W at 120V and 6000W with the 240V version. Aircraft-style toggle switches turn elements or pumps on and off. There are manual or auto modes, as well as mash or boil modes to control either temperature or percent power delivered to your vessels via a rotary dial. Microprocessor driven, an internal heat sink and fan dissipate the heat. Includes a 6-ft. (1.8-m) power cord and a 10-ft. (3-m) temperature probe. https://spikebrewing.com/products/solo-panel



BREWERY SAFETY BOOK

It's not just about government regulation, it is also about making your brewery the best brewery possible — for your beer, your staff, and your visitors. Breweries face hazards that can be divided into physical, chemical, biological, ergonomic, and psychosocial hazards. Learning to address these aspects of safety to ensure a safe product and working environment is key. From physical trauma to chemical irritations, biological hazards to psychosocial hazards, *Brewery Safety* explores how to think about and avoid these hazards. Learn to evaluate, educate, and execute safety conscious measures to ensure that the working environment, welfare of staff, and the quality of the product are first and foremost. https://www.brewerspublications.com/products/brewery-safety

HORIZONTAL LAGERING TANKS

For small-scale craft breweries, new stackable horizontal lagering tanks from Blichmann Engineering are now available for those looking to take their lagers to the next level. Available as single tanks or stacking pairs, they allow brewers to free up fermenter space during lagering. A 5-degree slope ensures a good sedimentation at the bottom of the tank. Available in sizes ranging from 5-BBL up to 30-BBL capacity, horizontal lagering tanks help shorten required lagering times. Other features include a sample port with Perlick-style valve, analog thermometer, carbonation stone, and clean-in-place (CIP) arm and rotary spray ball. https://www.blichmannengineering.com/horizontal-lagering-tanks.html

AUBURN
College of Human Sciences
Brewing Science and Operations

NEW REALM
BREWING COMPANY

NEW REALM BREWING CO. TEAMS UP WITH AUBURN UNIVERSITY

An announced collaboration between Auburn University's College of Human Sciences Brewing Science and Operations program and Atlanta, Georgia-based New Realm Brewing Co. offers an exciting new look at the way brewing education programs may move. New Realm operates production breweries and distilleries, each with on-site scratch kitchens serving globally inspired, locally sourced fare, in multiple Southeastern U.S. cities. New Realm's newest location at Auburn opened mid-summer in the Tony and Libba Rane Culinary Science Center, home to the Horst Schulze School of Hospitality Management in the College of Human Sciences. Students will receive hands-on training in the 7-barrel brewhouse as well as the taproom. New Realm's head brewer based there will be an affiliated professor alongside team members who will be guest lecturers on a variety of topics including brewing, distilling, recipe development, and supply chain management. https://newrealmbrewing.com/press-auburn-university-and-nrbc-announce-partnership/

Upcoming Events

BYO NANO CON ONLINE

OCTOBER 19, 2023

Early Discount Deadline

Save $100 when you register by October 19 for 2023 NanoCon Online, which takes place November 3&4, 2023. This is also the deadline for attendees with a U.S. mailing address to receive a NanoCon Goodie Box. Get your questions answered live by speakers, meet and learn from fellow attendees, and talk with vendors specializing in the small-scale Nano brewing niche. http://NanoCon.beer

BYO NANO CON ONLINE

NOVEMBER 3 & 4, 2023

BIG IDEAS FOR SMALL-SCALE CRAFT BREWING

- **30+ Live Online Seminars, Workshops, and Q&A Panels**
- **Full access to video recordings of all sessions**
- **3 Learning Tracks: Brewery Operations, Business/Sales, and Start-Ups**
- **Get your questions answered live by expert speakers**
- **Interact with other small-scale pro breweries and breweries-in-planning**
- **Q&A sessions with leading craft beer industry suppliers**

REGISTER BY OCTOBER 19 AND SAVE $100!

NanoCon.beer

Brought to you by Brew Your Own — The How-To Homebrew Beer Magazine

Save $100 when you register by our Early Discount Deadline of October 19, 2023. Your $199 NanoCon Online Registration includes:

- Full access to over 30 live online seminars and panels November 3 & 4, 2023
- Access to video recordings of all NanoCon seminars after the event
- Ability to get your questions answered live by speakers and attendees
- NanoCon attendee swag box filled with special offers shipped out to US addresses in advance of the online event
- Live Q&A sessions with leading craft brewing industry suppliers
- One-year print subscription or renewal to *Brew Your Own* magazine including our regular Nano Brewing column

For full event and registration details visit: NanoCon.beer

SCHEDULE AT-A-GLANCE

(All Times are Eastern)

BYO NANO CON ONLINE

NanoCon Online Day #1 • Friday, November 3, 2023

11:00 AM – 12:00 PM	Brewery Cash Flow Strategies	QC Fixes: Troubleshooting Test Results	From Brew Pot to Brewhouse: Sizing Up Homebrew Recipes to Nano Scale
12:10 – 12:40 PM	Q&A WITH NANO VENDORS		
12:50 – 1:50 PM	Best Practices for Using Thiolized Yeast	Brewery Insurance 101	Understanding Brewery Trademarks & Avoiding Mistakes
2:00 – 3:00 PM	NANO BUSINESS TRENDS PANEL		
3:10 – 4:10 PM	Heat It Up: Deciding Between Electric, Steam, Oil or Direct-Fired Brew Systems	Taproom Event Planning Panel	Low and No-Alcohol Beer Production for Nanos
4:20 – 4:50 PM	Q&A WITH NANO VENDORS		
5:00 – 6:00 PM	Strategic Email Marketing for Breweries	Small-Scale Glycol Systems	Taproom Design Best Practices

NanoCon Online Day #2 • Saturday, November 4, 2023

11:00 AM – 12:00 PM	Understanding Taproom Customer Motivations	Dialing in Sourness: pH vs. TA	1 Barrel or 5? Determining Start-Up Brewery Size
12:10 – 12:40 PM	Q&A WITH NANO VENDORS		
12:50 - 1:50 PM	Using a Malt COA to Brew Better Beer	Build a Better Brewery Business Plan	Legal Checkup List for Breweries
2:00 – 3:00 PM	NANO BUSINESS TRENDS PANEL		
3:10 – 4:10 PM	Branding for Start-Up Breweries	Pitfalls of Selling or Buying a Brewery	Staying on Top of Brewery Maintenance
4:20 – 4:50 PM	Q&A WITH NANO VENDORS		
5:00 – 6:00 PM	Accurate Short- and Long-Term Brewery Financial Forecasts	Keys to Better Brewery Production Schedules	Brewery Law 101

Thanks to our BYO NANO CON ONLINE Sponsors!

Get questions answered live and online about equipment, supplies, services, and ingredients from leading companies focused on the Nano craft brewing market and your specific small-scale brewery needs.

ABS COMMERCIAL · BEER LAW CENTER · BSG HandCraft · CANO Your Nano Canning Solution · Fermentis by Lesaffre · FIVE STAR · Hopsteiner · LaMotte BREWLAB · MoreBeer! Professional · OMEGA YEAST · WHITE LABS PURE YEAST & FERMENTATION · YAKIMA VALLEY HOPS

NANOCON ONLINE LEARNING TRACKS

BREWERY OPERATIONS

- Best Practices for Using Thiolized Yeast
- QC Fixes: Troubleshooting Test Results
- Small-Scale Glycol Systems
- Staying On Top of Brewery Maintenance
- Dialing in Sourness: pH vs. TA
- Low and No-Alcohol Beer Production for Nanos
- Using a Malt COA to Brew Better Beer
- Keys to Better Brewery Production Planning

SALES & BUSINESS OPERATIONS

- More Accurate Short- and Long-Term Brewery Financial Forecasts
- Brewery Cash Flow Strategies
- Strategic Email Marketing for Breweries
- Understanding Taproom Customer Motivations
- Understanding Brewery Trademarks & Avoiding Headaches
- Taproom Event Planning Panel
- Pitfalls of Buying or Selling a Brewery
- Legal Checkup List for Breweries

START-UPS

- 1 Barrel or 5? Determining Start-Up Brewery Size
- From Brew Pot to Brewhouse: Sizing Up Homebrew Recipes to Nano Scale
- Build a Better Brewery Business Plan
- Taproom Design Best Practices
- Brewery Law 101
- Branding for Start-Up Breweries
- Heat It Up: Deciding Between Electric, Steam, Oil or Direct Fired Brew Systems
- Brewery Insurance 101

NANOCON.BEER **REGISTER BY OCTOBER 19 & SAVE $100**

BY DAWSON RASPUZZI

SMaSH BREWING

How the pros approach simple brews

SMaSH (Single Malt and Single Hop) brews are a great way to learn about ingredients, in addition to being some of the simplest beers to make, but that doesn't mean they can't also taste great. Two pro brewers with SMaSH beers among their flagships offer advice to brew your own SMaSH.

When we opened Last Stand back in 2014 we introduced a SMaSH series of beers with a focus on highlighting how hops impact the flavor of beer and how each variety of hop differs from each other. SMaSH beers are a great way to really experience the flavors and aromas extracted from the hops in the brewing process, and we have continued the series with dozens of hop varieties used to date. Citra® was the second hop variety we did in the series and it immediately stood out to the staff and our customers. It quickly became our number one selling beer and we found ourselves drinking it more often than not so we knew we had something special with that recipe. That beer became a year-round offering since not long after the first batch was brewed and has remained our number one selling beer to this day.

We tend to focus on the hops when brewing a SMaSH beer, but we have experimented a little with different base malt from German Pilsner, English Maris Otter, pale malt, as well as lighter Munich malts. But we generally tend to start with either a Pilsner or pale malt so that the hops are the star of the show. Like with malt, we have done several different yeast strains like Dry English, London Ale III, and a few lager strains as well. That said, Citra SMaSH IPA uses a neutral West Coast IPA strain and that's what we usually start with.

Our SMaSH beers tend to gravitate toward IPA recipes (though we have done SMaSH Pilsners as well). For the IPAs we usually start with a first wort addition, then a late-boil addition followed by a whirlpool addition. Then we finish off with a healthy dry hopping.

In addition to being a great way to evaluate individual ingredients, we also like to take SMaSH beers and blend them at different ratios to see how hops play together. Those experiments help us with recipe development and ratios of hop additions.

In addition to Citra®, other favorites of ours include Mosaic®, Simcoe®, and Centennial. We recently brewed with one of the newer hop varieties, Nectaron®, and the reception was very reminiscent of back when we brewed Citra SMaSH the first time. We're looking forward to getting more Nectaron® to do more experimenting in the future.

For homebrewers wondering where to begin with SMaSH brewing, like with any other recipe, start with good water. Make sure it's free of chlorine and/or chloramines. I'd recommend a water test kit so you have a baseline of what your water profile is and then adjust from there with salts, or use reverse osmosis water and build up with salts if you prefer. From there I'd start with a pale or Pilsner malt and choose a hop to brew with. Once you've designed a recipe you like and are able to brew it consistently, then try changing the base malt or the yeast to see how that changes the flavor of the beer. I'd only change one ingredient at a time so you can see directly how it impacts the beer. I'd also suggest brewing multiple batches with slight changes close together so you can taste side-by-side.

Another thing to consider as part of SMaSH experiments is how the hop flavor/aroma changes over time. This is a great way to see which hops have "staying power" and which fade away quickly. We have found that some hop varieties fade very fast and some stick around for a while.

> . . . we also like to take SMaSH beers and blend them at different ratios to see how hops play together.

Kerry Richardson began homebrewing in the early 2000s and after 15 years working in the high tech industry he left to open Last Stand Brewing Co. in Austin, Texas. He remains the Head Brewer and Owner, with a passion for all things hops.

Ian Conboy is the Head Brewer and Vice President of Lucky Hare Brewing Company, a farm brewery in Hector, New York. He also serves on the board for the New York State Brewers Association.

At Lucky Hare we have actually produced very few SMaSH beers only because the first one we made, Live Action, was a hit. That recipe is 100% Pilsner malt, water, Mosaic® hops, and Kölsch yeast. Twenty IBUs of hops are added at 60 and 20 minutes, then there is a whirlpool addition and we dry hop at 2 lbs./barrel (about 1 oz./gallon or 7.5 g/L). The beer is fermented in the low 60s °F (~16 °C) until the beer is about eight gravity points from terminal and then warmed up for a diacetyl rest.

I used Kölsch yeast the first time because that was what I had that was freshly harvested and looking for some wort. It was a wonderful gamble that has led to a beer that we now make on our 15-bbl brewhouse four times throughout the year.

The intention of the SMaSH we brewed was to highlight Mosaic® hops to the fullest. When considering making a SMaSH you need to maximize flavor while achieving balance from only four ingredients. With Live Action, we feel we were able to do this by fermenting with Kölsch yeast instead of our usual Chico strain.

Being able to bitter, add flavor, whirlpool, and dry hop all with one hop variety in SMaSH beers really showcases the flavors and aromatics that are created. This can be said for yeast too — vary your fermentation temperature or the strain and create a plethora of flavor profiles. I have always considered doing the beer with a thiolized yeast strain, or perhaps even going the lager route. The SMaSH concept creates a ton of versatility in the hop and yeast department.

One thing to keep in mind with SMaSH brewing is that there isn't much to hide behind with just four ingredients if any flaws find their way through. Understanding the entire process of making a beer is key. You must also understand what you are trying to achieve with only those ingredients. Keep notes, don't take it too seriously, and have fun. With just four ingredients, what's the worst that can happen? BYO

HELP ME, MR. WIZARD

BY ASHTON LEWIS

HITTING TARGET FG

Also: Knowing your OG and magnesium salts in beer

Q I RECENTLY BREWED A PILSNER USING ALL-GRAIN IN A TWO-STEP BREWING PROCESS. MY TWO TEMPERATURE POINTS WERE 144 °F (62 °C) (BETA-AMYLASE) FOR 75 MINUTES AND 158 °F (70 °C) (ALPHA-AMYLASE) FOR 60 MINUTES. I USED A PUMPOVER WITH A STIRRING EXTRACTION METHOD.

I USED WYEAST 2278 (CZECH PILS). THE BEER'S FINAL GRAVITY (FG) WAS 1.006 AND IT TASTED EXCELLENT, BUT LACKED BODY. THE ORIGINAL GRAVITY (OG) WAS 1.042, AND THE FG WAS MEANT TO BE 1.010.

I WAS TRYING FOR A THINNER BEER BUT NOT THIS THIN! CAN YOU GUIDE ME ON HOW LONG YOU SHOULD MASH AT 144 °F (62 °C) AND 158 °F (70 °C) TO MANIPULATE THE BODY OF THE BEER? I FEAR I MIGHT BE LOOKING AT THIS QUITE SIMPLISTICALLY. DOES THE BODY OF A BEER HAVE MORE TO DO WITH THE TYPE OF GRAIN USED OR POSSIBLY THE YEAST?

GREG GIBSON
GISBORNE, AUSTRALIA

The two main factors in malt that influence how mashing affects wort are the degree of malt modification and the malt's enzymatic strength.

Hitting your target gravities can be an elusive goal. It partly depends on how much you want to focus on the objective.

A It's always great reading questions for brewers in other countries and doing a bit of traveling with the internet. Gisborne looks like a beautiful place to enjoy a nice Pilsner and hopefully some of the information here will help you out on your next brew.

For starters, your 1.042 OG is a bit low for classic Pilsners. Bumping the OG into the 1.048–1.050 range may be something to consider unless you specifically want a lower ABV and lower calorie beer. Alcohol and residual extract are both related to body, so simply increasing your wort's OG will help some.

Now onto addressing your relatively high apparent degree of attenuation (ADF) of 86% (calculated by dividing the gravity points fermented by points in the wort, or 36/42 x 100). Reducing the length of your beta-amylase rest at 144 °F (62 °C) from 75 minutes to about 20–30 minutes should reduce your ADF into the low 80s. Rests ranging from 60–180 minutes are commercially used to increase the ADF for styles like dry and light lagers, where approximately 92% ADF can be achieved without using exogenous enzymes or diastatic yeast. For this brew, if your ADF had been 82% your finish gravity would have been 1.008, which is still lower than your target of 76% ADF (1.010). Looks to me that the target is not aligned with the recipe. 80% ADF is not uncommon these days for infusion-mashed brews. And that brings up the next topic.

Mashing profiles do different things to different malts. The two main factors in malt that influence how mashing affects wort are the degree of malt modification and the malt's enzymatic strength. Modification is the malting term used to describe all changes occurring as barley is transformed from a dormant seed into malt and can be categorized using general terms: Poorly modified, under-modified, lightly modified, well-modified, and over-modified are useful for discussion purposes.

Poorly modified malts are generally not acceptable for brewing purposes unless the malt is used like an

adjunct, chit malt for example, or if the malt is a functional special malt, such as a foam-promoting malt. Meanwhile, over-modified malt is not something maltsters want to sell because over modification results in unacceptably high malting losses from excessive growth during germination. This leaves brewers with under-, lightly, and well-modified malts in grain catalogs.

Globally, most malt is either lightly or well-modified because these types work well in the brewery and can be consistently produced from modern barley. Breeding programs over the last 50 years or so have increased barley yield, enzymatic potential, disease-resistance, and overall agronomics. Many of these changes have allowed maltsters to deliver malt to brewers that is simply easier to use in the brewery.

Mash profiles these days are typically shorter and have fewer steps because malt modification within the kernel is more uniform, modification between kernels and batches of malt is more consistent, and enzymatic strength is generally higher than it was in the past. A real consequence of these changes is misalignment between modern raw materials and practices discussed in the brewing literature.

Let's switch back to your question. You want to brew a Pilsner wort with about 76% ADF. Although yeast don't define wort fermentability, strains that ferment maltotriose ferment more sugars than those that only ferment glucose, fructose, maltose, and sucrose.

