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JULY-AUGUST 2015, VOL.21, NO.4

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JULY-AUGUST 2015, VOL. 21 NO. 4

features

DIY BEER Coopers

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Brew
Bottle
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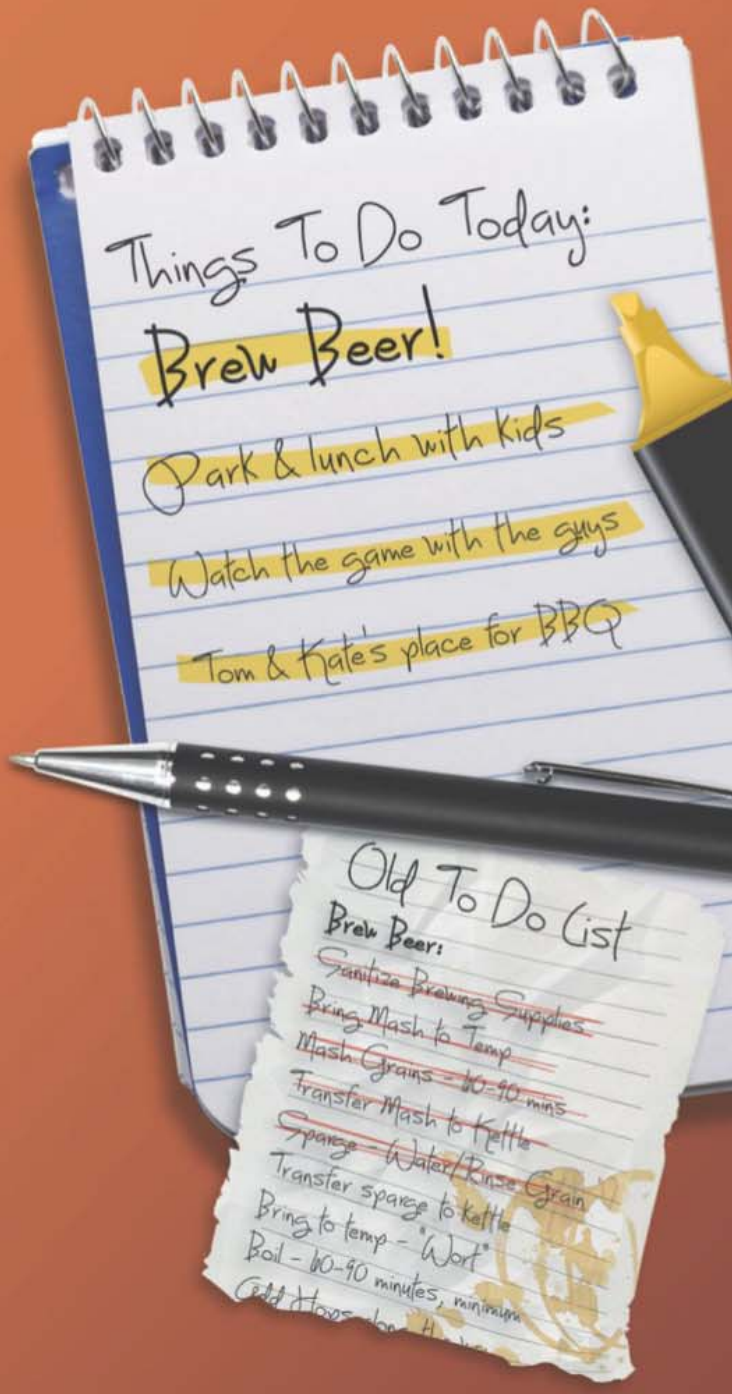

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Brew YOUR OWN
THE HOW-TO HOMEBREW BEER MAGAZINE

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 US gallon of water, would yield a wort of 1.024.)

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

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

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

Gallons:
We use US gallons whenever gallons are mentioned.

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what's happening at BYO.COM

Build a Tap Handle: Projects

Tap handles come in all sorts of designs, shapes, and colors. In Homebrew Nation (on page 12), Eric Strauss shares one design, but there are many to choose from. Including this one that uses wooden planks and decorative trim: http://byo.com/story1980

Beer and BBQ

Want even more beer & BBQ recipes? 11 years ago we ran a contest asking our readers to send us their favorite beer & BBQ recipes, which we then selected the best of. Whether it is Bell's Kalamazoo Stout Teriyaki Steak, Rauch's Smoke on the Water Beer-B-Que Sauce, or Thai-Style Beer Marinade, we've got plenty of recipes to wet your whistle: http://byo.com/story186

Homebrew Label Gallery

This year was *BYO*'s 20th homebrew label contest. Check out the archives to see how homebrew labels have evolved over the past two decades in our label photo gallery: http://byo.com/photos/label-gallery

Choosing Hops

There are dozens of hop varieties, and hops from every major growing region are readily available to U.S. homebrewers. In addition, hop breeders throughout the world introduce new varieties each year. Choosing the right hops for your brew can seem difficult amid all the options. Use these tips to help select hops for your next brew: http://byo.com/story461

Brew Your Own — THE HOW-TO HOMEBREW BEER MAGAZINE

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Special Subscription Offer
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Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for $28.00 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. Canada Post: Return undeliverables to P.O. Box 25542, London, ON N6C 6B2. 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 $33; for all other countries the print subscription rate is $45.

Volume 21, Number 4: July-August 2015

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BEYOND BUDWEISER I

I thoroughly enjoy your magazine and always look forward to your articles. I have to admit that I am always intrigued by at least one if not more articles, but recently was quite put off by one in particular. In the 2015 May–June edition the article "Beyond Budweiser" sparked some emphatic conversations. The same question arises when this topic is talked about; Why would *BYO* entertain such an article when AB InBev portrays and acts upon deceiving public interest, or destroying or buying smaller craft breweries to increase its bottom line? How does that M.O. fit into what homebrewing stands for and why would they put this article in their magazine? Now we are not foolish and understand that AB InBev served a purpose in our short history of craft beer but my customers want to support breweries that are truly craft. That begged to ask the question then, what is craft, truly? How can that be defined? One definition that has a common thread amongst our homebrewing folk here is that a brewery is not craft when quality is compromised and brewing solely becomes a need to increase the bottom line.

Warren Wilson, Homebrew University • *Hackettstown, New Jersey*

BEYOND BUDWEISER II

I was really disappointed to see a story featuring AB InBev in the latest issue. Pilot brewery or not, they are against everything we as homebrewers and craft beer lovers stand for.

Todd Williams • *Chicago, Illinois*

Brew Your Own *Editor Betsy Parks replies: "Thanks for writing in with your thoughts on the "Beyond Budweiser" story, Warren and Todd. We did receive other similar letters about the piece, as I expected we might before it ran. We knew that it would be a bit controversial among some homebrewers, but we thought that the story was interesting and that many of our readers would enjoy seeing what goes on behind the scenes at a macrobrewery.*

I did also reach out to Mitch Steele, Brewmaster at Stone Brewing Co., for his thoughts on the story, and your (and other) letters. As you may or may not know, Mitch used to be the brewmaster in charge of AB's research brewery that was described in the BYO *article. It's also worth noting that other well-known craft brewers are*

contributors

Joe Vella is a practicing physician living in Bloomfield, New Jersey and has been homebrewing for 15 years. He homebrews using extract, partial mash, and all-grain techniques depending on the situation and his mood, and when all-grain brewing he uses both the cooler mash tun and brew-in-a-bag methods. His favorite styles to brew are traditional English and Belgian-style beers, and he prefers simple recipes using properly sourced ingredients. His brewing philosophy is a combination of art, science, and culinary skill. He also enjoys cooking and the art of pairing beers with different dishes.

In this issue, beginning on page 57, Joe shares four gold and silver medal-winning commercial fruit beer clone recipes.

Terry Foster was born in London, England and holds a PhD in chemistry from the University of London. He now lives part of every year near New Haven, Connecticut, where he often brews commercially with the brewers at BrüRm@BAR — New Haven's first brewpub. Terry is known to many homebrewers as the author of the *Pale Ale* and *Porter* books in the Classic Beer Style Series (Brewers Publications). Terry is also a frequent contributor to *Brew Your Own* as both the regular author of the "Techniques" column as well as many feature stories.

In this issue, on page 78, Terry discusses designing a beer using some "oldie but goodie" hop varieties that have been overlooked in the last few decades of craft and homebrewing. Terry also tackles the subject of head retention in the "Techniques" column starting on page 86.

Mark Molinaro is a chef with more than 20 years of experience. He received his degree from the New England Culinary Institute (NECI) and has held positions at the Four Seasons Hotel Company and the Ritz-Carlton Hotel Company. He later worked as a chef instructor and Executive Chef for NECI and is now a lecturer at Northern Arizona University at the W. A. Franke College of Business' School of Hotel and Restaurant Management. He has also been homebrewing for the past three years.

In this issue, Chef Mark combines cooking and brewing in his *Brew Your Own* writing debut about grilling with homebrew. Check out his food and beer recipes, starting on page 38.

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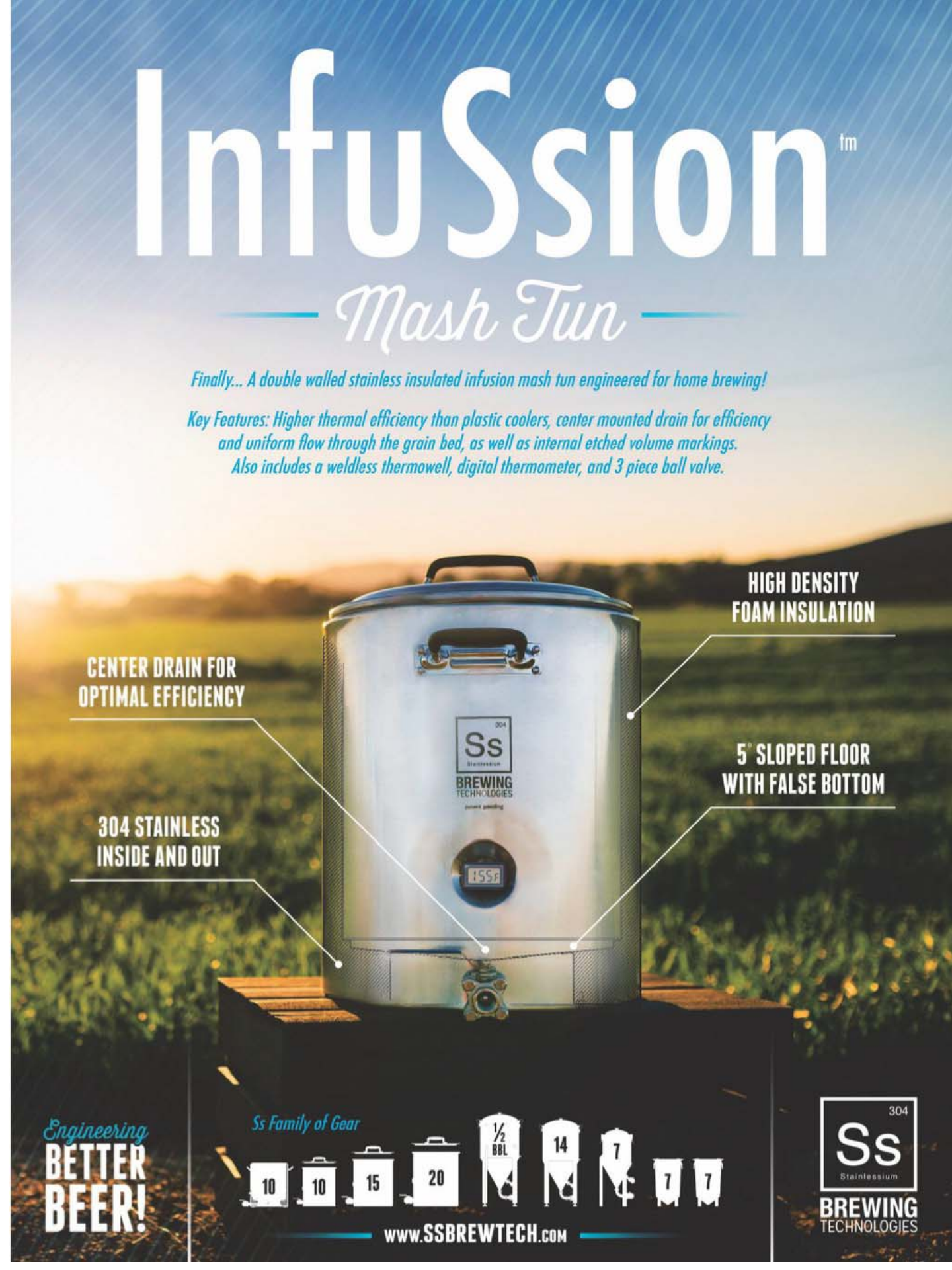

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MAIL

alumni of AB, including Dan Carey of New Glarus Brewing Company in New Glarus, Wisconsin. Here is what Mitch had to say: 'I can say in defense of the article that AB has some of the most talented brewers in the business, and I do think it's interesting how they approach developing new beer recipes. I think it's also interesting that many of the beers that are tested never make it to market. That demonstrates how AB is more sales driven and focused on marketing than they are in making interesting beers. Though their brewers are really focused on innovation and quality. I experienced this when I did new products in the 1990s, we made some really great innovative beers, like a hefty Scotch ale and a kick-ass IPA, but never released them. The company stance at the time was to purposely not be innovative, and always release beers designed to compete with beers already on the market. I think the objection to this article, while understandable, is also largely unfounded. I think it's good to understand how various brewers approach the business and approach beer innovation.