Wyeast does not provide information about maltotriose fermentation, however, based on the typical ADF range for Wyeast 2278, it's reasonable to assume that this strain does not ferment maltotriose. This means that mash control should allow you to limit ADF to under 80% using this strain. Modern malts being what they are, and assuming you are using a modern base malt, means that you may find skipping your beta-amylase altogether will get you close to where you want to be.

Yep, I am suggesting trying out a modern twist on the infusion mash. Aim for a mash temperature of about 153 °F (67 °C) for 45–60 minutes, then mash-off at 169 °F (76 °C) to denature enzymes and reduce wort viscosity. The main benefit to mashing-off is preventing enzymatic reactions from occurring during wort collection.

If infusion mashing is too extreme for Pilsner brewing, start your mash at 122 °F (50 °C), decoct about 50% of your mash, and jump from 122 °F (50 °C) to 158 °F (70 °C) to limit beta-amylase activity. The decoction is not needed for lightly or well-modified malt, but it is a handy way to blow past beta's happy place while holding onto the tradition of decoction-mashed Pilsner.

Another way to dilute enzymes, essentially what happens during a decoction boil, is to use adjuncts like maize and rice. I'll just drop the mic with that suggestion before I anger traditionalist brewers! Thanks for the great question.

Q I AM A LITTLE BIT OBSESSED WITH HITTING TARGETS, AKA PRECISION; SOME MAY CALL ME A LITTLE ANAL RETENTIVE. ONCE I HAVE SOMETHING TO AIM TOWARDS, I WANT TO HIT THE BULLSEYE EVERY TIME. ONE TARGET, OTHER THAN A FLAGSTICK ON A GOLF GREEN, THAT IS FRUSTRATINGLY HARD FOR ME TO HIT IS STARTING WORT GRAVITY. I'M AN ALL-GRAIN BREWER OF ABOUT 5 YEARS AND SOMETIMES I CAN BE WITHIN A POINT OR THREE OFF, OTHER TIMES I CAN FIND MY WORT 10 POINTS OFF FROM WHERE I WANT TO BE. CAN YOU SUGGEST SOME THINGS THAT MAY HELP ME OUT?

BOB ANZALONE
MYSTIC, CONNECTICUT

A This is a tough one. I had to put my thinking cap on before sitting down to write this response out. I need to get one thing clarified before I jump into my suggestions. It's tempting to jump down the rabbit hole of brewing efficiency when discussing nailing target gravity, but being efficient, or not, has nothing to do with hitting the OG target. There is a foolproof method to achieve your goal that only requires a good hydrometer or refractometer, a calibrated wort kettle, a uniform sample, and some simple math. Let's tackle this task one layer at a time.

But before I jump into my method to hitting target original gravity readings I need to take a brief moment to discuss grain crush and mash uniformity. If you're an all-grain brewer buying grains already crushed or crushing your own grains, just note that how fine your malts are crushed as well as grain size will have an effect on your mash efficiency. Consistency is key here so you have a general sense where you should land. Also, make sure your mash is well stirred when mixing brewing water into the grains. Dough balls will have a negative impact on your brewing efficiency.

STEP 1

Do whatever you do to prepare your wort before boiling. Whether that's a partial mash with extract added, a triple decoction, or an infusion mash with a few pounds of sugar added to bump your OG, do it. After you have all extract-contributing components added to your wort and all water in the kettle, including any last runnings dripping in from the mash tun, thoroughly, and I do mean thoroughly, mix your wort with a spoon or paddle. The goal is to make sure there are no dense pockets or weak pockets of wort. No need to splash about or make a big to-do while you stir, just be thorough.

STEP 2

Take a sample of wort and measure your pre-boil volume. I am old-school and have three hydrometers, each with an 8 °Plato range (0–8, 8–16, and 16–24/gravity point equivalence: 0-32, 32–66, 66–102) and each with a built-in thermometer. Did I mention I like hydrometers? Once you take a sample, cool it down to room temperature or whatever

temperature your device requires for proper use. While your sample is cooling, go ahead and begin heating your wort to boiling. Ideally, you want to cool your sample before you start boiling so you can adjust your hop weights if required or desired, but if you don't plan on tweaking your hop calculations the wort sample and pre-boil volume is all you need.

STEP 3

Calculate how much extract is contained in your kettle. This value is a constant and does not change during boiling unless you add malt, sugar, or extract, or spill part of your kettle. If you followed the directions in Step 1, the only reason your extract will change is through a spill. Let's just agree that it's a safe assumption that extract is a constant. An easy way to determine extract is by referring to the handy data shown in Table 1 and multiplying kg extract per liter by liters of wort (1 gallon = 3.785 liters; if your kettle is calibrated in gallons just divide your volume by 3.785 to convert to liters or calibrate it in liters).

If you want to do this long hand or write a spreadsheet, kg extract = (wort density) x (wort °Plato) x (liters of wort). Note that mathematical products of wort volume and wort strength (Plato), and products of wort volume and wort density don't work as shortcuts for calculating extract; density and strength are both required.

Here is an example. Before the boil, you have 22 liters of wort, and your hydrometer reading is 10.5 °Plato/1.042; how much extract is in the kettle? We can see from the data table that the wort sample contains 0.109 kg extract per liter. And multiplying this by 22 gives us 2.4 kg of extract. We'll come back to this value in a bit.

Table 1: Wort Extract Based on Plato/Specific Gravity

°Plato (% w/w)	Wort Density (kg/Liter)	Kg Extract/Liter
8.00	1.032	0.083
8.50	1.034	0.088
9.00	1.036	0.093
9.50	1.038	0.099
10.00	1.040	0.104
10.50	1.042	0.109
11.00	1.044	0.115
11.50	1.046	0.120
12.00	1.048	0.126
12.50	1.050	0.131
13.00	1.053	0.137
13.50	1.055	0.142
14.00	1.057	0.148
14.50	1.059	0.154
15.00	1.061	0.159
15.50	1.063	0.165
16.00	1.065	0.170
16.50	1.068	0.176
17.00	1.070	0.182
17.50	1.072	0.188
18.00	1.074	0.193
18.50	1.076	0.199
19.00	1.079	0.205
19.50	1.081	0.211
20.00	1.083	0.217
20.50	1.085	0.222
21.00	1.087	0.228
21.50	1.090	0.234
22.00	1.092	0.240
22.50	1.094	0.246
23.00	1.096	0.252
23.50	1.099	0.258
24.00	1.101	0.264

Step 4

Determine your final wort volume before boiling. To nail the target gravity, the only variable we can change is wort volume because extract is constant at 2.4 kg in our example and we want to hit our target, which, by the way, is 12 °Plato/1.048. Start by using the data table to determine that there is 0.126 kg extract contained in a liter of 12 °Plato/1.048 wort. We know we have 2.4 kg extract in the kettle and can determine the wort volume at 12 °Plato/1.048 wort by dividing 2.4 kg extract by 0.126 kg/liter. We want 19 liters after the boil. There are a few tips to make this all work out.

Tip 1 – Wort contracts when cooled but it's easier to measure volume when it's hot when we are still brewing. Nineteen liters of 68 °F (20 °C) wort equates to about 19.8 liters of 208 °F (98 °C) wort (19 ÷ 0.96).

Tip 2 – It's a lot easier to add water at the end of the boil to bump up wort volume than it is to boil excess water away because too much was added in Step 1. This is where experience comes into play and helps determine how much wort to collect before boiling. And when cool water is added to hot wort, the wort contracts some and makes it hard to estimate cool wort volume. Using hot water to top up your kettle helps hit your wort volume and gravity targets when things cool down.

CONCLUSION

That's it to this nailing your gravity discussion. If you have a well-mixed, pre-boil wort sample and know your pre-boil wort volume, you can determine your extract. Armed with this information and your target gravity you can determine how much wort you need to produce. Consistent brewing practices help keep adjustments minor and you can decide whether hop additions should be changed to track with changes in wort volume versus the recipe. But that's a discussion for another day. Happy brewing!

Q I RECENTLY WAS TOLD BY ANOTHER BREWER I SHOULD NOT BE ADDING MAGNESIUM TO MY BREW WATER BECAUSE OF ITS LAXATIVE EFFECTS. IS THIS TRUE? I'VE NEVER HEARD OF THIS BEING AN ISSUE. ALSO, HOW MUCH MAGNESIUM DOES A PERSON NEED TO CONSUME FOR THAT EFFECT TO KICK IN?

ANONYMOUS PROFESSIONAL BREWER
VIA EMAIL

A According to the article "Can You Take Too Much Magnesium" published on the *Medical News Today* website, the National Institutes of Health recommends 310–320 mg as the daily magnesium allowance for adult women and 400–420 mg as the daily magnesium allowance for adult men. Although typical diets may naturally contain sufficient magnesium to satisfy daily recommendations, some people take dietary supplements for a variety of reasons including magnesium deficiencies associated with the modern diet.

The NIH recommendation for all people older than 9 is to limit magnesium supplements to 350 mg per day (this is above magnesium ingested from food and beverages). I don't offer medical advice because I am a brewer, so please read up on magnesium if you want to know more about how it's used by the body and why there is a recommended daily allowance.

It is well known that magnesium has a laxative effect on people when ionic magnesium, for example from salts like magnesium chloride and magnesium sulfate, is ingested above about 350 mg/day. And higher consumption rates above 350 mg/day usually leads to diarrhea. That's why my friend does not want to add magnesium to brewing water. The related questions are: 1) how much magnesium is normally present in beer and 2) how much magnesium needs to be added to water to affect beer flavor?

Commercially brewed beers typically contain between about 40–150 ppm (mg/L) of magnesium. It's hard to know how much of this magnesium is from the brewing water, but levels in water are typically below 40 ppm, meaning that the balance originates from other brewing ingredients, primarily malt. That's a good thing because yeast do require magnesium for certain enzymatic reactions, and water devoid of magnesium need not be a concern.

The reason I am a fan of magnesium in brewing water is that it adds to the flavor of beer. At low levels, magnesium is hard to pick up, but is known to make water more refreshing. That may be why Dasani water adds a magnesium salt to its water. But when the concentration in water is increased to 20–40 ppm, magnesium adds a distinctive bitter-metallic flavor that can be detected in the finished beer. Why do all beers not taste like magnesium given the concentration in malt? It's likely the form; magnesium in malt is largely bound or associated with proteins, nucleic acids, and bran. Plant physiology aside, magnesium added to brewing water affects beer flavor.

The easiest way to understand how magnesium influences beer flavor is to buy Epsom salt (magnesium sulfate heptahydrate) without any aromatherapy additives. Make up a solution in water and add a few drops to a beer for tasting. If you like what a bit of magnesium adds to your pint of beer, this salt may be a water treatment you should try in your next brew.

> **"The easiest way to understand how magnesium influences beer flavor is to buy Epsom salt without any aromatherapy additives."**

Back to the original concern, how much magnesium-spiked beer can the average beer lover consume without having gastric issues? Referencing the NIH recommendations, the maximum intake from supplements is 350 mg/L. If we consider magnesium added to brewing water as a supplement and set our level in brewing water at 35 mg/L, which is on the high side, a beer drinker would hit this maximum intake after consuming 10 liters, or (28) 12-ounce bottles of beer.

Like I stated earlier, I don't provide medical advice. But I will wager a guess that most people will have problems much worse than a touch of the runs after consuming 28 beers in a day. Therefore, I suggest that adding a touch of magnesium to brewing water is not likely to cause gastrointestinal problems for the typical beer lover, even if your nickname is Joe Six-Pack. That's my answer and I am sticking to it! BYO

HAVE A BREWING OR BEER-RELATED QUESTION? ASHTON LEWIS HAS ANSWERED HUNDREDS OF QUESTIONS IN HIS "HELP ME, MR. WIZARD" COLUMN OVER THE LAST 28 YEARS. ALL BREWERS STAND TO LEARN MORE WHEN QUESTIONS GET ASKED. DON'T BE SHY TO EMAIL WIZ@BYO.COM, NO MATTER WHETHER YOU HAVE BEEN BREWING A FEW MONTHS OR 20+ YEARS. ALL QUESTIONS ARE WELCOME.

BY GORDON STRONG

WEST COAST IPA

Really just an American IPA

> The product it was differentiating itself from wasn't hazy IPA . . . it was distinguishing from products like Bell's Two Hearted Ale, Harpoon IPA, and Dogfish Head 60-minute IPA.

WEST COAST IPA
BY THE NUMBERS

OG:	1.056–1.070
FG:	1.008–1.014
SRM:	6–14
IBU:	40–70
ABV:	5.5–7.5%

Photo by Charles A. Parker/Images Plus

OK, let me get this out of the way first. West Coast IPAs are American IPAs. Full stop. Please, try to breathe. I'll talk you through this. American IPAs remain a very popular style today, but they are continuing to change over time, as they have since they helped usher in the craft era. West Coast IPAs are a subset of American IPAs that have a slightly narrower range than the full style. To me, it's more of a marketing term or lifestyle choice than anything else, so use the term if you like. Beer drinkers will understand what you are talking about.

To be perfectly clear, all West Coast IPAs are American IPAs, but not all American IPAs are West Coast IPAs. They are not exact synonyms, but they are similar. I'll go even further. Not all IPAs on the West Coast are West Coast IPAs, and not all West Coast IPAs are found on the West Coast. It's certainly a kind of IPA that originated on the West Coast and is popular on the West Coast. I've had people argue with me that San Diego IPAs are really a different thing from West Coast IPAs too, which ignores the fact the name was coined there, but also it just goes to show that some beer people will argue about anything.

American IPA is BJCP (Beer Judge Certification Program) style 21A within Category 21 IPA, along with specialty IPA and hazy IPA. If entering in competitions, you can add "West Coast IPA" in the comments, perhaps with the ABV, IBUs, and hop varieties, to assist with the judging. English IPAs are grouped with other British-derived beers for sensory and judging purposes, not to imply that they aren't related.

HISTORY

I have previously recounted the history of IPA when I wrote about English IPA, the original India pale ale and Burton ales. I won't rehash that except to say that IPA is originally an English style, created in London but perfected in Burton-on-Trent. Popular for over 100 years, its market presence faded in the 20th century as gravities dropped and it became indistinguishable from pale ales and bitters. It never really died out, but it did help inspire the IPA craze today in the craft beer era.

The United States had IPAs before the craft beer era, notably the well-regarded Ballantine IPA. But that beer was more closely related to historical English IPAs than modern American IPAs. It faded around the time craft beer was getting started in America. Anchor Liberty Ale (first made in 1975) is often regarded as the first modern American IPA, although it didn't use that term at the time (or pale ale, for that matter). There simply weren't enough examples or craft breweries to think about things in style terms much beyond ale vs. lager.

Bert Grant's IPA (released in 1983) was the first beer called an IPA in the craft era. Some important Californian IPAs were first made in the mid-1990s: Blind Pig IPA in 1994, Lagunitas IPA in 1995, and Stone IPA in 1997. A distinctly American take on IPAs was emerging, different from traditional English IPAs (or the memory of such things) and those IPAs further East (I don't like saying East Coast because that slights Midwest breweries such as Bell's and Great Lakes that make excellent IPAs).

Craft beer was already evolving and innovating but we were also at the start of developing a more detailed understanding (and documentation) of beer styles. Believe it or not, when I started judging in the mid-1990s, there was only one India Pale Ale description, and it described the historical English beer. Judges just sort of understood that these could also be made with American ingredients. In the 2004 edition of the Beer Judge Certification Program Style Guidelines, I divided IPA into English IPA, American IPA, and Imperial IPA

(later to be renamed Double IPA) to acknowledge what was clearly happening in the market.

Around that time, Green Flash Brewing Co. out of San Diego, California, came out with a beer called West Coast IPA, a term they trademarked and subsequently applied to other styles (which demonstrates that it is more of a marketing term than a style). Vinnie Cilurzo of Russian River has commented that the term West Coast IPA became more of a generic term with consumers around 2010 and it is used to provide differentiation in a large and growing market. It has come to be seen as a subset of American IPA, or some might think of it as the modern American IPA. The product it was differentiating itself from wasn't hazy IPA, which was only just emerging in New England; it was distinguishing from products like Bell's Two Hearted Ale, Harpoon IPA, and Dogfish Head 60-minute IPA.

So, while West Coast IPAs started as an individual beer from a brewery that no longer exists (and was actually not even a pale beer), it set a trend that essentially took over the previous category as other types of American IPAs became less popular. As hazy IPAs grew and mutated, that style became further separated from the traditional IPA. Variations of American IPAs blossomed for awhile (remember black IPA?), but have mostly fallen out of favor. However, the emerging trend of cold IPA (still not a fan of that name, but please bring me another one of those beers) is raising new questions about the future of American IPA. I'm personally very curious about what the next few years will bring.

SENSORY PROFILE

Modern West Coast IPAs are pale, dry, bitter, hoppy beers of above-average strength (usually in the 6.2% to 7.5% ABV range). The malt profile is relatively neutral and usually without any caramel flavors. The bitterness is significant and the late-hop profile is prominent with a fresh dry-hop character. They can have a minerally finish with sulfates adding to the dry finish and sharpening the perception of bitterness. The body is medium-light and the beer is well-carbonated to encourage drinkability,

WEST COAST IPA

(5 gallons/19 L, all-grain)
OG = 1.063 FG = 1.011
IBU = 72 SRM = 6
ABV = 6.9%

INGREDIENTS

5.5 lbs. (2.5 kg) Pilsner malt
5 lbs. (2.3 kg) 2-row pale malt
1.5 lbs. (680 g) Munich malt
1 lb. (454 g) Belgian pale ale malt
15 AAU Warrior® hops (60 min.)
(1 oz./28 g at 15% alpha acids)
9.2 AAU Amarillo® hops (10 min.)
(1 oz./28 g at 9.2% alpha acids)
13 AAU Simcoe® hops (10 min.)
(1 oz./28 g at 13% alpha acids)
1 oz. (28 g) Amarillo® hops (hopstand)
1 oz. (28 g) Simcoe® hops (hopstand)
1 oz. (28 g) Amarillo® hops (dry hop)
1 oz. (28 g) Centennial hops (dry hop)
1 oz. (28 g) Citra® hops (dry hop)
White Labs WLP001 (California Ale),
Wyeast 1056 (American Ale),
or SafAle US-05 yeast
¾ 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 ¼ tsp. of calcium chloride and 1 tsp. of calcium sulfate to the mash.

This recipe uses a step infusion mash. Use enough water to have a moderately thick mash (1.5 qts./lb. or 3.1 L/kg). Mash the grain at 146 °F (63 °C) for 45 minutes. Raise the temperature to 156 °F (68 °C) for 15 minutes. Raise the temperature to 168 °F (76 °C) and recirculate for 15 minutes.

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

Boil the wort for 75 minutes, adding hops at the times indicated in the recipe. For the hopstand hops, allow the wort to cool to 180 °F (82 °C) before adding the hops. Stir, and let rest for 20 minutes before proceeding.

Chill the wort to 66 °F (19 °C), aerate well if using a liquid strain, then pitch the yeast, and ferment until complete. Rack to secondary and dry hop for three days.

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

WEST COAST IPA

(5 gallons/19 L, extract only)
OG = 1.063 FG = 1.011
IBU = 72 SRM = 6
ABV = 6.9%

INGREDIENTS

9 lbs. (4.1 kg) pale liquid malt extract
15 AAU Warrior® hops (60 min.)
(1 oz./28 g at 15% alpha acids)
9.2 AAU Amarillo® hops (10 min.)
(1 oz./28 g at 9.2% alpha acids)
13 AAU Simcoe® hops (10 min.)
(1 oz./28 g at 13% alpha acids)
1 oz. (28 g) Amarillo® hops (hopstand)
1 oz. (28 g) Simcoe® hops (hopstand)
1 oz. (28 g) Amarillo® hops (dry hop)
1 oz. (28 g) Centennial hops (dry hop)
1 oz. (28 g) Citra® hops (dry hop)
White Labs WLP001 (California Ale),
Wyeast 1056 (American Ale),
or SafAle US-05 yeast
¾ 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 extract and stir thoroughly to dissolve completely. Turn the heat back on and bring to a boil.

Boil the wort for 60 minutes, adding hops at the times indicated in the recipe. For the whirlpool hops, allow the wort to cool to 180 °F (82 °C) before adding the hops. Stir, and let rest for 20 minutes before proceeding.

Chill the wort to 66 °F (19 °C), top off fermenter to 5.25 gallons (20 L) with water, aerate well if using a liquid strain, pitch the yeast, and ferment until complete. Rack to secondary and dry hop for three days.

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

despite the bitterness and alcohol levels. The fermentation profile is also relatively neutral.

If all of this sounds like an American IPA, you're starting to get the picture. Let me point out some of the narrower characteristics of West Coast IPA, however, to illustrate the differences. Basically, West Coast IPAs are on the upper end of the range of alcohol and bitterness, and at the lower end of the range for final gravity and color. They generally avoid crystal malts and emphasize more modern (although not necessarily cutting-edge) hops. Classic or modern hop varieties can be used, but dank, weedy, sulfurous (think alliums, like onion, garlic, leek, chive, or shallots) or resiny varieties are quite popular. The common element is that the hops often have an aggressive, some might say abrasive, quality. Dry hopping is pretty much a requirement. The water profile is closer to English IPA than Hazy IPA, in that sulfates are common. The yeast character is usually neutral rather than lightly fruity.

I could go into more depth on the individual characteristics, but that risks describing individual beers. The differences are subtle, and more about ingredient choice and overall balance than anything else. It's a beer style that is meant to be enjoyed fresh as oxidation has nowhere to hide. The late-hop character is critical and can be adapted with newer varieties.

I guess I might mention the perception of bitterness in these beers, as they seem to be lessening in recent years. In the early 2000s, there was a concept that was described as the "lupulin threshold shift," popularized by Vinnie Cilurzo. It basically said that as a drinker was more exposed to bitter beers, their tolerance for bitterness increased, and it then made them desire beers with even greater bitterness. This led to a kind of IBU arms race in West Coast IPAs and other styles where breweries were trying to make beers with even greater bitterness. This thankfully seems to have ended as breweries are currently rediscovering the joys of drinkability.

Today, I think of West Coast IPA as a mainstream craft beer style that is being made in many countries around the world where fresh hops can be found. As a judge, the challenge is to maximize the hoppiness and bitterness of the beer while still retaining the drinkability and enjoyment of full pints. Qualities such as smoothness are desirable and the alcohol level shouldn't come through as strongly — this is a beer where the alcohol should be felt, not tasted.

BREWING INGREDIENTS AND METHODS

Mitch Steele, in his outstanding *IPA* book, talks about a profile for a West Coast IPA. He characterizes it as having a high percentage of pale malts with a low percentage of crystal malts. The water is Burtonized with a sulfate-rich composition, which enhances the bitter, dry-hop profile. The beer is dry hopped and is on the stronger side for IPAs. I agree with all these statements, so let's unpack them.

A high percentage of pale malts is something above 85%, but it can be a mix of almost anything. Neutral 2-row North American brewer's malt or pale malt is an obvious choice, but Pilsner malt, pale ale malt, or even some continental malts can be used. However, the malt flavor shouldn't get too strong and shouldn't have overly bready or toasty flavors. Remember, hops come first in this beer.

While first to call itself a West Coast IPA, Green Flash's darker malty profile was quite different than more modern takes on this style of beer.

Crystal malts are something under 15% of the grist, typically well under that mark and are not too dark (60 °L and less). Personally, I like to use Munich malt as a substitute for a light crystal malt to give more maltiness and less sweetness, but this is a personal choice. I see many brewers using some dextrin-type malts to add a little body, but this could also be accomplished through mash temperature control. A light use of simple fermentable sugar is possible.

American craft beers were traditionally a single-infusion mash, so it makes sense to mash for attenuation and add a little dextrin malt to make sure the body doesn't get too thin. The alcohol level is often around 7%, but the finish is dry so take that into account when calculating the original gravity. You want the final gravity to be on the low side for an IPA to give that dryness, so don't go too big on the starting gravity or you'll quickly be in the double IPA alcohol range.

Hops can be any American or New World variety, so this is a very personal choice for a brewer. Many West Coast brewers seem to like the resiny, dank, piney, weedy, garlicky, and citrusy varieties more than the more modern tropical and fruity varieties often found today in other versions of American IPAs. West Coast IPAs often have multiple hop varieties, although one of my favorites (Alpine Beer Company's Duet) is known for using just two hops, Amarillo® and Simcoe®. When I make American IPAs, I often skip a bittering addition to use a first wort hop addition. But in a West Coast IPA, a traditional 60-minute bittering addition can give it a little extra bite.

Multiple hop additions are common, often with the late-hop additions being quite heavy. Additions in the last 10 minutes are common, and post-boil additions via a whirlpool or hopback are also frequent. Dry hopping is expected to give a big fresh hop aroma. The challenge in all these hop additions is to avoid excessively green or harsh flavors, often called hop burn, and the modern phenomenon of over-attenuation due to enzymes in dry hops, called hop creep. Basically, these become a problem with enormous additions of fresh hops,

especially those of lower-alpha acid concentration for extended times. So, I prefer to use higher-alpha hops in one addition and to limit the contact time to three days or less. These issues are more of a problem in hazy IPAs, but they can show up in American IPAs.

The water profile used in this beer emphasizes sulfates but also has a light touch of chloride. Carbonates are to be avoided since they can give dull, soapy flavors. Depending on where you live, you may have better results building your profile with reverse osmosis water.

Neutral yeast is common in this beer, so the Chico/California ale strain is perfect. I often switch it up and use the Anchor strain, 1272 American Ale II/WLP051 California V, in my American IPAs for its light fruitiness. Either is a solid choice, but the Chico yeast is probably most authentic for this style.

HOMEBREW EXAMPLE

My example is a variation of one of my favorite American IPA recipes, with a reformulation moving it higher in alcohol and bitterness, upping the dry hopping, and using the classic Chico yeast.

I'm using a variety of pale malts as the base for the beer. I often use a mix of Pilsner and 2-row American pale malt as a clean base, and I'm adding a touch of pale ale malt for a slight bready note and Munich for a little extra maltiness without getting sweet. I'm using a step mash for attenuation while still providing some body. If you want to use an infusion mash, shoot for something around 151 °F (66 °C) and add a quarter pound (113 g) of Carapils® malt.

Instead of first wort hopping, I'm using a bittering addition of Warrior®, which is a higher-alpha hop that gives a clean bitterness. Kind of like Magnum hops for Americans. Amarillo® and Simcoe® provide much of the flavor and aroma with late and whirlpool additions. The beer is heavily dry hopped with Citra®, Centennial, and Amarillo®, but keep the contact time to three days or less to avoid picking up too much astringency from the hop matter.

The water is adjusted with calcium sulfate and a little calcium chloride, which is done to sharpen the final flavor profile. The final gravity is similar to my normal IPA but I've increased the starting gravity a little to get a higher alcohol content and I increased the IBUs from my preferred 55 to a more typical 70. I've talked about changes to a standard recipe of mine to show you how you might take one of your IPA recipes and make it more West Coast in nature. Both are still American IPAs, but they hit different parts of the range of the style.

IPAs can be a very personal choice as people have different flavor preferences and bitterness tolerances. But I think all IPA lovers can't get enough of a fresh hop character and that's one thing that a proper West Coast IPA will deliver. As the pendulum swings towards cold IPAs, I wonder if some day we'll be talking about West Coast IPAs in the same nostalgic tone as Ballantine, or if we'll look at West Coast IPA as an important milestone in the evolution of IPA towards some future state. Hmm, bring me another one and let's talk about it … BYO

10 MUST-HAVES FOR PROS AND AMATEURS

Equipment I (a pro and amateur brewer) can't brew without

Story and photos
by Jason Simmons

With close to 20 years of brewing experience, it always amazes other homebrewers when they see my limited homebrewing setup. While working at my day job in a brewery I get to play with all the new toys, pumps, gadgets, and pressurized glycol jacketed fermenters to make a precise, calculated, and repeatable beer. At home, where I continue to brew frequently as a hobby, I like to focus primarily on my knowledge of the brewing process to make a beer with much more basic equipment. I have no exact temperature control, often ferment out of Home Depot buckets on the porch, bottle condition using a bottling bucket and various sugars, and I've also been known to drink from the garden hose (though, I won't brew with water directly from it). With little interest in keeping up with new equipment on the market, I thought, "What are 10 pieces of brewing equipment that I must have when brewing at home as well as at commercial breweries of various sizes?" The more thought went into this exercise, the more I realized it may be eye opening to other homebrewers.

When brewing at home I do not have a lot of room for equipment storage so I like to keep my inventory as small as I can get it. With all of the equipment options on the market why did I choose these particular items? I feel that the brewing items listed in this piece are what helps keep my process and beers consistent as well as make the brew day go much smoother. As I get to see other homebrewers and professional breweries with their equipment setups I often find that they are also using the same, or similar, items. So, here I'll share these 10 items I like to have in every brewing situation.

1 WATER ANALYSIS EQUIPMENT

Water chemistry is truly the final frontier in the brewing process. Many brewers I know take the approach of "if it tastes good then use it" method, while others are very particular with every aspect. When it comes to brewing beer, hard seltzers, or even sodas, there are two main choices of water to use. The first is mineral-free water such as reverse osmosis (RO), or distilled water, in which you have a clean canvas to build your desired water profile. Many homebrewers and professional brewers use mineral-free water as a base due to its reliability, consistency, target accuracy on each batch, and ease of use. If you use RO or distilled water as your water source then you do not need water-testing equipment or a water report as everything starts at zero ppm.

For the rest of us that use our brewing water as is from the house, from a special location, or at a brewery that has no RO options, you will want to know the mineral content to see if it needs to be adjusted. Knowing your water source mineral content is critical to brewing even if you do not plan to adjust your water chemistry. I enjoy sourcing specialty water for some homebrews — which have included using rain, snow, icicles from mountain cliffs, water from the pipe in the mountain for hikers, and pure spring water from an untouched stream a few miles in the forest that needed to be carried out by hand. Sourcing water can be just as fun as the rest of the brewing process, and by knowing what you have you are better suited to brew beers that complement the unaltered water profile.

You can sometimes obtain a yearly or quarterly water report from your local municipality, however, I will say from experience that the water mineral content changes daily; and depending on the weather it might be drastic. The most respected company that offers water analysis tailored to brewing needs is Ward Laboratories. Ward Laboratories is highly recommended by everyone that talks about getting water analysis, mainly due to their accuracy and reputation for excellence. Of course if the water profile changes each time you brew, sending water off to a lab for every batch gets pricey, not to mention you need to wait for the results.

Recently I have been diving deep into water chemistry and I have found that the Exact IDIP Bluetooth water tester is exactly what I needed to run tests on everything that isn't dry. This piece of equipment runs about $400 and requires downloading their app on a smartphone for the device to send the results of your test. You purchase the one-time test algorithm for each test, sync the IDIP device to your phone, use 4 mL of water and the appropriate test strip to get your results in less than 30 seconds per test. For just under $3 a round I test for pH, alkalinity, calcium, sulfate, chloride, and total hardness, and

then the app calculates the magnesium, sodium, and residual alkalinity. I like to run this test on every single batch so that I know how I would like to adjust my water chemistry or even choose a style that is better suited to the water source.

2 CALIBRATED BUCKETS & LIDS/BUCKET FERMENTERS

In every brewery I have worked has been a collection of calibrated 5- and 6-gallon (19- and 23-L) buckets that usually consist of a combination of homebrew buckets and empty PBW buckets. In the brewery, we use these for everything — fermenter CO_2 blow-off buckets, weighing and milling grain, cleaning small parts, sanitation/caustic/other chemical soaking buckets, hose and pump sanitation siphon loop rig, and endless other uses. It's also nice to have a homebrew bucket at the brewery for an occasional side project to make a unique keg of your favorite altered flagship. You never know when you will need a homebrew bucket at the brewery.

I find the same to be true when homebrewing, which is why I own my own stack of calibrated buckets used for similar tasks. Once they are no longer fit for brewing purposes they get moved over to the farm-side of the yard for animal feed, water, and gardening purposes. You can never have enough buckets!

3 CALIBRATED MASON JARS

Calibrated Mason jars are just like buckets (but much smaller), meaning that you want to have a few around. These are great for collecting and storing yeast, measuring volumes of liquids, taking water samples, brew day samples for tests, and storing dry powders like gypsum, calcium chloride, or Irish moss when bags rip. They can also be used as a small mixing container for kettle finings or extracts and can easily be cleaned or sanitized if needed. I always keep plenty of Mason jars on hand at the brewery, and even more at home. I even keep a clean Mason jar in the trunk of my car for when I am in a situation where I want to collect a water sample to test.

4 SCALES

I enjoy understanding each of my ingredients and the process of recipe formulation to create the perfect beverage. However, this is only useful if the recipe is strictly followed. Having accurate ingredient weights helps ensure that all of your calculated targets are achieved or are within respectable ranges. I like to have a scale that can read at least 10 pounds (4.5 kg) and also offers options for kilogram, ounces, and grams. Scales like these are usually my first choice to use because they read in the ranges that I normally work. Common weights for this type of scale would include: A 5-gallon (19-L) batch worth of base malt, specialty malts, hops (pounds, ounces, or grams), sugar, honey, other adjuncts, and various cleaning chemicals such as PBW.

Most homebrewers and breweries have a moderate scale of this size and it gets chosen 90% of the time over the other scale options available. The catch is that often these scales do not read in decimals in grams suited for precise smaller weights. For cases where I need smaller measurements with a +/- 0.1 g variable I have a small handheld scale. This scale is perfect for weighing powders like kettle finings, yeast nutrients, citric acid for sodas and hard seltzers, sodium benzoate for sodas, and priming sugar for exact carbonation targets for bottle or keg conditioning. Having these two scales will help ensure that the weights are exactly as intended

so that you hit your targets and help prevent you from using excessive ingredients or chemicals. This will save you inventory and money no matter what size batches you brew.

5 GRADUATED CYLINDER

Just like with scales, I find calibrated graduated cylinders of multiple sizes to be extremely useful at home and at the brewery. To accomplish my various brewing tasks I have three plastic graduated cylinders that are commonly used. The first is 250 mL and is used for taking hydrometer readings, measuring larger quantity chemicals, or calibrating volumes for tests. The second is a smaller 50-mL cylinder with every 5 mL marked out. This is the one that sees the most usage. With this calibrated container I can properly measure things like sanitizer, Fermcap S, Clarity Ferm, flavor extracts, or liquid hop extracts. The third container is a 10-mL vial that is rarely used, but useful when needed (another option may be a syringe of this size). When you are fine-tuning recipe formulation and your adjustments are in mL, having something to measure these micro volumes is very useful. For instance, when making beverages with flavorings like soda, hard seltzers, or flavored beer we like to do trials with 4-oz. samples and 0.5 mL changes to narrow in our spectrum of desired flavor.

Enzymes and lactic acid are other liquids that require small dosing rates. For instance, I have used SE-Bamyl GL Liquid Saccharification Enzyme to brew a brut IPA that has a dosing rate of 0.36 mL per pound of grain. So 10 lbs. (4.5 kg) of malt would require 3.6 mL, which can be rounded up to 4 mL of enzymes. Having a smaller calibrated container will help you hit your targets and save on waste from overuse.