And to respond to the second part — it depends on who you ask how craft is defined. The Brewers Association has the most widely recognized and accepted definitions, though there are many who would not agree with excluding Widmer, Redhook, Goose Island, 10 Barrel, Elysian etc. from the realm of craft brewing simply because of their ownership structure. To me "craft brewing" is about attitude and approach to the business. Focus on the brewers and their beers, focus on innovation, pushing boundaries, and taking risks, and focus on getting people to become craft beer fans, primarily through grass roots interaction. This is what AB doesn't get and never will.'"

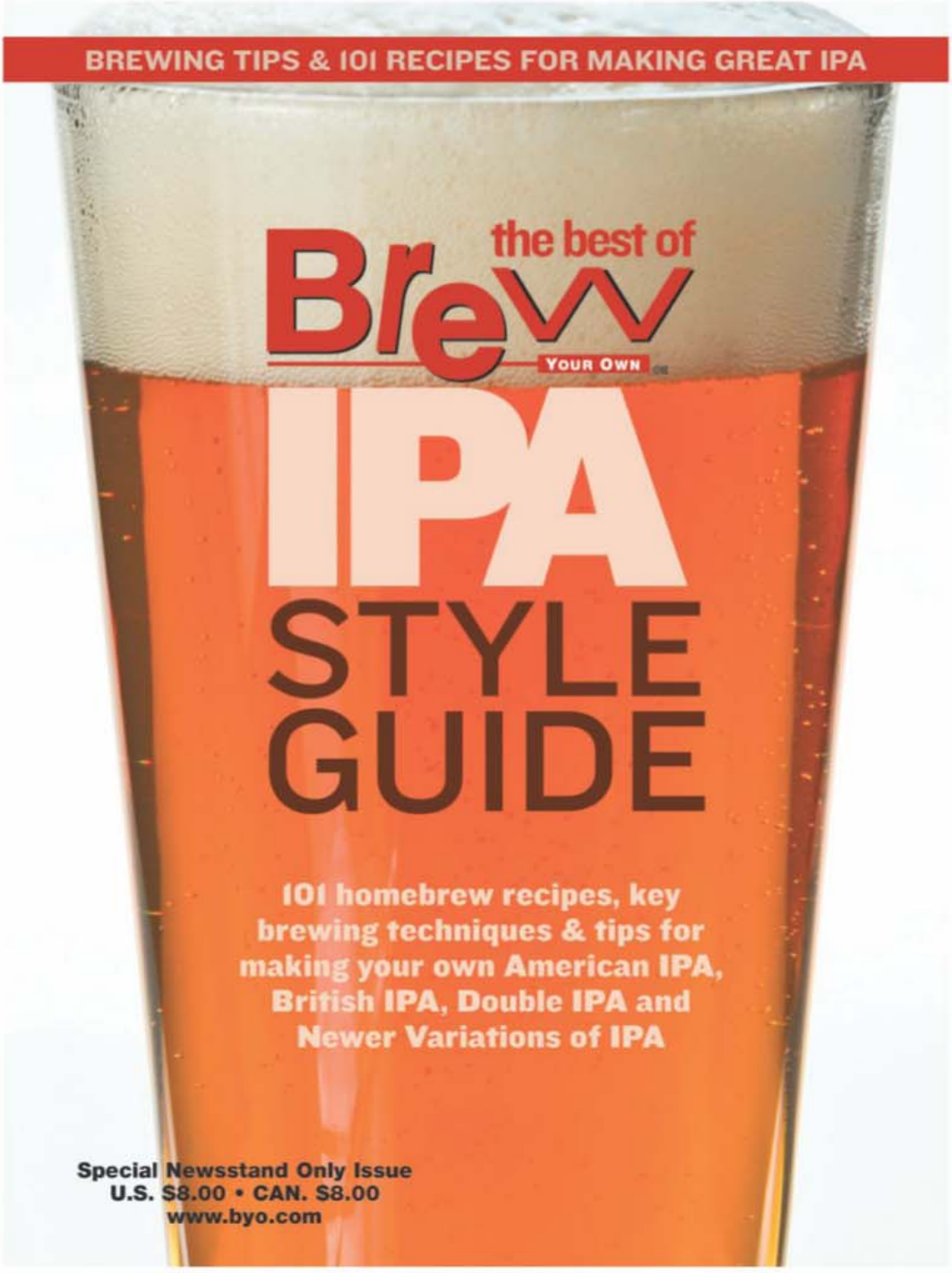
HOP CAGE QUESTION

As a follow up to Tyler Haymond's Reader Project in the May-June 2015 issue of *BYO*, is this method more susceptible to mold and fungus? Also, is there a quick process for harvesting the mature bines?

Christopher Whiting • *via Facebook*

Brew Your Own *Editor Betsy Parks replies: "I think it really depends on the pest and disease pressure where you will be growing the hops. For instance, the hops at* BYO *headquarters have never required spraying and we've seen nary an aphid, but other hop growers have had quite the opposite experience. If you live in an area where you have already had troubles with pests and disease when growing hops, this setup might not be the right design for you as it would indeed be difficult to spray. As for harvest, however, it's just a matter of clipping the strings and harvesting as you would with any trellis. If you end up designing a trellis that solves the spraying question, be sure to send it in to me so I can share it with the rest of the homebrewing community!"*

COMING SOON!



The newest addition to the Best of Brew Your Own special issue series. Keep an eye on byo.com/store or sign-up for the BYO e-newsletter on the Byo.com homepage to be notified when the new *IPA Style Guide* is released!

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READER PROJECT: DIY TAP HANDLES

ERIC STRAUSS • FISHERS, INDIANA

After planning for more than two months for our annual Strausstoberfest party (more on that on page 64), I realized two days before the party that I didn't have tap handles. After a quick trip to the hardware store, I had a plan. This should take under an hour for two handles. More time will be required based on the level of finishing work you want.

MATERIALS LIST (FOR TWO TAP HANDLES)

Wooden staircase spindle
(2) ⅜"-16 brass inserts for wood
Installation tool for insert

STEP BY STEP

1. Cut both ends of your spindle to the length you want. There may be a stub or extra hole at one end that you may want to cut off.

2. Drill a hole in the bottom as straight along the axis of the handle as you can. To avoid splitting the wood, start with a smaller bit and work your way up to the final diameter required by your inserts. Most require a ½-inch diameter. Make sure you drill deep enough so that the full ½-inch diameter is as deep as the length of the insert.

3. Line up the insert. The groove in one side is what you use to drive the insert into the handle with a special T-handle or drive tool for your drill.

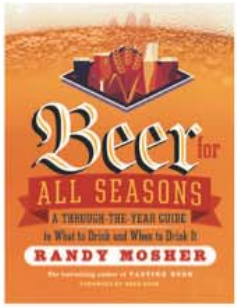
4. I used a standard ⅜"-16 bolt with a wing nut. Thread the insert onto the bolt along with the wing nut as shown. Tighten the wing nut to the insert and then use that to drive it into the tap handle. Hardwood spindles will require more effort to install. Be patient, so you don't crack the handle.

5. If you drilled by hand, your holes will most likely be slightly crooked. Go ahead and install your unfinished handle onto a faucet to determine which side oriented toward the front is the most straight, then mark it and use that side for your label.

6. When it's time to finish your handles, I've painted and stained different handles using another ⅜"-16 bolt to hold the handle while I painted. I've found what works best for labels is to design them on the computer and print them out on normal paper. Then my wife helped by using Mod Podge (or something similar) to adhere and seal it to the tap handle.

For more homebrewing-related DIY projects, check out Eric Strauss' website at www.fermware.com

BYO WHAT'S NEW?



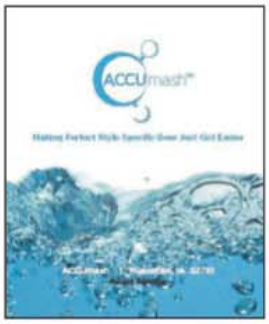
BEER FOR ALL SEASONS

Beer expert and best-selling author of *Tasting Beer*, Randy Mosher's newest book *Beer for All Seasons* is an ultimate guide for beer lovers. Arranged by season, this book explores the agricultural and historical reasons certain beers are made and enjoyed at particular times of the year, and Mosher includes guidelines for the best beer styles to try at any given time. Mosher also explains which beers taste best with holiday and seasonal foods and offers month-by-month event guides including information on Beer Weeks and beer-focused holidays, conferences, and festivals. In the final chapter, Mosher leads readers through the ultimate beer tour, "Around the World in 80 Beers." Available at major booksellers.

MUNICH CLASSIC YEAST

New from Lallemand, the Munich Classic wheat beer yeast strain is used by a number of commercial breweries to produce a flavorful, full bodied, and aromatic Bavarian-style wheat beer. Munich Classic can give amplified clove (phenol) and banana (iso-amyl acetate) characteristics for wheat beer recipes versus Lallemand's original Munich strain. The strain is known for quick starting and vigorous fermentations that can be completed in four days above 63 °F (17 °C). It has a medium to high attenuation and is a non flocculent strain. Aroma and flavor have balanced fruity esters and spicy phenol notes. Available at better homebrew suppliers.

ACCUMASH



Besides sanitation and yeast management, water chemistry is the most common cause of defects in homebrewed beers. ACCUmash™ offers a solution that allows you to target the right water characteristics for your brew and remove the stress of water chemistry. ACCUmash™ alters your strike water profile to deliver the perfect pH and mineral/ion content for each batch. It's as simple as stirring it into your mash right after the grain. ACCUmash™ is intended to be used only with distilled or reverse osmosis water. Available at better homebrew suppliers.

7 CALENDAR

JULY 15
E.T. BARNETTE HOMEBREW COMPETITION
Fox, Alaska

$500 is up for grabs as the grand prize for Best of Show in the 19th annual E.T. Barnette Homebrew Competition. Great prizes and custom medals will also be awarded to the 1st, 2nd and 3rd place winners of each of the seven judged categories. The entry deadline is July 15 and judging in this AHA/ BJCP sanctioned competition will be July 18. The seven categories (2008 BJCP Style Guidelines) that will be judged are: Pilsner, English Pale Ale, American Ale, Porter, Stout, IPA, and Fruit/Spice/Herb/Vegetable Beer. The fee is $5 per entry. More information can be found at http://ow.ly/u5qqC.

JULY 20
CRAFT OF BEER HOME BREW CHALLENGE
Bennington, Vermont

The first annual Craft of Beer Home Brew Challenge and street festival will be held August 1. The registration fee is $10 to enter the homebrew competition, which is limited to the first 50 registrants. Registration is open until July 20. This is a "Best of Show" competition voted on by those in attendance. The Best of Show homebrewer wins the opportunity to brew their winning recipe at Madison Brewing Co. where it will be available on draft. The street fair will include live bands, food trucks, vendors, and of course the best homebrewed beer in the area. This is a family friendly event. Admission to the street festival is free and $15 for unlimited homebrew sampling. Find more at www.craftofbeer.weebly.com.

AUGUST 7
HOT SUMMER BREW OFF
Kansas City, Missouri

Sponsored by the Missouri Mashers homebrew club, entries into the second annual Hot Summer Brew Off must be in by August 7. Judging will be August 11-12. The results will be announced at Zona Rosa Micobrew Festival, on August 15. This is an AHA/BJCP sanctioned event and will be using the new 2015 BJCP Style Guidelines. The fee is $7 per entry and there is a limit of 200 entries, so get your best homebrew in early. This competition is only accepting entries from select categories. Find more at http://www.momashers.talkhops.com

BY DAWSON RASPUZZI

WORT AERATION

"The yeast is the most significant factor in determining the quality of fermentation, and oxygen can be the most significant factor in determining the quality of the yeast." — How to Brew, *John Palmer.*

What John Palmer is referring to in the quote above is wort aeration — the practice of adding oxygen to the cooled wort immediately prior to the start of fermentation. The presence of oxygen in your fermentating wort is essential for yeast vitality and growth. The presence of oxygen allows yeast to produce lipids that help build cell membranes that are needed for healthy yeast. A lack of adequate oxygen prevents proper yeast growth and results in underattenuated wort or beer. This is especially important for higher gravity beers where a high yeast cell count is necessary to convert all of the sugars to alcohol because oxygen is less soluble in high gravity (high sugar) worts.