6 DIGITAL THERMOMETER

I get that floating thermometers are cheap and do the job, but the ease and instant readings of a digital thermometer or thermal gun is well worth the little extra money. I have many things to do during a brew day and waiting around to figure out a mash or knockout temperature is not on the list of things I want to do. I want to get an accurate reading, make a decision, then move on. For this, digital thermometers are the way to go.

7 REFRACTOMETER

I didn't think that the refractometer would make it on my list, but the more I thought about my brew days I realized that I rely on this tool fairly often. A refractometer is a device that reads sugar content in a liquid sample that is usually expressed in °Brix, while others offer specific gravity, or both. I use this device to help guide my lauters and make sure I am on target with my lautering operations. When making sodas I like to back up my specific gravity readings with a Brix refractometer reading to double check numbers. Another great use of the refractometer is to measure the sugar content in fruit. Once you know how much sugar is in the volume or weight of your fruit you can then calculate the fruit's alcohol contribution. I have done brew days without using a refractometer and it did not feel right because I like knowing where I am in the process at particular times. I personally have two different inexpensive handheld refractometers for homebrewing, and several more expensive handheld refractometers at the brewery of various styles, and as long as they are calibrated they should all read accurately. Over time, and with heavy use, the cheaper refractometers might need to be replaced. There are more precise digital refractometers on the market if this item is next on your upgrade wish list.

8 pH METER

A pH meter is a must-have for all serious brewers. I must admit that it took me longer than it should have to get into taking pH readings, but now that I do,

every sample gets tested. I thought that my beers were respectably good until I dove into water chemistry and realized how unbalanced they actually were. Controlling mash pH is vital to making a well-rounded and balanced beer. Homebrewers often use pH strips because they are cheap, however they are not precise. When I need to know a pH of a sample, I am looking for a quick, accurate number. Just like the thermometer, the extra money for digital equipment is well worth it.

9 CAPPER, EXTRA BOTTLES, AND CROWN CAPS

Most breweries package a large portion of their production in kegs and many homebrewers choose to go the kegging route as well due to the ease in cleaning and sanitizing, transfers, carbonation, dispensing, and time saved. While I love the ease and convenience of using a kegerator, it does not as easily allow me the option to bring my homemade creations with me when visiting friends and family. I usually give half of each batch away to friends so that I can brew another batch without the concerns of over consumption just to brew another batch again. For this reason, even after all the years of homebrewing and professional brewing, I still hand bottle every homebrew batch using a bottling bucket and bottle conditioning methods.

I found it interesting over the years that every brewery I have worked at has had a hand capper, spare crowns, and bottles available for small projects. Even with a fully operating bottling line or canning line that we could use, for a small 5- or 10-gallon (19- or 38-L) experimental batch. Sometimes it's easier just to bring out a couple cases of bottles, a bottling bucket or a Blichmann BeerGun®, and a capper. These pieces of equipment are a must for all of my homebrewing and professional brewing inventory. They are great to have on hand when you need them, even if you do keg the majority of your beer.

10 TEMPERATURE GUIDANCE AND/OR CONTROL

Breweries are fairly exacting when it comes to fermentation temperature control to create precise, repeatable products. Homebrewing equipment has come a long way in recent years and now there are many options for homebrewers to choose from for their fermentation control needs. There are products like conical jacketed stainless steel fermenters of every size, digital temperature controllers that hook up to your refrigerator or deep freezer, small glycol units, and a variety of fermentation chambers. These types of temperature control all work well and are nice if you have the extra money and space, though I consider them a luxury.

At the brewery we use fermentation temperature control, however, when I am homebrewing I have always used temperature guidance. Temperature guidance means to use nature, ambient in-house/garage temperatures, or other basic means to guide my fermentation temperature. I ferment my homebrew batches in fermentation buckets and plan my brew days during the right time of year and adjust for style. Brewing a lager in July proves to be mighty difficult without temperature control, so waiting until colder fall and winter temperatures to do outside lagering is what I do. Instead, when I'm brewing in July I pick yeast strains that perform at higher temperatures such as Belgian, hefeweizen, or kveik strains. Even if you pick a lager yeast and fer-

ment it in your living room at ambient temperatures, you can help guide the temperature to not be excessive, and cold crash the fermenter using a basic method of your choice.

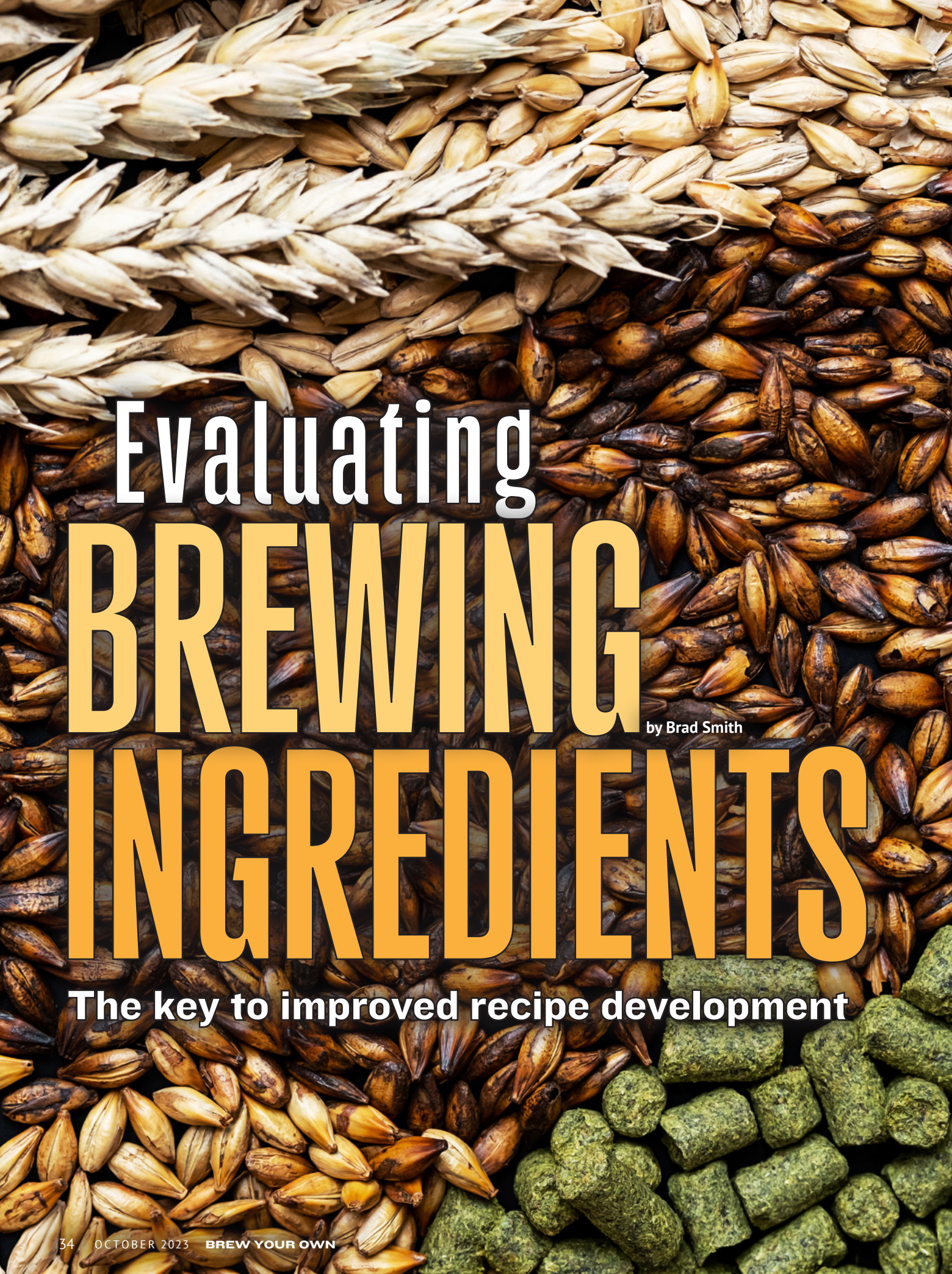
Picking beer styles that ferment in the range of your current environment is not necessary but very helpful. When not using nature to guide your temperature you can do a few clever things to adjust your temperature. In the past I have used a big bin to place my bucket fermenter in as an ice bath or to increase temperature as a hot bath. This surprisingly works well and you can even add cold/warm towels to help maintain the temperature. Even at a commercial brewery I've worked at I have experienced temperatures too cold in our fermentation room that we needed to add space heaters to keep the ambient temperature to at least 65 °F (18 °C) so that the wort would ferment at the ideal temperature. I have done this countless times when brewing in the winter at home and at work when I need a quick fix to increase the fermenter temperature.

It was more work than it was worth, but to drop the temperature I once dug a hole in my yard that was deep enough to place my bucket fermenter in along with some ice for a 4-day cold crash with gelatin. It was a hassle, but it worked as planned. A homebrewing friend of mine even has a small natural cave on his property that he ferments, ages, and stores his homebrews in.

Whether you have the best advanced temperature control fermenter on the market, use ambient living room temperature, use a bin, or have a hole dug in the yard, use what you have around to help guide your temperature control. Over the years I have become more relaxed with precise fermentation temperature control and try to keep my fermentation temperatures within a respectable range.

A SPECIAL SHOUT OUT FOR OFFICE SUPPLIES

There are some items that we take for granted and I feel that a special shout out to the office supplies is in order before closing out this article. These items are often overlooked until you run out and need to get more to have a smoother brew or work day. I am sure that we all have bookshelves full of notebooks, stacks of printing paper, printer ink, staplers, binders, clear paper sleeves, pens, markers, highlighters, assorted batteries, calculators, and other office supplies that help document our brewing experience. In a commercial brewery, full batch documentation is required by law, and is a great habit to continue when homebrewing. Detailed documentation is a great resource to have to review your process and allow you to make better quality beer, or to save money on your upcoming batches. Without these supplies our daily tasks would be much more difficult. BYO



Evaluating BREWING INGREDIENTS

by Brad Smith

The key to improved recipe development

Photo courtesy of Shutterstock.com

Homebrewing has become a very technical pursuit. From humble beginnings of boiling extract on stovetops, the last 30 years have brought ever more science and sophisticated equipment into the homebrewing process. A recent podcast guest of mine commented that many homebrewers are far more sophisticated in their equipment and processes than the average professional craft brewer. It's commonplace these days to speak with homebrewers who carefully craft water profiles, mash schedules, and even mash pH adjustments in search of the perfect beer.

Unfortunately, sometimes the artistic side of brewing can be lost in our relentless pursuit of technical excellence. Beer brewing is not merely an exercise in tracking numbers. It is a profoundly creative pursuit as well. It is the intersection between art and science that makes a great beer, and not just chemistry and hitting all of your numbers.

Central to the artistic side is the understanding and careful blending of flavor and aroma. For even beer brewed using sound techniques can taste bad, and I've sampled many examples of outstanding beers brewed in far from ideal conditions. I'd argue there is a more recent trend entering both the craft beer and homebrewing markets that focuses on flavor and not just science.

PANCAKES AND BEER

I was making breakfast one morning with a box of Bisquick™ at my side. Bisquick™ is a simple boxed pancake mix composed mostly of flour with a bit of rising agent in it. However, on the side of the box of Bisquick™ is a series of recipes for other things you can make from the mix. Recipes included biscuits, shortcake, pancakes, dumplings, and waffles. A quick search online turns up more recipes for things like cakes, pies, cheese balls, pot pies, stuffed mushrooms, and many other foods that use Bisquick™ as the primary ingredient.

Browsing the recipes on the side of the box, I noticed that they all share some combination of common ingredients like milk, butter, eggs, oil, sugar, and vanilla, but these ingredients are arranged in slightly different ways to create the wide variety of Bisquick™-based foods. All these foods are based on subtle combinations of the same basic ingredients.

The other thing that I found interesting is that as adults we all have knowledge of the various ingredients. Each of you know what butter, sugar, milk, vanilla, eggs, flour, and oil taste like because you've been tasting them since you were big enough to stick your finger in the butter or bowl of sugar and put it into your mouth. You literally have a lifetime of knowledge on each of the ingredients used to make biscuits, pancakes, shortcake, or any number of other foods.

Beyond that you also know what combinations of ingredients taste like whether it be butter and sugar mixed to create cookie dough or flour and oil used to make bread. This knowledge has been developed over a lifetime of tasting, cooking, and enjoying foods made from a handful of staple baking ingredients.

But what of beer? Do you really understand the difference in flavor between a brown malt and a crystal 60 malt? How is the flavor and aroma of Citra® different than Mosaic®? What happens to the beer flavor if you use an English ale yeast instead of a California ale yeast? These are questions that are important to be able to answer if you want to build the best recipes as flavor and aroma are at the very core of brewing – even more so than mash chemistry or yeast pitch rates.

EXPANDING YOUR FLAVOR KNOWLEDGE

There are several ways to develop a larger base of expert knowledge on ingredient flavor and aroma and how those flavors manifest themselves in a finished beer. The first of these is to gain expertise in judging beers.

Becoming a formal or informal beer judge will expose you to the major styles, flavors, and off-flavors in beer as well as the terminology used

to describe beer flavors. Understanding that "diacetyl" refers to a buttery popcorn-like finish in the beer, for example, gives you a common reference point and term you can use that fellow brewers understand. You also will gain knowledge of common imbalances in beer and how they affect flavor.

Formal beer judging can also be a great experience as you'll understand a wider variety of beer styles, often have access to the underlying recipe used in homebrew competitions, and have a chance to compare your opinion on beer with other judges who may be more experienced.

As you gain experience judging you can expand to evaluating commercial beers, even though you may not know the exact recipe used. I try to take a few minutes with any new beer I taste to evaluate it as impartially as possible to see if I can pick up imbalances, off-flavors, distinct ingredients used, as well as formulate an overall impression in my mind. With time it is not hard to pick out a specific hop or malt used.

Another great method for expanding your flavor expertise is Single Malt and Single Hop (SMaSH) brewing. This involves brewing small batches of beer with only one malt and one hop so you can see precisely what the flavor from those ingredients is. You can expand this to brewing batches varying only the water or yeast, or adding a second hop or malt to see how it impacts flavor as well. Learn more about SMaSH brewing in the article beginning on page 40.

INGREDIENT SENSORY EVALUATION

Beyond beer judging and SMaSH brewing, another method to develop ingredient knowledge is through sensory evaluation. This involves methods to individually taste or smell ingredients to simulate what they might smell or taste like in a finished beer without having to brew the beer. These methods will be the focus of the remainder of this article.

HOP SENSORY EVALUATION

Hops add well over 500 flavor and aroma compounds to beer. As a result of the craft brewing revolution and dominant position of IPAs in the craft beer market, we know more about hop bitterness, flavor, and aroma than ever before. There has also been a revolution in how we use hops. While at one time hops were mainly valued for their preservative and bittering properties, the most prized hops are now selected for their aromatic properties.

Fortunately, sensory analysis of hops is simple to do and provides an excellent indication of hop aroma, freshness, and flavor. I personally prefer to evaluate several varieties of hops at a time as I find that this gives a baseline for evaluation and helps to highlight hops that are truly fresh as

Whether a formal judge or not, critically tasting beer is a helpful tool in understanding beer styles and the ingredients that go into them.

well as those that are of poor quality. The best way to perform sensory analysis of hops is to have at least three varieties available, though certainly more can be used. Most professionals use a small panel of people, which lets each person evaluate and discuss their own perceptions. Having a hop sensory panel is a great activity for a brew club or small group of brewers.

When evaluating hop pellets, begin with a few pellets and crush them up with the back of a spoon until you get a fine powder. Put a pinch of the powder into your hand and rub both hands together until the hops begin to warm slightly and then open your hands and insert your nose down into the hops. This is called a "dry rub" and it should give you a burst of aroma highlighting the hop variety used. You can also do hop rubs with fresh hop cones (which can give you a sense of when to harvest if you grow your own hops) or dried whole-leaf hops. In this case, place one or two hop cones between your hands and do the rub. As you perform your sensory analysis it is helpful to take notes on the aromas and flavors you pick up from each variety.

Hop rubs are a great way to get a good feel for the aroma of a variety. Doing these in small groups is a fun and educational opportunity as each person can discuss their perceptions.

By using several varieties, you can also get a strong indication of the freshness of each. Likely one or more varieties will really be fresh and popping with myriad aromas. It is also likely you may run into a few stinkers with a muted, stale, or otherwise unpleasant aroma. Often these poor-quality hops were not harvested, processed, packaged, or stored right, and may not necessarily reflect the underlying flavor of the variety itself, so before writing off a variety try evaluating them from a few different crops/vintages/suppliers.

I do urge all brewers to perform a basic dry rub on their hops before you begin to brew. In my experience as many as 1 in 10 homebrew-sized packages of hops I've sampled can be of poor quality. The last thing you want to do is brew a great beer and drop sub-par hops into it.

Hop suppliers have been performing aroma sensory evaluation for many years, and many suppliers publish this information online. Most hop suppliers and merchants express data using spider charts on their website showing panel aroma evaluations for all their varieties. For instance, Hopsteiner hops are evaluated by a panel of judges for aroma on a scale of zero to five in the following characteristics: Citrus, Fruity, Floral, Herbal, Spicy, Resinous, Sugar-like, and Other. They also publish an aroma specification for each hop and in many cases suitable substitute hops to use. This type of information is useful to help you narrow your hop search and provides a guide when performing sensory analysis to see which aromas you can pick up yourself. Other suppliers provide similar flavor profiles and aroma intensity information on their websites as well.

With the wealth of information from hop suppliers, it makes sense to use it to your advantage as you begin your ingredient evaluation, but always evaluate hops yourself in a sensory panel.

GRAIN SENSORY ANALYSIS

Evaluating the flavor of malts has traditionally been a bit tricky short of brewing with them. Many of us have tried chewing raw malt, which does give some sense of the flavor of the malt, however I find it unsatisfying and hard on your teeth. Fortunately, several years back the American Society of Brewing Chemists (ASBC) published a "hot steep" method for malt sensory analysis that is easy to perform at home but still gives you a good representation of the flavor profile of the malt.