The rate of oxygen you want in your wort immediately prior to pitching your yeast varies by style, yeast strain, fermentation conditions, and other factors, but you will generally want 8 to 16 mg/L (ppm) oxygen in your wort. If you are unable to get to those rates with the equipment you have, remember it is important to add *some* oxygen rather than skip this important step all together.

So how do you get that oxygen into your wort? There are a few different ways. The most economical is shaking, stirring, whipping, or splashing the wort in your fermenter, or dumping it from one vessel to another causing the wort to be well disturbed. This doesn't require any additional equipment, although it is also the most labor-intensive method.

The second method is using a stainless steel or bronze aeration stone hooked up to an aquarium pump. With this setup, air is forced through microscopic pores in the stone for 15 to 30 minutes to aerate the wort.

Another method that can save time and energy is adding a piece of hard plastic or stainless steel tube near the end or middle of your racking hose and puncturing it with needle-size holes. As the wort flows through the hose it will draw air in, creating a Venturi-style aerator. A further explanation and directions to build an in-line aerator was published in the "Homebrew Hacks" feature in the March-April 2015 *BYO*.

Because air is only about 21 percent oxygen, all of these methods that incorporate mixing air with wort will max out with a wort around 8 ppm oxygen. If you want a higher rate of oxygen, the only way to get there is by adding pure oxygen directly to your wort. Oxygen tanks can be purchased from welding supply stores, hardware stores and even some homebrew shops. One method is adding oxygen to the headspace of your carboy, capping it, and then shaking vigorously for 30 seconds or so. Or, you can attach an oxygen tank to an aeration stone and instead of releasing air as described earlier, the stone will deliver tiny bubbles of pure oxygen into your wort, bringing it to a suitable level within a minute or so. You do not want to let it go too long, as there are potential negative consequences with over-oxidating the wort: Like a loss of desired aromas and stalled fermentations.

Aeration can be done immediately before adding your yeast or right after, but you don't want to aerate your wort until it is cooled to fermentation temperature. Aerating hot wort can lead to unwanted color pick-up and decreased solubility.

BYO REPLICATOR

BY MARC MARTIN

DEAR REPLICATOR, I'm hoping you can help me with a beer I never thought I would plan to brew. Let me say that I have been somewhat a beer purist and was totally against fruit in any brew. That changed with my first taste of the apricot saison from The Burnt Hickory Brewery near Atlanta, Georgia. All of their beers were very good but the wallop of delightful apricot in this beer was amazing — I am converted. They don't offer this beer all the time and it is a 110-mile drive for me anyway. Let me know if you can get the details and I'll never poo-poo fruit beers again.

David Griffith
Chattanooga, Tennessee

I would question if there is another brewery owner/brewer in the country that has received a TV News Emmy award. Owner of The Burnt Hickory Brewery Scott Hedeen was awarded 15 while employed for 20 years as a television news cameraman (10 of those for the Atlanta NBC affiliate station). During that same time he also became an accomplished homebrewer. As many of us did, he started with 5-gallon (19-L) buckets, cans of liquid extract and packets of dried yeast that came with them. The news business was changing and eventually he decided it was time to expand upon his love of making great beer. Knowing that he would need more knowledge of brewing on a commercial scale he completed the Siebel Institute's concise course in 2010.

After several months of federal and state applications, Scott opened the doors of The Burnt Hickory Brewery in Kennesaw, Georgia during the spring of 2012. He brewed the first batch on April 1 of that year. The brewery is named after Burnt Hickory Road that goes through Kennesaw Mountain. He purposely started with only a 2-barrel heat exchanged recirculating mash system (HERMS) he lovingly named "The Falcon." He wanted to start small in order to avoid loans or taking on investors and was able to obtain the initial financing by selling his collection of punk rock albums and Nirvana memorabilia. As he explained, the other reason he wanted to start small was "to properly dial in his recipes and maintain full control over the product." All of his initial beers were based on his homebrew recipes and he wanted to make sure the profiles carried over when scaling up to commercial size batches.

Georgia's laws were not very conducive to supporting the burgeoning craft beer revolution. "Compared to places like California, Colorado, and Oregon, it was like a babe in the woods," he said. Acknowledging that he was not exactly in a beer geeks paradise, Scott decided that he would have to create somewhat of a unique business model. Hence the self-proclaimed title of "a small brewery with big beers." It seems he has fulfilled that moniker with beers like Cannon Dragger, a potent IPA, Fighting Bishop, a Belgian Tripel, Courageous Conductor, a red velvet Porter and, of course, the White Flag Third Strike Apricot Saison.

The real goal of the beer, Scott said, was to have the apricot flavor dominate — making this beer live up to his slogan "to be minimal would be criminal!"

Even though his plan has been to stay small, popular beers have forced him to grow. When being faced with performing all of the duties became overwhelming he brought on Will Avery to become the Brewer. With a background of 12 years of homebrewing, Will had plenty of opportunities to create his own good beers. Needless to say, he caught on quickly and the lineup of brews expanded.

Unique beers of high quality created increased demand. This dictated the need for more capacity. The big move came in November of 2014 when they brewed their first batch on a new 20-barrel system, named "Clementine," from Sprinkman Industries in Wisconsin. This has allowed them to expand distribution throughout Georgia. They are presently hand bottling 22 oz. (650 mL) bottles, which takes a full hour to package one barrel of beer. The next addition is scheduled to be a 6-head automatic filler.

Scott reports that White Flag Third Strike Apricot Saison was originally based on Randy Mosher's recipe for "Nit Wit," however over time the recipe has been tweaked so much that it is now much closer to a saison than a wit. The beer's name is a tribute to one of his favorite punk rock bands. The selection of hop varietals and yeast was made to complement the fruit profile. Scott recommends a long conditioning period to allow the complex flavors to fully develop. The real goal of the beer, Scott said, was to have the apricot flavor dominate — making this beer live up to his slogan "to be minimal would be criminal!"

David, you won't have to make that long drive for your new favorite fruit beer because now you can "Brew Your Own." For more information about The Burnt Hickory Brewing Company and their other fine beers visit them on the web at www.burnthickorybrewery.com or call the brewery at 770-514-8812.

THE BURNT HICKORY BREWERY'S WHITE FLAG THIRD STRIKE APRICOT SAISON CLONE

(5 gallons/19 L, all-grain)
OG = 1.069 FG = 1.008
IBU = 38 SRM = 6.2 ABV = 8%

INGREDIENTS

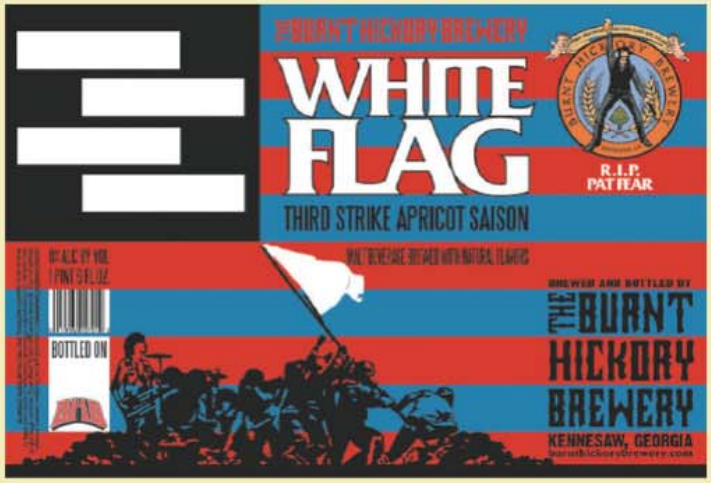
7.5 lbs. (3.4 kg) Pilsner malt
3.75 lbs. (1.7 kg) white wheat malt
1.25 lbs. (0.56 kg) rye malt
12 oz. (0.34 kg) caravienne malt (20 °L)
8 oz. (0.23 kg) corn sugar (10 min.)
5 lbs. (2.27 kg) apricot purée (secondary)
6.1 AAU Citra® hop pellets (60 min.) (0.5 oz./14 g at 12.2% alpha acids)
3 AAU Amarillo® hop pellets (60 min.) (0.3 oz./8.5 g at 10% alpha acids)
0.5 oz. (14 g) Citra® hop pellets (0 min.)
0.5 oz. (14 g) Amarillo® hop pellets (0 min.)
½ tsp. Irish moss (30 min.)
½ tsp. yeast nutrient (15 min.)
White Labs WLP566 (Belgian Saison II) or Wyeast 3711 (French Saison) or Lallemand Belle Saison yeast.
¾ cup corn sugar (if priming)

STEP BY STEP

This recipe is a single step infusion mash. Mix all of the crushed grains with 4.9 gallons (18.5 L) of 168 °F (76 °C) water to stabilize at 148 °F (64 °C). This is a medium thin mash using 1.5 quarts of strike water per pound of grain (3.1 L/kg). Mash for 90 minutes, then slowly sparge with 175 °F (79 °C) water.

Collect approximately 6.2 gallons (23.5 L) of wort runoff to boil for 90 minutes. While boiling, add the hops, Irish moss, yeast nutrient and 10-minute corn sugar addition as per the schedule.

After the boil is complete, cool the wort to 75 °F (24 °C). Pitch your yeast and aerate the wort heavily. Allow the beer to cool to 67 °F (19 °C). Hold at that temperature for the first two days and gradually ramp up to 76 °F (24° C) over the next 3–7 days. Hold at 76 °F (24° C) until fermentation is complete. This may take 10–14 days. Gently transfer to a carboy, avoiding any splashing to prevent aerating the beer and add the apricot purée. Allow the beer to condition for an additional week. Prime and bottle condition or keg and force carbonate to 2.8 volumes CO_2. Allow the beer to age for two more weeks to fully develop the flavors and enjoy your White Flag Third Strike Saison clone.



THE BURNT HICKORY BREWERY'S WHITE FLAG THIRD STRIKE SAISON CLONE

(5 gallons/19 L, partial mash)
OG = 1.069 FG = 1.008
IBU = 38 SRM = 6.2 ABV = 8%

INGREDIENTS

6.6 lbs. (3 kg) Coopers light, unhopped, liquid malt extract
1.75 lbs. (0.79 kg) Pilsner malt
12 oz. (0.34 kg) white wheat malt
4 oz. (0.11 kg) rye malt
2 oz. (57 g) caravienne malt (20 °L)
8 oz. (0.23 kg) corn sugar (10 min.)
5 lbs. (2.27 kg) apricot purée (secondary)
7.9 AAU Citra® hop pellets (60 min.) (0.65 oz./18.4 g at 12.2% alpha acids)
4 AAU Amarillo® hop pellets (60 min.) (0.4 oz./11.3 g at 10% alpha acids)
0.5 oz. (14 g) Citra® hop pellets (0 min.)
0.5 oz. (14 g) Amarillo® hop pellets (0 min.)
½ tsp. Irish moss (30 min.)
½ tsp. yeast nutrient (15 min.)
White Labs WLP566 (Belgian Saison II) or Wyeast 3711 (French Saison) or Lallemand Belle Saison yeast.
¾ cup corn sugar (if priming)

STEP BY STEP

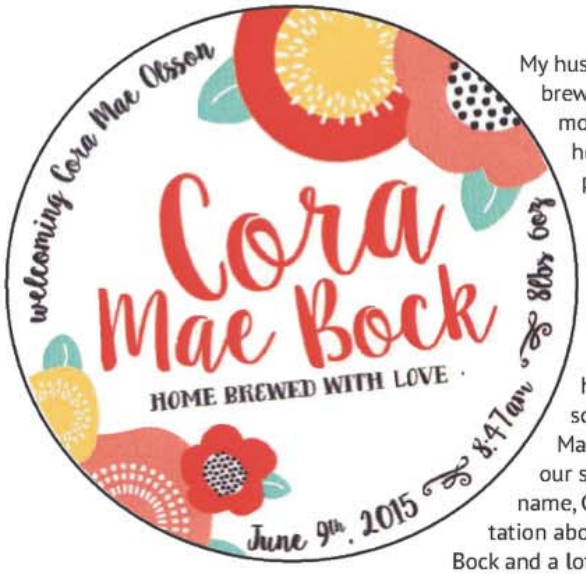
Steep the milled grain in 2.5 gallons (9.5 L) of water at 148 °F (64 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.8 L) of hot water. Add the malt extract and boil for 60 minutes. While boiling, add the hops, Irish moss, yeast nutrient and 10-minute corn sugar addition as per the schedule. When the boil is complete add the wort to 2 gallons (7.6 L) of cold water in the sanitized fermenter and top off with cold water up to 5 gallons (19 L).