This method involves making "hot tea" using finely crushed malt, hot water, and a coffee filter. The process is best done with several malts at a time so you can do a comparative analysis. Like hop sensory analysis, this is a great project for a homebrew club or panel of brewers working together and sharing impressions.

The precise method to use is summarized here. Note that different quantities are used depending on

the malt type (base malts, specialty malts, or roasted malts):

1. Weigh a sample of 50 grams (1.75 oz.) of base malt. If evaluating specialty malts, instead use 25 g (0.88 oz.) of specialty malt blended with another 25 g (0.88 oz.) of pale base malt. For dark roasted malts, use 7.5 g (0.25 oz.) of roast malt with 42.5 g (1.5 oz.) of pale base malt. Obviously, you can double or triple the amount of malt and water if you need a larger sample for a group to evaluate.
2. Mill the grains in a clean electric grinder for about 10 seconds. A coffee grinder works well for this as you want a coarse flour consistency — finer than what you would typically use for brewing.
3. Heat 450 mL (15 fl oz.) of water to 149 °F (65 °C) and combine it with the crushed grain sample in an insulated Thermos or growler and shake it for 20 seconds to mix the grain and water. Let the mixture stand for 15 minutes.
4. While the mixture is steeping, place some filter paper (Alstrom 515) at the top of a clean beaker or glass. A coffee filter is a suitable substitute if you don't have access to lab paper filters. Wet the paper with some deionized water.
5. Swirl the Thermos/growler to bring the particles back into solution and pour the mixture into the filter. Draw the first 100 mL (just under ½ cup) off the collected wort and pour it back into the thermos to collect any remaining grains then pour that also into the filter. Allow the filter to drain completely leaving your liquid sample.
6. Let the sample cool and do your sensory evaluation when it has reached room temperature, within four hours of filtering.

The final sensory analysis is done by tasting the cooled samples. While more time-consuming than chewing raw malt, this method provides a good approximation of the finished malt flavor and provides a great baseline for comparing the flavor and aroma of two similar malts. It is basically the gold standard for malt sensory analysis short of brewing a beer with it.

As with hops, some of the larger malt providers publish sensory analysis along with their malt data on their websites. Many maltsters provide spider charts or flavor wheels on their websites for all their malts with the sensory profile done by a panel using the ASBC hot steep method. These generally offer panel evaluation of the following flavors: Sweet, Malty, Bready, Graham Cracker, Honey, Biscuit, Nutty, Toast, and Grainy. Along with this they provide general descriptions and recommended applications for each malt. These data sheets and analysis can be used to aid in searching for grains as well as guides when doing your own sensory evaluation of the malts.

YEAST ANALYSIS

Unfortunately, there is no known method to do yeast sensory analysis short of brewing beer. If you are fortunate enough to be near the White Labs breweries in Asheville, North Carolina, or San Diego, California, they do offer a variety of beers made with the same wort but different yeasts. Here you can sample, side-by-side, identical beers made with different yeasts to see what the differences are in the finished beers. Obviously, you can do the same at home by splitting a batch of beer before fermentation and using two different yeasts to compare strain traits. Be sure to record the results!

All major yeast labs provide fermentation data that can help you compare yeast strains on paper and determine what flavors to expect in a finished beer. The basic data you will find from most yeast provider data sheets includes:

- **Type** – The type of yeast – typically Ale, Lager, Wheat, Hybrid, Wine, or Champagne.
- **Attenuation** – The percent of the sugars (gravity points) you can expect to ferment into alcohol — usually quoted as "apparent attenuation."
- **Temperature** – The recommended fermentation range for the yeast.
- **Flocculation** – An indication of how quickly the yeast "falls out" of beer after fermentation.
- **Alcohol Tolerance** – Highest alcohol percentage the yeast can tolerate before it goes dormant.
- **Other Variables** – These days you will often find if a yeast strain is POF+ (positive for phenolic off-flavor), STA-1+ (positive of the STA-1 gene that indicates *diastaticus*), as well as whether a strain will ferment maltotriose.

Out of the above, the genetics of the yeast strain found in Other Variables is probably the most impactful and helps dictate attenuation. A high attenuation yeast will give you more alcohol but fewer sugars, resulting in a cleaner but lower bodied beer. A low attenuation yeast will leave more unfermented sugars for a maltier finish with more body and malty flavor in the beer.

Also of interest is the fermentation data, which is collected by analyzing beer made with a given strain. Unfortunately, this data can be hard to find and depends on multiple factors related to wort and fermentation process, but some yeast providers have started publishing it. These may include:

- **Isoamyl Alcohol/Acetate:** The primary ester in beer and a measure of ester production for yeast. Banana or pear blossom flavor in small quantities.
- **Acetaldehyde:** Intermediate compound produced during fermentation (green apple flavor).
- **Ethyl Acetate:** (Ester) Strongest of the common esters (fruits, pears, solvents if too much).
- **2,3 Pentainedione:** Vicinal Diketone (VDK like diacetyl) gives a honey flavor, but has 10x lower flavor threshold.
- **Diacetyl:** (VDK) Buttery popcorn-like flavor.
- **1-Propanol:** Fusel alcohol can give off alcoholic odor to a strong solvent-like or moonshine flavor at higher concentrations.
- **Ethanol:** Simply the alcohol percentage of the test batch
- **Hours to 50%:** Time it takes to reach 50% fermented — indication of how quickly the yeast ferments out.

You may notice that many of the

flavors listed are considered "off-flavors" above certain thresholds in certain beers. For example, excessive esters or diacetyl would not be desirable at all in a European lager but might be perfectly at home in an English pale ale. While these compounds are natural byproducts of fermentation in both cases, a European lager yeast would produce much lower levels of both. So, if you have access to this data for your yeast strains you can use that data to help make flavor comparisons.

WATER ANALYSIS

Sensory analysis can also be performed on water. John Palmer has been running sessions for several years now where participants sample various water profiles, often built up from distilled water and salt additions to create specific profiles used in brewing. You can purchase distilled water from your local grocery store and calculate the adjustment salts to add using your favorite brewing software or online water calculator. Most people can taste the difference between different water profiles using this method, and it can be a useful introduction to the varied world of brewing water.

The challenge, of course, is that the water chemistry does react with other ingredients during the brewing and fermentation processes so tasting water alone does not really give you a completely accurate picture of how the water might manifest itself in a finished beer. For example, waters with different sulfate-to-chloride ratios may taste slightly different in their plain form, but they won't reflect the malt/hop balance you will get in a finished beer without the actual malt and hops.

Not surprisingly, changing your water profile does have a profound impact on the finished beer and in blind taste tests water is one of the simpler changes to detect. This is probably because it makes up over 90% of the base in most beers and also that many of the major water ions do interact during the mash or fermentation to produce slightly different flavors in the finished beer.

Steeped grain using the ASBC hot steep method is a good way to evaluate malt flavors.

While there is no "water supplier" guide you can use to help you select the perfect water profile, there are many available water profiles that you can easily match using brewing or water software. These generally have two forms — either "match a city" or "match a style." Most brewers have moved away from matching particular brewing cities, in part because the breweries in these cities often make small changes to their water. Also, as our knowledge of water has improved, we're now able to make more precise adjustments to achieve a given goal.

While mash pH and sulfate/chloride water adjustments are a topic that could easily fill several more articles, a good place to start is to find a water profile that is suitable for the style of beer you are brewing and then adjust your local water as needed to match that profile.

SUMMARY

The recent focus on flavor in both craft beer and homebrewing has pushed more brewers beyond "technical" brewing to understand the artistic side of brewing. Fundamental to this approach is understanding the flavors and aromas of beer ingredients and how those flavors manifest themselves in beer.

I encourage you to carefully evaluate new beers from a flavor and aroma perspective, and to use sensory analysis where possible on individual ingredients to understand their contribution. Over time you can gain expert knowledge of ingredient flavors and aromas like the expert knowledge you have for common baking ingredients and foods. Only by understanding ingredient flavor and aroma can you make the shift from brewing by the numbers to brewing to create specific flavors and aroma in your beer.

Keep it Simple –

Photo by Charles A. Parker/Images Plus

it's a SMaSH!

Single Malt and Single Hop brewing

by Ryan Hansen

The availability of amazing brewing ingredients gives us brewers the chance to brew any beer style we can think of. While our access to great resources is a fantastic thing, today I want to take a step back from traditional recipes and look at SMaSH brewing and give you the top three reasons I think it should be incorporated into your regular brewing schedule. Let's get right to it!

SMaSH stands for "single malt and single hop." This could be a combination of any single base malt and any single hop variety used for the whole brewing session. The primary benefits I believe SMaSH brewing provides are:

1. The ability to learn the taste of specific ingredients.
2. It allows for simple brew days.
3. It helps clear out ingredients that may be languishing in the back of your brewery storage shelves.

I will discuss how SMaSH brewing provides these benefits throughout this story, along with providing some recipe ideas, but let's start from the beginning with a discussion on ingredient selection.

LEARN YOUR INGREDIENTS

Every good chef knows each ingredient in a recipe as an ingredient first, and how that ingredient will behave when introduced to different cooking techniques and how it will interact with the other ingredients in the dish. This is the same idea in brewing: If I know what a specific malt or hop is like in a simple brew, I will be better prepared to predict how it will perform in other recipes. An example would be that I can look at a recipe and "brain taste" the difference between a recipe with a base malt of pale 2-row vs. a recipe relying heavily on Vienna malt. The only way to be able to do that is to taste beers with these ingredients repeatedly — SMaSH brews allow us to do exactly this without any confusion that can be caused by multiple grains in a recipe where you may not be sure which is responsible for a particular characteristic. In the specific example of pale 2-row vs. Vienna malt we'd make two brews using the same hop variety, hop schedule, and fermentation parameters, substituting only the malt. Once they're fermented and carbonated we get to taste how different they are and note the individual flavors the two malts bring to the brew.

Before we dive into some things that may apply more for all-grain brewers, it needs to be stressed that SMaSH brewing is a technique that can be used by extract brewers as well.

It's just as easy (in fact, much easier) to brew a SMaSH extract batch as all-grain. Note that some malt extracts are a combination of multiple base grains, however, you can also find examples that are only one. (And even if you use an extract that is a combination, we're not going to fault you as the same benefits you get from SMaSH brewing will apply as it is still a single ingredient.) The idea of SMaSH isn't beholden to the strict rules of a single malt or hop, but the idea behind simplicity. With a simple online calculator you can convert all-grain recipes to find out how much dried or liquid malt extract you'd need for the same recipe. The upside is that you only have to convert a single malt when talking about SMaSH recipes! Easy peasy.

SINGLE MALT

When I'm creating my own SMaSH recipe, the place I start is selecting my malt. For newer brewers looking for much more detail on what base malts are I'd recommend reading the *BYO* article "Understanding Base Malt" online at https://byo.com/article/understanding-base-malt/. In short, the base malt will be pale malt, pale ale malt, Pilsner, Vienna, or Munich malt. Keep in mind that malt with the same name from one maltster may not be the same as from another, so taking note of the specific brand and even lot is important to track. The beer style you're targeting will help pick which malt is the best for you, but don't feel constrained by style guides when it comes to SMaSH recipes! Just because it's not a specific style does not mean you can't brew it. In fact, I've had some really good beers that were random combinations of things that don't fit a specific style. Go crazy with it and you may discover something new that you really love. Got a bunch of Vienna malt left over that needs to be used soon? Make a recipe with it and some classic West Coast IPA hops and see what happens!

SINGLE HOP

Next we move to the hop selection. The style of beer you're going for will likely dictate what hop you select, but again, use whatever you want and experiment with it. Generally, the same hops you find yourself reaching for in combination for a style are the same ones you can use individually in SMaSH beers. Checking the Beer Judge Certification Program (BJCP) guidelines for different styles will help guide you on hop selection, but it's also perfectly fine (and encouraged!) to try new hops you're not familiar with so that you can get to know how they are in finished beer. In fact, I think SMaSH beers are the best platform for testing out new hop releases and varieties you haven't brewed with before.

The second decision to make when it comes to hops is the amount to use and when to add them during the brew day or fermentation. The options here range from mash hops, first wort, throughout the boil, hopstands/whirlpool additions, and at varying times during the fermentation and beyond, so you get to play with balancing bitterness with aroma by choosing your addition schedule. I highly recommend using software like BrewFather or BeerSmith to tweak the recipe's hop schedule because you'll see real time updates on estimated IBUs as you put in your numbers. We will look at some example recipes later that will be good starting points for your SMaSH adventures — adjusting from the baseline recipes is another good way to start as long as you're taking notes on what you're doing.

Photo courtesy of Shutterstock.com

YEAST & WATER

Yeast selection may be dependent on the style you're aiming for as well as your goals. Yeast has a huge influence on the outcome of beer and is sometimes overlooked with SMaSH beers. When I was first starting brewing I wanted to soak in as much information about each ingredient as I could. SMaSH beers provided a perfect opportunity to split batches and test two different kinds of yeast, say SafLager W-34/70 German Lager yeast vs. SafLager S-189 Lager yeast. Split fermentations will result in two different beers and you can pick which version you like more, or just note their differences. If you're trying to learn about the malts or hops in a particular recipe, then keep the yeast selection the same batch-over-batch so you're not changing more than one variable at a time. In this case, a more neutral yeast is a good option.

I don't think anything out of the ordinary is required for SMaSH beers when it comes to water. Treat your water the same way you would when brewing the style you've selected for your SMaSH beer.

RECIPE FORMULATION

So, you've picked your three primary ingredients, now what? As you prepare for brew day, you'll need to decide the target original gravity, IBUs, and

timing of aroma additions. My go-to method for deciding how much malt to use is to simply target the ABV for the style I'm making and then use brewing software to back into how much grain to use. For example, if I'm making a pale ale and targeting about 5% ABV using Simpson's Pale Ale Golden Promise malt I'll add that as the fermentable into the software starting with 10 lbs. (0.45 kg) for a 5-gallon (19 L) batch and see what that tells me the expected ABV will be, and then adjust the quantity until I hit my target. This will vary from one brewing system to another, so make sure your equipment profile is accurate when doing this. Each base malt, and each brand of malt, will have different diastatic powers, which is its capacity to convert starches into fermentable sugars during the mash, so don't assume each batch will require the same amount of malt when changing the grist.

Nerdy note: The diastatic power of malts is recorded using the Lintner scale, using the symbol °L. Pay attention when looking at that because the same symbol is used for the Lovibond scale, which indicates the color of the malt.

Your brewing software likely has the information for the common brands and malts, so you usually don't really need to know the diastatic power if relying on brewing software.

The second reason I stated in the beginning for embracing SMaSH brewing is that it offers super simple brew days. Having helped a number of new homebrewers getting into the hobby, I always cringe a little when I hear first-time brewers explain their plans for their first brew day, which is often something intensely complicated and challenging. It's always something like an English smoked Porter with six malts, four hops, mash steps, and a marshmallow dry hop. Look, I get it! I was excited my first brew too, going with a Pliny the Elder clone with multiple grains and a combination of whole cone hops, pellet hops, a hop shot, and dry hopping. It did not turn out well. Fortunately, I stuck with the hobby and learned over time that focusing on the fundamentals is far more important than fitting more things into a recipe.

SMaSH brewing allows for very simple brew day prep because you're only weighing out one kind of grain and accounting for a single hop to work with. Of course, just because you're doing a SMaSH brew day doesn't mean that you can skip the basic steps for sanitizing, using good water, minding mash temperatures, and monitoring your fermentations. For consistency over time, you'll want to keep good notes and attempt to duplicate the brew days as closely as possible so you can keep the tasting baseline equal, allowing you to evaluate the new ingredient you're testing.

One final idea for SMaSH brewing is the homebrew club group project approach: By joining forces with other brewers you get to save money by buying ingredients in bulk, but you can test multiple variables and do side-by-side tastings once everyone's beers are ready to serve. The scenario could look like this: Everyone agrees on one factor they'd like to differentiate in their brews, let's say hops for this example. They then agree on a malt to use and pitch in to buy a 55-lb. (25-kg) sack to split between five brewers. Next, everyone chooses a different hop to use: Cascade, Centennial, Citra®, Chinook, and Columbus, for example. The yeast should remain the same for everyone so that this experiment can highlight the hops being used. Once everyone has brewed their batches, fermented, and carbonated all the beers it's time to gather and have a tasting together so you can experience and discuss the different qualities of each hop on the same beers.

Another exercise that can be done with these final beers is to try to do blind tastings where the taster attempts to identify which hop was used in each beer. I've done this along with a group of homebrewers with the different hops in front of the taster so each person could smell each of the pellet hop varieties in different cups while tasting the beers to see if they could identify which beer used which. This is far more challenging than one may think! This is a learned skill so the more practice and reps you put in, the easier it will come, and more importantly, the more you will benefit in your future recipe formulation. Doing this kind of exercise as a group has always proven beneficial for me and the fellow brewers participating.

SMaSH COMBOS

Choosing ingredients sounds easy as there are so few of them in SMaSH beers, yet with so many ingredients to choose from it can still be daunting for new brewers. If you're new to this, start with the basics:

- Pilsner malt + lager hop + lager yeast
- Pale ale malt + UK hop + UK ale strain
- Munich malt + lager hop + lager yeast
- North American 2-row malt + New World hop + neutral ale strain

Every once in a while I'll do an inventory of the ingredients I have on hand and find that I have leftover hops that are starting to get older, and as long as they've been properly stored in airtight packaging and cold temperatures I'll see if there's a good SMaSH option for them so I can use them and get a refresher on what that particular hop tastes like when it's used all on its own. This helps me clear out aging inventory and gives my palate a refresher course — it's a win-win!