Follow the remainder of the step by step instructions from the all-grain version of this recipe.

Note: If you are unable to locate apricot purée, whole apricots may be substituted in either the all-grain or the partial mash recipe. If using fresh apricots, discard the pit and cut the apricots into small slices. Immerse the slices in 190 °F (88 °C) water for two minutes to sterilize the fruit. Crush the slices and allow them to cool before adding them to the secondary fermenter.

BYO STORY BEHIND THE LABEL

JILLIAN OLSSON • NEW BERLIN, WISCONSIN



My husband and I are homebrewers (and by that, I mean mostly my husband, but I do help!). We are currently expecting our first child, due in the beginning of June. We have had the name Cora Mae Olsson picked out for quite a while and I wanted to do something fun and creative for her birth announcement — so I brought up brewing a Mai Bock and calling it by our soon-to-be daughter's name, Cora Mae Bock. After hesitation about trying to brew a Mai Bock and a lot of research, my husband jumped on the opportunity to try something new. It's currently brewing (as is our baby) and will be done right before she's born. So as for date/weight/time, that is just filler information on the label until she's born and I'll have all of the real information on the labels that I get printed. The design of the label is based on her nursery theme, color, and bedding. We can't wait to meet our baby girl AND try our beer!

Everyone, and we mean *everyone*, is getting into homebrewing with *Brew Your Own* magazine!

@Tommyguns03:
Dad let's make some brew! I'll pick the recipe.

To my Friends at *Brew Your Own* Magazine,

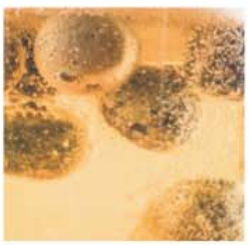
I thought you might enjoy the attached picture of my 5-month-old son Austin enjoying your magazine. It's never too early to learn about brewing good beer! Keep up the good work with the magazine articles, projects, and recipes so that me and my son can continue to enjoy it for years to come. I can't wait to brew my first batch of beer with this little guy, but I guess it will be a while :)

Russell White
Charleston, SC

BYO.COM BREW POLLS

What is your favorite base beer style to brew a fruit beer with?

44%	Wheat
21%	Pale ale
16%	Sour
9%	Stout
10%	Other



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BY DAWSON RASPUZZI

A TWIST ON YOUR FAVORITE STYLE

Brewing beer with fruit

It's summer time, which means it's a great time to brew and enjoy a fruit beer on the back porch. Get inspired by the story on page 54 and use tips from the brewers of Ballast Point and Funky Buddha to craft your own fruity homebrew.

I firmly believe it takes three tries, at any recipe, to dial in your final flavor profile.

Photo by Rick Nocon

Colby Chandler is the Vice President and Specialty Brewer at Ballast Point Brewing & Spirits in San Diego, California. Colby has been a part of the Ballast Point team for 18 years, helping develop many of the beer styles in its current portfolio and helping support locally-made beer with his duties as President Emeritus for the San Diego Brewers Guild.

Finding a bridge between the base beer and the fruit is usually my first thought in recipe development. Whether it is a honeydew sweetness from a particular malted barley or the tropical fruit flavors in new hop varieties, or the apricot esters you can create from a certain strain of yeast. You really need to decide if you want layers of the fruit flavor coming from all the main ingredients of beer; like a peach ale that uses Caravienne malt, British ale yeast and Galaxy hops (which all have a peach component to them). The other question is will the fruit be showcased as its own layer of flavor, with complementary beer ingredients that do not taste like the fruit being used? Think of Meadowfoam honey (honey with marshmallow flavor) in a cherry, pineapple and coconut ambrosia cream ale.

Another approach is adding fruit to an existing beer that we already make. Our robust cask program allows us to play and add all kinds of un-fermentable fruit components to beers already being produced. Whether it is grapefruit rind, habaneros, cucumbers or avocados, the 10.8-gallon (41-L) vessel is a perfect way to experiment and find complementary or bridge flavors, from savory to sweet fruits, and add them to an existing beer. The alcohol in the finished beer acts as a low-grade tincture to help dissolve oils from the fruit into the beer over time. Most of the time when adding adjuncts to existing beers we have a goal of enhancing the flavors of the beer and not overwhelming them. On the other hand, when we design fruit beers from scratch we tend to make the fruit as dominate as possible.

I always pick my yeast to complement the fruit that I am using. You can also use higher fermentation temperatures to amplify the fruity esters, which helps build up the perceived flavor from the fruit you will be using. I would also suggest that the more acidic the fruit is the less bitterness you need in the beer. Acidity and bitterness is a battle I don't want to be a part of when drinking a beer.

I firmly believe it takes three tries, at any recipe, to dial in your final flavor profile. Keeping a consistent wholesale source of raw ingredients will help keep your notes on amounts easier to replicate and will help in future recipe formulations. Nothing will throw off fruit amounts in recipes you are trying to duplicate more than procuring your ingredients from multiple sources. On your first brew the goal is to get into the nosebleed seats at the ballpark with an educated recipe formulation. By the third brew you have tweaked the recipe slightly each time and should be right where you want to be, the seats behind home plate.

A few other tips for homebrewers: I really like the quality and ease of using seedless aseptic purées if you can. Keep heat to a minimum. If using fresh fruit, unpasteurized juice or zest, make a low temperature tea with 180 °F (82 °C) water for 30 minutes before adding to fermenter ('tea' and fruit). Pectic enzyme is a great way to get rid of the pectin haze and helps with overall clarity of the final product, but be prepared to lose some volume from the silty sediment that the pectic enzyme creates.

Ryan Sentz is the Co-founder and Head Brewer of Funky Buddha Brewery in Oakland Park, Florida. He has been brewing his own beer since before he could legally drink it, and has parlayed that love of the craft into a lineup of distinct beers using natural, food-centric ingredients.

The base beer style is the first thing that I think of when designing a fruit beer recipe as each style is going to react differently with your fruits. I've preferred to use fruit in light beers like blondes or wheat ales. We've done a lot of fruit Berliners as well. There is definitely not a style that we wouldn't try. You need to decide what role you want the fruit to play. Then consider how the beer stands alone and then add fruit based on that. For instance, if I brewed a high gravity barleywine with a lot of residual sugars I would stay away from fruit that would add even more sweetness.