When it all comes down to it, SMaSH brewing is a great technique for testing and learning about grains, hops, and yeast. It allows for simple recipe creation and easy brew days, helps clear out aging ingredients, and can bring a homebrew club together for a group project. SMaSH brewing may have a reputation as a technique for beginners, but it is certainly more powerful than that. Advanced brewers can benefit from SMaSH brewing and as we can see with some of the big commercial brewers (Stone Brewing Co., for example) you can make really great beers by keeping it simple. If you haven't done a SMaSH brew recently, perhaps it's time to give it a go!

Not sure about where to begin with your SMaSH brewing? Find some of my favorite SMaSH recipes I've brewed on pages 44–45 for simple versions of IPA, Kölsch, and pale ale.

Simcoe® SMaSH IPA

(5-gallons/19-L all-grain)
OG = 1.058 FG = 1.012
IBU = 65 SRM = 4 ABV = 6%

INGREDIENTS

12 lbs. (5.4 kg) North American 2-row pale malt
12 AAU Simcoe® hops (60 min.)
(1 oz./28 g at 12% alpha acids)
12 AAU Simcoe® hops (15 min.)
(1 oz./28 g at 12% alpha acids)
1 oz. (28 g) Simcoe® hops (hopstand)
2 oz. (56 g) Simcoe® hops (dry hop)
Imperial Yeast A07 (Flagship), LalBrew BRY-97,
or SafAle US-05 yeast
¾ cup corn sugar (if priming)

STEP BY STEP

With the goal of creating a moderately dextrinous wort, mash in with 3.75 gallons (12.5 L) of 166 °F (74 °C) strike water to achieve a single-infusion rest temperature of 155 °F (68 °C). Hold at this temperature for 45 minutes.

With sparge water at 170 °F (77 °C), collect about 6.5 gallons (24.6 L) of wort. Boil for 60 minutes adding hops at the times indicated. At end of boil, chill wort to 170 °F (77 °C) then add hopstand addition hops. Create a whirlpool then let settle for 15 minutes.

Chill wort to slightly below fermentation temperature, around 66 °F (19 °C), then transfer to fermenter. Pitch yeast and ferment at 68 °F (20 °C). Allow fermentation to finish. Add dry-hop addition after reaching terminal gravity. Wait 3–4 days before packaging.

Transfer beer to keg and force carbonate to 2.5 v/v or add priming sugar and bottle.

Extract-only version: Replace the pale malt with 6.75 lbs. (3.1 kg) extra light dried malt extract. Heat 5 gallons (19 L) water to about 180 °F (82 °C), turn off heat and stir in the extract, making sure it is fully dissolved. Bring to boil and boil for 60 minutes following hopping schedule of the all-grain recipe. After the hopstand is complete, chill wort to 66 °F (19 °C) then transfer to fermenter and top up to 5.25 gallons (20 L) with water. Pitch yeast and ferment at 68 °F (20 °C). Follow the remainder of the instructions in the all-grain recipe.

Tettnang SMaSH Kölsch

(5-gallons/19-L all-grain)
OG = 1.040 FG = 1.008
IBU = 20 SRM = 3 ABV = 4.1%

INGREDIENTS

8 lbs. (3.6 kg) continental Pilsner malt
4 AAU Tettnang hops (60 min.)
(1 oz./28 g at 4% alpha acids)
4 AAU Tettnang hops (10 min.)
(1 oz./28 g at 4% alpha acids)
White Labs WLP029 (Kölsch Ale), Omega Yeast OYL-044
(Kölsch II), or SafAle K-97 yeast
¾ cup corn sugar (if priming)

STEP BY STEP

With the goal of creating a medium- to medium-low-bodied Kölsch, mash in with 3 gallons (11.4 L) of 164 °F (74 °C) strike water to achieve a single-infusion rest temperature of 152 °F (68 °C). Hold at this temperature for 60 minutes.

With sparge water at 170 °F (77 °C), collect about 6.5 gallons (24.6 L) of wort. Boil for 60 minutes adding hops at the times indicated. At end of boil, create a whirlpool then let settle for 10 minutes.

Chill wort to slightly below fermentation temperature, around 64 °F (18 °C) then transfer to fermenter. Pitch yeast and ferment at 66 °F (19 °C). Hold at this temperature until fermentation is complete. Consider a short lagering at slightly above freezing temperature if possible. If not, wait 3–4 days before packaging.

Transfer beer to keg and force carbonate to 2.5 v/v or add priming sugar and bottle.

Extract-only version: Replace the Pilsner malt with 4.7 lbs. (2.1 kg) Pilsen dried malt extract. Heat 5 gallons (19 L) water to about 180 °F (82 °C), turn off heat and stir in the extract, making sure it is fully dissolved. Bring to boil and boil for 60 minutes, following hopping schedule of the all-grain recipe. After the boil is complete, whirlpool for 10 minutes and then chill wort to 64 °F (18 °C). Transfer to fermenter and top up to 5.25 gallons (20 L) with water. Pitch yeast and ferment at 66 °F (19 °C). Follow the remainder of the instructions in the all-grain recipe.

Cascade SMaSH Pale Ale

(5-gallons/19-L all-grain)
OG = 1.048 FG = 1.010
IBU = 42 SRM = 4 ABV = 5%

INGREDIENTS

10 lbs. (4.5 kg) North American 2-row pale malt
6.5 AAU Cascade hops (60 min.)
(1 oz./28 g at 6.5% alpha acids)
6.5 AAU Cascade hops (30 min.)
(1 oz./28 g at 6.5% alpha acids)
1 oz. (28 g) Cascade hops (hopstand)
1 oz. (28 g) Cascade hops (dry hop)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale), or SafAle US-05 yeast

STEP BY STEP

With the goal of creating a moderately dextrinous wort, mash in with 3.75 gallons (12.5 L) of 166 °F (74 °C) strike water to achieve a single-infusion rest temperature of 155 °F (68 °C). Hold at this temperature for 45 minutes.

With sparge water at 170 °F (77 °C), collect about 6.5 gallons (24.6 L) of wort. Boil for 60 minutes adding hops at the times indicated. At end of boil, chill wort down to 170 °F (77 °C) then add hopstand addition hops. Create a whirlpool then let settle for 15 minutes.

Chill wort to slightly below fermentation temperature, around 66 °F (19 °C) then transfer to fermenter. Pitch yeast and ferment at 68 °F (20 °C). Allow fermentation to finish. Add dry-hop addition after reaching terminal gravity. Wait 3–4 days before packaging.

Transfer beer to keg and force carbonate to 2.5 v/v or add priming sugar and bottle.

Extract-only version: Replace the pale malt with 5.7 lbs. (2.6 kg) extra light dried malt extract. Heat 5 gallons (19 L) water to about 180 °F (82 °C), turn off heat and stir in the extract, making sure it is fully dissolved. Bring to boil and boil for 60 minutes following hopping schedule of the all-grain recipe. After the hopstand is complete, chill wort to 66 °F (19 °C) then transfer to fermenter and top up to 5.25 gallons (20 L) with water. Pitch yeast and ferment at 68 °F (20 °C). Follow the remainder of the instructions in the all-grain recipe. BYO

Photo courtesy of Shutterstock.com

BY DREW BEECHUM & DENNY CONN

CONCEPT BEERS

Bringing ideas to fruition

Concept beers are a concept that seems to be conceptualized in different ways. Confused yet? See, that sentence was about as convoluted as what people think concept beers are. For many (most?) homebrewers, concept beers have strange exotic blends of ingredients … a marshmallow raspberry mango imperial mild with lactose and oak, for instance. But we're here to tell you that every beer you brew is (or should be) a concept beer.

Concept beers are most assuredly not just about how unusual you can make the beer. Concept beers are about defining a goal and figuring out how to reach that goal, not an off the wall collection of ingredients that looks like they were chosen blindfolded while walking the grocery aisles. An IPA can be as much of a concept beer as a fruited sour whatchamacallit. We'll return to that in a moment.

One of Denny's most famous concept beers is his Bourbon Vanilla Imperial Porter. The concept was to make a beer that replicated a barrel-aged porter in enough aspects that it was a plausible substitute. He wanted to give it to people for Christmas and the time was short, so he broke down the components of what a beer like that would taste like.

There was no time for barrel aging, but adding some Bourbon could give some of the same flavor. The beer had to be able to withstand the "heat" from additional alcohol, so he needed to make sure it wasn't too bitter or roasty. Those flavors would conflict, so he went with a high final gravity to match the high original gravity. The result was a recipe that's been brewed and enjoyed by thousands of homebrewers.

For a more notoriously out-there example — consider the Clam Chowdah Saison from a few years back. We were in the process of writing our book *Homebrew All Stars*. We had sent out questionnaires to homebrewers about how/why/where they brewed. The respondents were slow getting back to us. Understandable, our schedule wasn't their schedule!

In an attempt to speed up the process, Denny spun a tale that Drew was threatening to make a Manhattan clam chowder saison to unleash on the world if they didn't hurry! Drew immediately responded that he'd never do that. It would be a New England clam chowder saison, as his heritage dictated! Ten minutes later he sent Denny a recipe. Here's his thought process on the design …

Drew: I wanted to make a beer that had the initial squick factor — firing the part of your brain that seeks to continue procreation by discouraging dumb behaviors — but rewarded you with a rich and shockingly "normal" beer drinking experience.

To that end, what I really made was an herbal-laden saison with two adjuncts — potato flakes and a bottle of clam juice. Having played with potato in a beer before, I knew that they'd provide a level of creaminess and body that would provide a luxurious mouthfeel. The potato flakes were mashed just like any other grain. (Incidentally, potato flakes induce way less weirdness to your mash calculations than the shockingly water laden raw potato.)

The clam juice was the one weird addition, but I knew that against the other flavors in the beer, it really would just read as "briny." The eight-ounce bottle went in at knockout to allow the juice to be pasteurized. In later rebrews I skipped the juice in favor of a small addition of salt.

The final key to the concept was the spiciness. One doesn't normally think of New England food as "spicy," but clam chowder is full of herbal flavors like thyme, black pepper, and bay. So each of those went into the boil. Plus remember the spices from the characterful yeast.

Concept beers are most assuredly not just about how unusual you can make the beer.

Photo courtesy of Shutterstock.com

Developing a new recipe from a concept involves understanding what individual ingredients bring to the table.

The end result then was exactly what I wanted — a rich-presenting, yet dry-drinking saison full of herbal characters. But note what wasn't there (no clam chowder)!

Here are some of our rules for coming up with a concept beer recipe:

- **Have a concept! —** Yeah, this seems obvious, but all too often it's a case of "put all this stuff in there and see what happens." Now, that may be a concept, but it's not what we're talking about. Start by using your taste imagination to taste the beer in your head. Think about the flavors you want. Think about the mouthfeel and how that plays against the ingredients and style of the beer. Think about what level of hopping will complement the other flavors. Don't just use numbers to do this. You're not at that stage yet. Think about how it's going to taste. (Besides, you can't taste a number!)
- **Is your concept focused? What's the story it's telling? —** With the world as your brew supply and the pantry just a short walk away, it's easy to keep gilding the beer with "just one more perfect touch." Remember that the more you've got going on, the less distinct each element will be. So looking at that, is a chocolate raspberry jalapeño sour smoothie beer really a good idea?

  What kind of story are you telling with the beer? Is it culinary (see the Clam Chowdah)? Is it "high concept" – (Drew's Gonzo Imperial Poppy Spirit Wine as a Hunter S. Thompson tribute)? Is it a flavor exercise (Denny's BVIP — aka barrel-aged beer in a hurry)?

  How does it flow and how will it taste? Think about your next IPA – how many varieties are you actually going to smell and taste? Do you really need nine different malts in your Russian imperial stout? Don't do it because you can, do it because it sounds delicious! Do it because pragmatism brought you to this place.
- **Recreate the experience, not the ingredients. —** If you want to create a beer that's reminiscent of marshmallows, think about what marshmallows actually taste like. Vanilla, right? So don't put marshmallows in your beer, use vanilla! And they have a kind of full, pillowy mouthfeel, so maybe some lactose to get that. Same if you want to make an Oreo beer. Don't use Oreos; use dry cocoa and vanilla. That's what Oreos taste like without all the additives.

  Remember Drew's Clam Chowdah example? Notice that the beer uses a number of different ingredients, but nary one can of clam chowder went into the boil or the fermenter! Instead, the focus was on using ingredients that gave you the sense of the concept, not a 1-to-1 usage of the components.

A MORE PRACTICAL CONCEPT EXAMPLE — IPA

As we said up front, as much fun it is to talk about the crazy, goofy, and stunt-laden ideas, the concept beer is really all beer. So, back to the "ordinary" and let's look to our recent brewing collaboration with North Park Beer Company out of San Diego, California — the Denny Kong IPA. There's absolutely nothing unusual about making yet another IPA, right? But the concept for this beer was clearly driven by the explorations we've been doing around the evolution of the West Coast IPA. We wanted a beer that would reflect the sensations of the "Modern West Coast IPA" to help drive the talk we gave in San Diego at the 2023 HomebrewCon.

The concept — make a clear, golden, crisp beer with a dry, cracker malt character and all of the fun fruit and punchy hop aromas so desired in today's IPAs (both hazy and clear) with the hop blast that made Denny and Drew the bitter IPA people we are. We also wanted to explore new ingredients and techniques that were all in service of the concept.

Working with North Park's Owner/Brewer, Kelsey McNair, we settled on a base of the ultra-crisp Rahr North Star Pilsner malt with a touch of Weyermann Vienna malt to provide color and character. Yes, there was debate on the use of a crystal malt, but the beer was settled around Vienna to better reflect the modern Southern California IPA experience.

For the hops, the beer has a push/pull in its mission statement — classic yet fun and fresh. For the classic we stuck with loads of Cascade, the OG American craft hop and then blended in some other classics like Citra® and Simcoe® before adding the "new" with loads of berry-forward Mosaic®.

To push stronger hop aromas with less "green" plant and tea flavors, we used a blend of standard hop pellets mixed with the more concentrated Cryo Hop® pellets from Yakima Chief Hops (YCH). And then just to keep the learning going (and the lower vegetation) we used a new liquid Citra® product called Trial 702 from YCH.

The hopping schedule blended classic first wort hopping (hops added to the kettle during the sparge) with "Coolpool" hop additions (a 30-minute post-boil whirlpool performed at 170 °F/77 °C), a bit of dip hopping (the Trial 702 was added to the fermenter and mixed with some warm wort and steeped while the beer was being whirlpooled) and, of course, multiple dry hops for short exposure times. For fermentation we used Wyeast 1217 (West Coast IPA) yeast, which is a fairly mild yeast in terms of esters with a clean and attenuative fermentation profile.

Every choice that we just described was in service of the concept. We stayed focused because of the parameters we set. The end result was a dry IPA that mixed classic West Coast citrus bitter notes with heavy berry-ladened aromas. It was crisp and easy drinking with a hop slap to remind you to respect the beer.

That's not to say that by having a concept we nailed it perfectly — all three of us behind the beer agreed that it could use a touch more bitterness than we got from the initial first wort addition. Something to give just a bit more teeth and cut to the citrus and sweet fruit notes in the rest of the beer.

Take that same example into your everyday brewing life — some concepts will be radically simple. There's not a lot of wiggle room in a cream ale recipe for instance, but that didn't stop Drew from trying malted corn in his.

Don't mistake the simple for bad. Don't confuse the complex with the good. With a clear and focused concept or story you can help drive the development of the flavors in your beer. You can make a beer that has purpose behind it instead of feeling like a product developed by unlucky dice rolls and bad AI language models.

Between you, us, and the trees, which of those previously mentioned beers would you find yourself reaching for? BYO

BY DAVE GREEN

IT'S A BITTER WORLD

The many forms of hops

It's good for every brewer to understand the different hop products available and ways to utilize them.

Photo courtesy of BSG CraftBrewing

Pelletized hops are the most popular format for homebrewers and are available in different strengths.

It's hard to deny that hops have become the darling of the craft beer world over the last 20 years. While there are still plenty of malty beer enthusiasts, a trip to a local beer store and the respective shelf space taken up by hop-forward beers represents that its popularity is undeniable. It's not surprising to many observers because the explosion of new hop varieties coming out of breeding programs has revolutionized the hop character that can be produced. If the term "tropical fruit character" were used 20 years ago to describe a beer, it probably would have implied a citrus element. Today, we think mango, pineapple, guava, papaya, and even coconut.

But it's not just the new hop varieties that have pushed that hop mania we've experienced recently, it's also been aided to some extent by a new look at yeast selection as well as the way in which hops can be delivered into the wort and beer. It is this last piece of that puzzle that we will be focusing on today. It's good for every brewer to understand the different hop products available and ways to utilize them. Even if you are not brewing a hop-forward beer, an understanding of their pros and cons is beneficial.

WHOLE-CONE HOPS

Many traditionalists enjoy what whole-cone hops can bring to a beer. Proponents cite an increase in the complexity whole cones provide because they are the least processed. After all, there is a reason many esteemed breweries like Sierra Nevada and Deschutes still utilize them in their lineup. Whole-cone hops do absorb a lot of liquid so are best utilized for low to moderately hoppy beers, or at key junctures in the process along with other hop formats in order to minimize beer loss.

Breweries who still employ whole-cone hops in their recipes utilize various methods for hopping. As one example, Sierra Nevada adds whole-cone hops in the kettle and removes them with a continuous hop separator. For dry hopping with whole-cone hops, they have their Torpedo and still use giant bags for dry hopping Bigfoot.

Homebrewers may have very specific uses for whole-cone hops. A hop-back, where hot wort is passed through a canister packed with whole-cone hops, is the perfect example of when this format of hops is required. Mash hopping can also utilize whole-cone hops and they will provide the added benefit of creating space in the mash, similar to adding rice hulls.

On the downside, whole-cone hops take up more space in cold storage and are also known to oxidize faster once the package is opened due to the lower density nature of the cones. Vacuum re-sealing of bags is by far the best way to store, flushed with CO_2 if possible.

PELLET HOPS

There are several different types of pelletized hops, T-90 and lupulin-enriched pellets (sometimes referred to as T-45) being the most prevalent. Homebrewers are most familiar with the T-90 hops, although lupulin-enriched pellets are widely available these days and continue to gain traction. Basically, the number in format relays how much of the original hop cone material has been pelletized. T-90s represent 90% of the original hop cone with 10% of the vegetative material removed. T-45 has 55% of the vegetative material removed. This represents a more concentrated version of the remaining materials that brewers are mainly seeking from the lupulin glands of the hop cones: Alpha and beta acids and the essential oils.

One of the main benefits of hop pellets is efficiency; this means higher yields and less hops required to achieve

the same hoppy results. Working with T-90 pellets not only offers the 10% saving of green material that will absorb liquid, but also when settled can form a more compact trub. This allows more liquid to get racked off the hops. Also, pellets have better storage life due to their dense nature.

For dry hopping, they are commonly cited as being superior since they typically submerse themselves, break apart, and fall to the bottom of the fermenter so you can easily rack your beer off of them. There is some exception to this, notably when low-density hop pellets end up floating and creating rafts on the surface of the fermenter. This is one reason why some breweries use special vessels for dry hopping with pellets via recirculation. To be safe, homebrewers can add pellets to a large and sanitized muslin bag with weights or place hops in a metal canister. If dry hopping in a Corny keg, the whole keg can be flipped twice a day (this is only advised if proper closed-racking techniques were employed).

Also, pelletized hops release their oils much faster than whole-cone hops when dry hopping. Whole-cone hops can take 7–10 days to express the oils from the lupulin glands. Pelletized hops do the same in 1–2 days.

A downside to them is they can clog up screens and specialty equipment is often required to remove pellet hop material. Also, while the pelletizing process has greatly improved over the years, there are some brewers who question the loss of oils and uniqueness during the procedure.

LUPULIN-ENRICHED HOPS

If you're looking to brew a more hop-forward beer, this style of hop product has been designed with that recipe in mind. Big, bold hop flavors with less of the vegetative material found in whole-cone and T-90 hops, which can lend astringency and "green" character to a beer. While the processing is unique to each of these products, the end result is similar . . . increased lupulin concentration in each hop pellet. The biggest pro for these products is the minimized loss of beer when trying to achieve big hop flavor, like during dry hopping. While this may be great for that hazy or West Coast IPA you're brewing, the lack of vegetative character may actually be a loss in a beer like a Pilsner.

Since many homebrew recipes are written for T-90 pellets, there will be a conversion that needs to happen unless a specific lupulin-enriched product is listed in the recipe. Going by the alpha acid content of the hop is one good way to scale proportionally. For example, you might find Centennial hop pellets at 22% alpha acids. If the recipe utilizes 11% alpha acid Centennial hops, then simply cut the amount used in half. A little calculator work may be required.

It's also good to check with the manufacturer's literature about their recommendations for dosage rates. For example when using Cryo Hops®, Yakima Chief Hops recommends cutting hop amounts in half compared to standard T-90 pellets for aromatic purposes. So if your recipe calls for 4 oz. (113 g) dry hops, you would want to use 2 oz. (56 g) of this product. Lupomax® states to use 70% of the recipe's recommended rate — so in the above example that would be just about 3 oz. (85 g). There are other proprietary lupulin-enriched products out there like Lupulin™ from Hopsteiner and lupulin-enriched Type 45 from Germany's HVG that actually can range from T-30 up to T-85.

Photo by Charles A. Parker/Images Plus

Often packed in syringes for homebrewers, hop extracts have seen a rise in usage as well as product availability in the homebrew market.

HOP EXTRACTS

To even further reduce hop material, we come upon the next two types of products: Hop extracts and distilled oils. While they have been around for about 40 years, hop extracts are a huge and growing field that is evolving as research into techniques to extract specific characteristics from the hop cone continues. There are several different classes of hop extracts now available from different manufacturers, often with a focus on a specific purpose or usage in the brewery. Brewers can now brew a big IPA without utilizing a single hop cone or pellet.

Disposable pipettes and syringes are a common delivery mechanism for these products on a homebrew scale. Quite a few have very small to minute dosage rates, so some research into this should be done prior to purchasing. Others have been designed specifically for homebrew-scale and don't require any outside equipment for measuring dosing rates. Warming the products up some prior to dosing may be helpful in some but not all cases.

Iso-Extracts

We'll start off with the concept of simply adding bitterness to a beer. To be clear, there is no aroma enhancement with iso-extracts. These products offer pre-isomerized alpha acids that can be added either to the kettle, whirlpool, or fermenter to achieve bitterness in a beer. There are several different types and concentrations of iso-extracts. Variations include rho, tetra, and hexa, each with its own set of enhancement characteristics.

Some, most notably tetra, have the added benefit of a positive effect on foam retention of beer as well as body enhancement. Some will provide microbial protection while others can help prevent light strike from occurring. So if your beer is going to be poured at a daytime brewfest, that could be a great opportunity to try a light-stabilized iso extract for bittering. Also, high-altitude brewers may find iso-extracts an efficient way to achieve enhanced bitterness when such a profile is desired.

CO_2 Extracts

CO_2 hop extracts (sometimes referred to as hop shots) are great for adding bitterness and hop character during brew day and are typically sold in syringes for homebrewers. Like

the iso-extracts, these get IBUs into a beer without adding any vegetative material. Suppliers will often state how many IBUs one milliliter of a CO_2 hop extract will add to a 5-gallon (19-L) batch of beer. Always add CO_2 extract off heat and stir until fully dissolved before turning heat back on.

CO_2 extracts for a long time were generally not very user friendly, being thick, honey-like resins and were not varietal specific. As mentioned earlier, things have changed and now a new line of hop extracts have been developed with the beta acids removed, allowing for a much less viscous substance. Typically you will see them labeled as "flowable" or with similar phrasing. CO_2 extracts are now commonly varietal-specific as well, so brewers can hone in on certain traits coming from the hop's profile for later kettle additions. Just note that it's typically advised not to add these CO_2 extracts with less than 10 minutes remaining in the boil.

Supercritical CO_2 Aroma Extracts

With specialized processing after the CO_2 extraction, you will find extracts that are further refined by selecting specific fractions of what is extracted from the hop. The primary fraction, discussed above, is the alpha-acid fraction. But the oil fractions are capturing the attention of brewers these days because they offer another way to add hop aroma to beer. Fractioned aroma extracts are usually recommended for use just prior to or in the whirlpool, or in the fermenter as a dry hop substitute or companion (use is product dependent). These may or may not come varietal-specific and will not contribute bitterness from alpha acids or polyphenols that whole-cone and pellet hops will release because of the extraction process, nor will they cause hop creep. Several of these are available from suppliers in homebrew-sized packaging.

DISTILLED HOP OILS

The availability of hop oils to homebrewers and commercial brewers has increased dramatically over the last few years and now includes distilled oils. These are another class of hop products with several sub-types and some crossover with the fractioned extracts. Alcohol extracts and steam-distilled extracts are the two main families, and within each are several sub-categories, like we see with supercritical CO_2 extracts. Some of these can be extremely potent and need to be handled with care. One line of hop oils boasts adding wet-hop character (freshly picked hops) to the beer.

If available, follow the manufacturer's instructions when using these products. But many suppliers of the distilled oils provide little instruction aside from performing bench trials prior to use and some loose dosing guidelines.

Depending on the supplier, fractionated extracts and distilled oils are blended to create aromas associated with different hopping methods. Kettle hop, late hop, whirlpool, and dry hop are examples of some of the descriptions used for fractionated extracts. Because these aromas approximate hopping practice, many commercial brewers use extracts to augment traditional hopping practices to improve process efficiency while minimizing obvious differences. BYO

BY MYKE MARTIN

HEADS-UP DISPLAY

DIY keg beer level management system

Keg management is an important tool in any kegging brewer's arsenal. Being able to keep track of keg levels is vital to brew scheduling and not being surprised at your summer BBQ when the keg kicks unexpectedly. Until recently, I've been using the method of when you pull the tap handle and beer comes out, that means there's still beer in the keg. When no beer comes out, the keg is empty.

There is a small variety of DIY and commercially available systems out there. In-line flow meters, the ol' ball and magnet thing, pull the keg out to room temperature and let it sit for a few minutes until it sweats at the level line. The one I liked the most is the Plaato system that came out not too long ago. I really like the idea of the Plaato system because it uses a scale to very closely approximate the remaining beer in the keg. I just couldn't pull the trigger on the $130 per scale price tag, and I need three, so I found that be a little cost prohibitive. After some more research, I ran across a YouTube video of a guy who made a scale out of a piece of plywood and some electronics on the cheap. Not just a little cheap. I mean cheap, cheap. I was intrigued …

Some more internet research and I found someone else who used the same materials, but upped the game by 3-D printing a housing and added LEDs to it. My only problem with his design is that the diameter was wider than a corny keg and definitely too wide for my 3-D printer. I have a standard-sized kegerator and the kegs fit in there snugly as it is. So, it was high time to design my own. I used Google SketchUp to bring this to life.

I was able to design a scale that was the exact diameter of a corny keg and only lifted it about an inch (2.5 cm) off the bottom of the kegerator. It's a little tighter up top, but not impossible to connect gas and liquid lines.

After the design was finalized and the proof of concept was there, I decided to go for it. The price point was right for me too. At less than $10 per scale for the boards, Home Assistant being free and open sourced, add-ons not costing a cent, plus I had some USB cables in the infamous box of extra cables … it was worth a shot to see if I could do it.

This scale can be used in kegerators, keezers, fridges, and it doesn't have to stop at kegs. You can even use it to monitor CO_2 tank levels or anything up to 110 lbs. (50 kg) that will fit on the scale.

This project is going to be relatively easy if you have experience with Home Assistant, are an avid tinkerer, or are just a good old-fashioned tech nerd like me.

Links:
Home Assistant: https://www.home-assistant.io/
ESPHome: https://esphome.io/index.html
Scale print: https://www.thingiverse.com/thing:6007574
HX711: found on www.amazon.com
ESP3266: found on www.amazon.com

Tools and Materials

- 3-D printer (with minimum 235 mm x 235 mm build plate)
- Printer filament (172 meters / 511 g per scale)
- (4) M4 x 0.7 x 12 mm screws
- M4 x 0.7 tap
- HX711 load cell amplifier (with four load cells)
- ESP8266 (USB-C)
- USB to USB-C cable
- USB power brick
- Soldering iron
- A computer running Home Assistant

I was able to design a scale that was the exact diameter of a corny keg and only lifted it about an inch (2.5 cm) off the bottom of the kegerator.

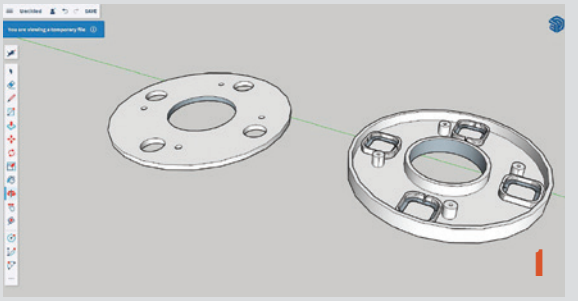
Photos by Myke Martin

STEP BY STEP

1. PRINT SCALE HOUSING

I took certain design aspects of those that I saw online and modeled one to suit my needs. Along with the housing, I also made feet and retaining clips to keep the load cells in place. The only glue that is needed is when assembling the feet through the bottom plate and securing the circuit boards. The load cells are kept in place with friction and some clips for extra insurance.

After I had a prototype I was happy with (Figure 1), I printed the first production scale using PLA with 70% infill.

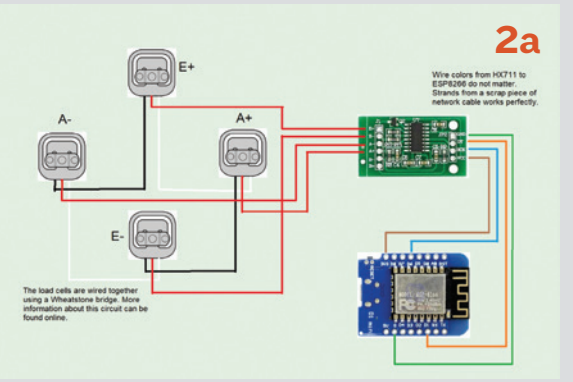


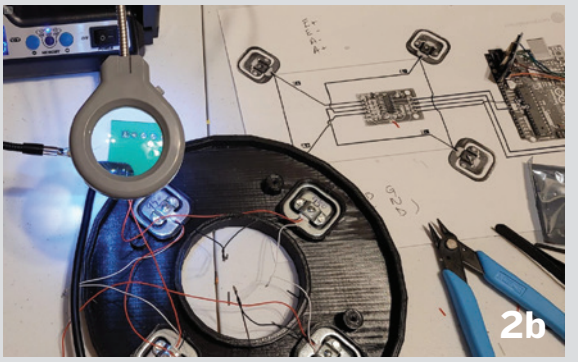
2. BOARDS AND WIRING

Wiring is pretty straightforward and there are tons of diagrams, forums, and pages on how to wire the boards around the internet. An important thing to note is that some of the wires on the boards can be wired to different D pins, but if you are doing more than one scale, it's important to wire them all the same for continuity.

These boards are small — a magnifying glass and a steady hand are key here. Cut to size, strip, then solder the wires to the board per the diagram on the right (Figure 2a) and solder the black and white load cell wires to each other per the Wheatstone circuit (Figure 2b). The solder doesn't have to be pretty. It just needs to keep the wires in place and make sure you don't have the solder pools touch one another. Electrical tape or heat shrink tubing will keep the connections safe and secure.

Tip: I used my prototype 3-D print to hold the load cells and boards while the production print was going.



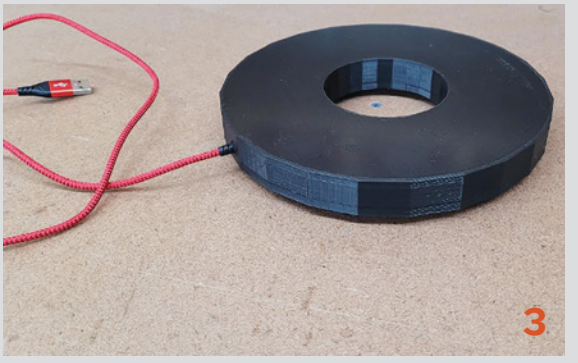


3. ASSEMBLY

After all the pieces are printed and the soldering done, it's time to do some assembly. Start by tapping the screw bosses with the M4 x 0.7 tap. Putting a piece of tape on the tap threads can act like a depth-stop so you don't go too far. Next, glue the feet together through the bottom of the scale. The smaller part of the foot should be on the inside and the larger foot should be on the outside. The outside has the countersinks for the screws.

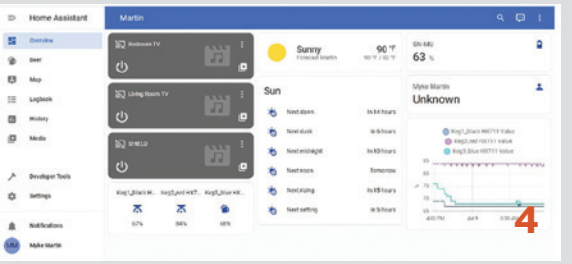
Then place your load cells in their respective housings following the same Wheatstone bridge that you assembled them in followed by the retainer rings – these are just friction fit. Use some tape or hot glue to manage the wires and fix the circuit boards in place.

Lastly, you will need a hole or slot for your USB cable (Figure 3). A drill or Dremel will make quick work of this part. Finish it with a file and/or blade to refine the fit, if needed. Affix the top and bottom with the four screws and you have a fully assembled scale!



4. HOME ASSISTANT

I am using Home Assistant with the ESPHome add-on to do all the configuring for my load cells. I had an old Intel NUC lying around so I figured I can run Home Assistant on that. You can choose to run it on a stand-alone computer, as a virtual machine, or on a purpose-built Raspberry Pi. Whichever one you choose depends on your setup and needs. Please see the Home Assistant webpage for more details.



4

5. ESPHome

Once Home Assistant is installed, install ESPHome from Settings→Add-ons to add your scale to Home Assistant. Plug the scale into the computer running Home Assistant. In ESPHome, choose to install a new device. Follow the prompts to complete the installation.

After the installation completes, click on "Edit" in the scale's window. Here you will see some default code in yaml. You don't need to edit this, but you will need to add some of the code to get everything displaying correctly. You can copy the code (Figure 5) to set up your sensor at the bottom of the existing code, starting around line 29. Please note the "calibrate linear" data will differ with your keg depending on the tare and full weight. You may also change the "update interval" depending on how often you want the values to update. I find 60 seconds to be good. Enter this code under "captive_portal:" then click "save", and then "install". You may have to restart Home Assistant a time or two during the process for the scale to fully install.

Note: If any of your values are negative numbers, it's likely that you have mis-wired the red wires on the load cells. Go back and double-check the Wheatstone bridge.

```
sensor:
  - platform: hx711
    name: "HX711 Value"
    dout_pin: GPIO5
    clk_pin: GPIO16
    gain: 128
    update_interval: 60s
    filters:
      - calibrate_linear:
          - 274891 -> 0
          - 699100 -> 100
    unit_of_measurement: "%"
```

5

6. DISPLAY

Displaying your keg level is done with "cards" within Home Assistant. Cards are what make up the dashboard. There are many card options. I chose the gauge in a three-card vertical set. Although there are many ways to display the keg scales from Home Assistant using any network-connected device, I wanted a classy screen on a stand display near my kegerator. You can choose any display method you prefer. Here is how I chose to do mine:

I got an old iPad and installed a kiosk app on it. I set the iPad to never turn off, but set the kiosk app to black the screen after X minutes of inactivity. These settings allow me to just tap the screen when in idle state to see the keg levels.

For my frame, I milled up some scrap cherry to hold the iPad. I used a small CNC router to carve text into the wood to show the tap number and added a little quip at the top. My little CNC router travel is a bit too short to do the whole thing, so I had to break the lettering into segments and route out the opening for the iPad by hand.

In my case, because of the layout and formatting, I had to install the iPad upside down. I wanted to limit the times I would have to remove the iPad, so I drilled a small hole in the 'r' so I can easily press the 'home' button with a finish nail whenever needed. BYO

6

HOMEBREW DIRECTORY

UNITED STATES

CALIFORNIA

THE CHI COMPANY
6070 Enterprise Dr., Suite K
Diamond Springs 95619
(530) 622-8265
info@chicompany.net
www.chicompany.net
4000+ Beverage related parts: Beer, Wine, Soda. New & used equipment. Brass & Stainless Fittings. ALL Ball, Pin & Sanke keg parts. If we don't have it — We will find it for you!

MOREBEER! & MOREWINE! (Concord)
995 Detroit Ave. Unit G
Concord 94518
(925) 771-7107 fax: (925) 671-4978
srconcord@moreflavor.com
www.morebeer.com
Absolutely Everything! for Beer-Making

MOREBEER! & MOREWINE! (Los Altos)
991 N. San Antonio Rd.
Los Altos 94022
(650) 949-BREW (2739)
srlosaltos@moreflavor.com
www.morebeer.com
Absolutely Everything! for Beer-Making

MOREBEER! & MOREWINE! (Riverside)
1506 Columbia Ave. #12
Riverside 92507
(951) 779-9971 fax: (951) 779-9972
srriverside@moreflavor.com
www.morebeer.com
Absolutely Everything! for Beer-Making

MOREBEER! & MOREWINE! (San Leandro)
2315 Verna Court
San Leandro 94577
(510) 351-3517
srsanleandro@moreflavor.com
www.morebeer.com
Absolutely Everything! for Beer-Making

NORCAL BREWING SOLUTIONS
8865 Airport Rd., Ste. H
Redding 96002
(530) 243-BEER (2337) or
(530) 221-WINE (9463)
www.norcalbrewingsolutions.com
Beer, wine & distilling supplies, hardware, and "Jaybird" custom fabricated equipment including stills, Speidel accessories, and yeast harvesters.

SIMI VALLEY HOME BREW
1555 Simi Town Center Way, Suite 530
Simi Valley 93065
(805) 422-8469
www.simivalleyhomebrew.com

STEIN FILLERS
4160 Norse Way
Long Beach 90808
(562) 425-0588
www.steinfillers.com
brew@steinfillers.com
Your complete Homebrew Store, serving the community since 1994. Home of the Long Beach Homebrewers.

COLORADO

BOULDER FERMENTATION SUPPLY
2510 47th - Unit 1
Boulder 80301 (303) 578-0041
www.boulderfermentationsupply.com
Newly Expanded! Proud vendor of Colorado Malting Co. With a wide range of gluten free grains, CO_2 refills and all your fermentation needs. Stop in, open weekdays 11-7, weekends 10-6.

LIL' OLE' WINEMAKER
516 Main Street
Grand Junction 81501 (970) 242-3754
Serving Colorado & Utah brewers since 1978

CONNECTICUT

BEER & WINE MAKERS WAREHOUSE
290 Murphy Road
Hartford 06114
(860) 247-BWMW (2969)
e-mail: info@bwmwct.com
www.bwmwct.com
Area's largest selection of beer, wine, cheese, kombucha and coffee roasting supplies. Complete line of kegging equipment. In-store brewery w/tap featuring beers from Phantom Brewing Co.

BREW & WINE HOBBY
Classes available! Area's widest selection of beer making kits, supplies & equipment.
12 Cedar St.
East Hartford 06108
(860) 528-0592 or 1-800-352-4238
www.brew-wine.com
Always fresh ingredients in stock. Pick Your Own grain room & free Crush!

DELAWARE

HOW DO YOU BREW?
812 Pencader Dr., Suite E
Newark 19702
Phone: (302) 738-7009
www.howdoyoubrew.com
Shop Online!
Quality Supplies and Ingredients for all homebrewers. Easy on/off I-95. One of the Mid-Atlantic's best-stocked Brew Stores!

HAWAII

HOMEBREW IN PARADISE
740 A Moowaa Street
Honolulu 96817 (808) 834-BREW
bill@homebrewinparadise.com
www.homebrewinparadise.com
Fermenting with ALOHA since 1996. Everything you need for beer, wine, mead, cider, and more!!

ILLINOIS

GNOME BREW
2026 W Montrose Ave.
Chicago 60618 (773) 961-7750
gnomes@gnomebrewshop.com
gnomebrewshop.com
2022 Homebrew Shop of the Year. Easy online ordering with next day fulfillment and nation-wide shipping. Call or email us anytime to talk with our knowledgeable and friendly staff.

IOWA

BLUFF STREET BREW HAUS
372 Bluff Street
Dubuque (563) 582-5420
jerry@bluffbrewhaus.com
www.bluffbrewhaus.com
Complete line of wine & beermaking supplies. In operation since 2006.

KANSAS

BACCHUS & BARLEYCORN LTD.
6633 Nieman Road
Shawnee 66203 (913) 962-2501
www.bacchus-barleycorn.com
Fast, friendly, personalized service since 1968. Full line of fresh ingredients for home beer, wine, mead, cider and cheese makers. Your home fermentation specialists.

LOUISIANA

BREWSTOCK HOMEBREW SUPPLY
1300 S Broad Ave.
New Orleans 70125 (504) 208-2788
www.brewstock.com
email: oliver@brewstock.com
Louisiana's largest selection of Homebrewing supplies! Beer, wine, cider, distilling, kombucha, and more!

MARYLAND

THE FLYING BARREL
1781 North Market St.
Frederick
(301) 663-4491
fax: (301) 663-6195
www.flyingbarrel.com
Maryland's original Brew-On-Premise; winemaking and homebrewing supplies!

MASSACHUSETTS

THE WITCHES BREW, INC.
12 Maple Ave.
Foxborough 02035
(508) 543-0433
steve@thewitchesbrew.com
www.thewitchesbrew.com
You've Got the Notion, We've Got the Potion

MICHIGAN

BELL'S GENERAL STORE
355 E. Kalamazoo Ave.
Kalamazoo 49007
(269) 382-5712
www.bellsbeer.com
Staying true to our roots, Bell's General Store has been supplying homebrewers since 1983. Visit us next door to Bell's Eccentric Café or online at www.bellsbeer.com

SICILIANO'S MARKET
2840 Lake Michigan Dr. N.W.
Grand Rapids 49504
(616) 453-9674
fax: (616) 453-9687
e-mail: sici@sbcglobal.net
www.sicilianosmkt.com
The largest selection of beer and wine making supplies in west Michigan. Now selling beer & wine making supplies online.

NEBRASKA

PATRIOT HOMEBREW SUPPLY
2929 N 204th St #107
Elkhorn 68022 (402) 991-6655
www.patriothomebrewsupply.com
Large selection of quality Equipment & Ingredients for making beer, wine & hard cider! Plus beer on tap, classes, and free seminars.

NEW HAMPSHIRE

EARTH EAGLE BREWINGS
175 High St.
Portsmouth 03801 (603) 767-8235
www.aghomebrewsupply.com
alex@eartheaglebrewings.com
Fromerly A&G Homebrew Supply
Quality supplies for beer and winemaking at home. CO_2 exchanges, kegging equipment. Cheesemaking, gifts, books. Friendly, expert service and great prices. Plus, Earth Eagle Brewings merch and 4-packs!

NEW YORK

PANTANO'S WINE GRAPES & HOME BREW SHOP
249 Rte 32 South
New Paltz 12561
(845) 255-5201 or (845) 706-5152 (cell)
www.Pantanosbeerwine.com
pantanowineandbeer@yahoo.com
Find Us On Facebook. Full line of homebrewing equipment & ingredients for all your brewing needs and Distilling Yeast. Serving Hudson Valley's homebrewers. Beer Club in House! M.H.B.A.

NORTH CAROLINA

AMERICAN BREWMASTER
3021-5 Stony Brook Dr.
Raleigh 27604 (919) 850-0095
www.americanbrewmaster.com
abrew@americanbrewmaster.com
Serving Homebrew since 1983. (and Homebrewers, too!)

ATLANTIC BREW SUPPLY
3709 Neil St.
Raleigh 27607 (919) 670-4043
info@atlanticbrewsupply.com
www.atlanticbrewsupply.com
The largest homebrew shop on the East Coast! Our low prices are now available nationwide on our new website!

OHIO

THE GRAPE AND GRANARY
915 Home Ave.
Akron 44310 (800) 695-9870
www.grapeandgranary.com
Complete Brewing & Winemaking Store.

LABEL PEELERS BEER & WINE MAKING SUPPLIES, INC.
636 S. Walnut St.
Ravenna 44266 (330) 678-6400
info@labelpeelers.com
www.labelpeelers.com
Guaranteed lowest shipped price to your door. Free Wine and Beer Making classes. Hours: Mon–Fri 10 am–7 pm; Sat & Sun 10 am–5 pm.

OKLAHOMA

HIGH GRAVITY
6808 S. Memorial Drive, Suite 146
Tulsa 74133 (918) 461-2605
store@highgravitybrew.com
www.highgravitybrew.com
Home of the Wort Hog Electric Brewing Systems. Take the pain out of propane.

OREGON

F.H. STEINBART CO.
234 SE 12th Ave
Portland 97214
(503) 232-8793 fax: (503) 238-1649
e-mail: info@fhsteinbart.com
www.fhsteinbart.com
Brewing and Wine making supplies since 1918!

THE HOPPY BREWER
328 North Main
Gresham 97030 (503) 328-8474
thehoppybrewer@gmail.com
OregonsHoppyPlace.com
Homebrewing Supplies, Draft Equipment, Bottle Shop, Tap Room & Nanobrewery.

THYME GARDEN HERB COMPANY
20546 Alsea Highway
Alsea 97324 (541) 487-8671
Visit us at: www.thymegarden.com
Email: herbs@thymegarden.com
Order NOW for the best selection! Over 22 varieties of certified organic hop rhizomes, extra large and rooted rhizomes. Wholesale by phone or email. Also dried hop cones and herb and pepper seeds.

PENNSYLVANIA

SCOTZIN BROTHERS
65 N. Fifth St.
Lemoyne 17043
(717) 737-0483 or
1-800-791-1464
www.scotzinbros.com
Open 6 days! Tu-F 10am-6pm, Sat 10am-5pm, Sun 10am-3pm
Central PA's Largest IN-STORE Inventory!

RHODE ISLAND

CONANICUT BREWING
34 Narragansett Ave., Suite C
Jamestown 02835
(401) 524-9359
conanicutbrewing@gmail.com
www.conanicutbrewing.com
Beer- and Wine-Making Supplies, Equipment, And Ideas For Getting Your Fermentation On!

VERMONT

BREWFEST BEVERAGE CO.
199 Main St.
Ludlow 05149
(802) 228-4261
www.brewfestbeverage.com
Supplying equipment & ingredients for all your homebrewing needs. Largest selection of craft beer in the area. Growlers poured daily!

VIRGINIA

ORIGINAL GRAVITY
6118 Lakeside Ave.
Richmond 23228
(804) 264-4808
www.oggravity.com
Extensive selection of ingredients, supplies, and equipment for all levels from beginner to seasoned brewer. We have a knowledgeable and friendly staff to assist you with brewing and kegging questions and recipe formulation.

WASHINGTON

JON'S HOMEBREW AND WINE SUPPLY
1430 E. Main Ave., #1430C
Puyallup 98372
(253) 286-7607
jon@jonshomebrew.com
jonshomebrew.com
Puyallup's home for Home Beer and Winemaking supplies!

SOUND HOMEBREW SUPPLY
6505 5th Place S.
Seattle 98108
(855) 407-4156
info@soundhomebrew.com
soundhomebrew.com
Knowledgeable Staff. Great Selection.

WISCONSIN

WINE & HOP SHOP
1919 Monroe Street
Madison 53711
1-800-657-5199 or (608) 257-0099
www.wineandhop.com
info@wineandhop.com
Madison's locally-owned homebrewing and winemaking headquarters. Offering fresh ingredients, quality supplies, and expert advice for over 40 years.

AUSTRALIA

VICTORIA

GRAIN AND GRAPE PTY LTD.
5/280 Whitehall St.
Yarraville 3013 (03) 9687 0061
www.grainandgrape.com.au
Best Homebrew Shop in Australia 4 years running!

W. AUSTRALIA

BREWMART BREWING SUPPLIES
*Bayswater * Maddington * Rockingham
Wholesale and Retail suppliers of Brewing Equipment and Ingredients. Find us at brewmart.com.au or on Facebook and Twitter.

NEW ZEALAND

BREWSHOP
www.brewshop.co.nz
sales@brewshop.co.nz
Online homebrew beer supplies

READER SERVICE

ADVERTISERS IN THIS ISSUE, THEIR CONTACT INFO, AND THE AD PAGE NUMBER.

BY GARY FISK

JIMMY CARTER AND HOMEBREWING

Insights from rural Georgia

Most homebrewers have heard that Jimmy Carter, the 39th President of the United States, signed legislation in 1979 that exempted homebrewing from alcohol taxation. This action helped to legitimize homebrewing as a hobby. Relatively little is known, however, about Jimmy Carter's personal views regarding homebrewing and the craft beer movement. Here are some small stories from rural Georgia that provide insight.

In December 2010, several local homebrewers from Americus, Georgia, (about 12 miles/20 km from Jimmy Carter's hometown of Plains) attended a holiday open house event sponsored by a local coffee roasting company. The party atmosphere became electric when former President and First Lady Jimmy and Rosalynn unexpectedly arrived to show their support for a local business. A homebrewer friend who once lived in Plains approached Mr. Carter. He told him that we appreciated his presidential action that legalized homebrewing. Carter was delighted! He enthusiastically posed for a picture with several local homebrewers. The takeaway for current homebrewers is that Jimmy Carter was glad to be recognized for his presidential action that supported homebrewing.

The second story involves a coworker who had a tradition of giving the Carters small exotic food presents each year around the holidays. She was impressed with my honey lager and thought it would be a perfect gift for them, so I gave her a 750-mL bottle to gift them. Several months later, I was pleasantly surprised to receive a thank-you letter from Jimmy Carter. His handwritten note states: "Thanks very much. The honey lager has a great taste. It should be on the market. Jimmy C." The Carters could appreciate a good homebrewed beer. They may have liked it for being lightly colored, low in bitterness, and flavorful. The encouragement part also shows how Mr. Carter, a former small businessman, never tired in his efforts to grow local business.

The honey lager gift also included a specific question: How did the legalization of homebrewed beer influence the hobby of homebrewing and, more indirectly, the craft beer movement in this country? Carter's written note pointed to the craft beer part of the sentence and stated: "It has been surprisingly helpful." This clearly shows that the legislation he signed was probably viewed as being a trivial matter. And the "helpful" part in regard to craft brewing is also consistent with Carter's pro-business attitudes. He was likely proud that his presidential action helped to promote small businesses, now seen worldwide.

The third story is from a local homebrewer during the beer dark ages of the 1960s and 1970s. He likes to tell people about sending homebrewed beer to Jimmy Carter when Carter was the governor of Georgia (early 1970s). He claimed that tasting these homebrewed beers had a favorable impression upon the soon-to-be President. This positive attitude later contributed to Carter's willingness to legalize homebrewing. The implication is that this local homebrewer may have single-handedly contributed to the legalization of homebrewing by sharing his beers with Jimmy Carter. While his story cannot be verified, it's a good one!

Jimmy Carter likely had reservations about alcohol consumption, like most prominent families in the rural South. However, he also seemed glad that his presidency had a positive impact on both homebrewing and craft brewing. The next time you enjoy a homebrew, please take a moment to thank Jimmy Carter and his small, yet powerful contribution to the hobby. BYO

The implication is that this local homebrewer may have single-handedly contributed to the legalization of homebrewing by sharing his beers with Jimmy Carter.

Photo by Dave Campbell

From left, Chuck Huffman, Keith Welch, Jimmy Carter, and Gary Fisk. The photo was taken in December of 2010 at Cafe Campesino in Americus, Georgia.

DELTA BREWING SYSTEMS

FERMENTATION UPGRADED

27" TALL

UPGRADED LID

WELDED HANDLES

INCLUDES:

- THERMOWELL
- ALL TRI CLAMP FITTINGS
- ETCHED VOLUME MARKINGS
- PRESSURE TRANSFER CAPABLE
- 8 GALLON VOLUME

1.5" DUMP VALVE

CREATE BIGGER AND BETTER WITHOUT BREAKING YOUR BANK

WWW.DELTABREWINGSYSTEMS.COM
INFO@DELTABREWINGSYSTEMS.COM
(630) 310-5812

wyeast™
Premium Liquid Yeast

A REPUTATION OF QUALITY & INTEGRITY, SINCE 1986

The same Wyeast yeast strains that spurred the craft brewing revolution, and defined the meaning of *quality and integrity*, continue to set the precedent to this day for all scales of brewing. Our heritage collection of proven premium liquid yeast and cultures in the one-of-a-kind Activator Smack-Pack System™ are ready to get fermenting with uncompromised results on your next homebrew day.

WYEASTLAB.COM PROUD PRODUCT OF HOOD RIVER, OREGON