We always try to use fresh fruit whenever possible, or frozen if they aren't in season. We've used purées many times and have been happy with the results. We've never used fruit extracts, but I wouldn't say we never would. We just would prefer not to. At the end of the day, I don't think there is a wrong choice. Try as many fruit types (juice, concentrate, frozen, fresh, dried, etc.) as you have access to and see what you like best. If you can do side-by-sides with different types, do it. But if you are tweaking a recipe, don't change more than one variable at a time, especially if it's a new recipe. If you end up changing the hops, mash temperature and fruit amount and end up enjoying the beer more, it's hard to say what change made the difference.

Designing a recipe is pretty much all trial and error at first. At this point after using so many different ingredients in different ways, I have at least a general idea of what they will do in my beer. Using 5-gallon (19-L) batches as the recipe, I would say we've used anywhere from 2–6 pounds (0.9–2.7 kg) of fruit per batch. You can cut that in almost a third if you are using dried fruit.

We've been all over the place on when to add fruit. We've mashed with it, added it to the boil, during fermentation, as well post-fermentation. All work to varying degrees, but definitely the safest from a microbiological standpoint would be on the hot side. BYO

BY ASHTON LEWIS

OVER-CARBONATING MY BOTTLES

Increasing efficiencies, aerating with oxygen

Q I HAVE BEEN HAVING PROBLEMS WITH OVER-CARBONATION IN MY BOTTLES. I GIVE MY BATCHES PLENTY OF TIME TO FINISH THE SECONDARY AND CHECK THE HYDROMETER READING TO BE SURE THE FERMENTATION IS DONE. THEN I ADD 5 OZ. (0.14 KG) OF CORN SUGAR AND WAIT ABOUT TWO WEEKS BEFORE SAMPLING THE FIRST BOTTLE. IT IS ALMOST ALWAYS OVER-CARBONATED AND NEARLY ALL FOAM. WHAT AM I DOING WRONG? MY BREWERY IS AT 4,000 FEET, COULD MY ALTITUDE BE THE PROBLEM?

TALLEY POLLARD
LITTLE SWITZERLAND, NORTH CAROLINA

Whenever I encounter a problem that simply does not add up, the first thing that comes to my mind is the accuracy of measurements.

A I think your problem is too much sugar added for bottle conditioning. But before I jump into this topic, I want to focus on the state of beer when it is opened. All carbonated beverages are super-saturated with carbon dioxide, meaning that there is more CO_2 in solution when the container is opened than permitted by the atmospheric pressure outside of the container. This is why carbonated beverages are fizzy when the pressure of the container is released.

In the case of beer, carbonation levels up to about 3.5–4.0 volumes or about 7–8 grams of carbon dioxide per liter cause little problem when a bottle or can is opened. Most beer in the world contains somewhere between 2.5–2.8 volumes of carbon dioxide (~5–5.6 g/L) and bottle conditioned styles from Belgium and German weizen beers are often in the 3.5–4 volume range. These beers do not typically gush, even when opened at higher elevations. I have enjoyed many a fine beer on the tops of mountain peaks without major incident.

The thing about super-saturated liquids is that anything that is a nucleation site can cause rapid and seemingly explosive gas release. A fun parlor trick in the kitchen is to heat water in a very clean stainless steel pot with fairly pure water. If you control things just right, which typically happens by mistake, you can cause water that is hotter than the boiling point, but not yet rolling, to gush into steam by tossing in a packet of powder or something as innocuous as a tea bag. The same sort of thing occurs when soda is poured over coarse ice cubes or beer is poured into a glass containing a few salt crystals. But under normal conditions, a bottle of beer can be opened and poured without too much fanfare.

So now it's time to take a huge turn in the flow of this question. And that is onto the topic of why the metric system makes problem solving easy. Bet you didn't see that one coming! Above I slipped in the metric equivalent to the volume, which is a unit that both makes sense and no sense at the same time. A liter of beer containing 3 volumes of carbon dioxide would fill a balloon with 3 liters of carbon dioxide if all of the carbon dioxide were driven from solution. And this cannot happen under atmospheric pressure. And doing any simple math with this weird term is simply not feasible. The metric sys-

tem solves all of these problems.

Hold onto your bottle opener! When one gram of glucose is fermented by yeast (assuming 100% efficiency), 0.49 grams of carbon dioxide is produced. When you add 5 ounces of priming sugar (corn sugar, aka glucose) to your bottling bucket (I am assuming weight here, not 5 ounces of volume) you are adding 142 grams of glucose. And when that glucose is fermented by yeast during bottle conditioning it yields 70 grams of carbon dioxide. Add in the assumption that your nominal batch size is 5 gallons or 18.9 liters, this equates to 3.7 grams of carbon dioxide per liter of beer attributed by the priming sugar. But beer after fermentation and cold conditioning, even at atmospheric pressure contains at least 3 grams of carbon dioxide per liter of beer, bringing the total up to about 6.7 grams per liter, or 3.4 volumes in US terms. This is a wee bit on the high side of things, but nothing to give huge concern.

The assumption above about your hypothetical carbonation level assumes a beer volume of 18.9 liters (5 gallons). If you fiddle around with the numbers in my logic above with your actual bottling volume, say 15 liters, you will discover that you may have about 8 g/liter or 4 volumes of carbonation in your beer. This level of carbon dioxide coupled with your elevation very well could lead to gushing bottles, especially when dealing with beer that is likely to contain more yeast solids (nucleation sites) than commercial beer.

The basic problem is likely a result of using too much priming sugar. But the underlying problem, with this and others, may be that weights and measures cited in recipes are all based on wort and beer volume. If you follow a recipe for a 5-gallon (19 L) batch of beer and end up with only 4 gallons (15 L) the ingredient additions that are pegged to beer volume need to be adjusted. Likewise, if you are adding hops based on 10 gallons (38 L) of wort after boiling and you predict only ending up with 8 gallons (30 L), you should reduce hop additions by 20%.

Whenever I encounter a problem that simply does not add up, the first thing that comes to my mind is the accuracy of measurements. Many homebrewers don't measure a lot of things because of the seemingly precise instructions of recipes. My bet on the cause of your problem is in part, if not entirely, due to assumptions made about beer volume at packaging, the weight of sugar required for the job and/or the relationship between sugar volume and sugar weight.

Q **I AM LOOKING FOR IDEAS TO HELP ME GET MORE YIELD FROM A BATCH OF MY HOMEBREW. I FIGURE THE TIME SPENT FOR MASHING (I BREW ALL-GRAIN), FERMENTATION, RACKING AND PACKAGING ALL TAKE ABOUT THE SAME AMOUNT OF TIME WHETHER I NET 5 GALLONS (19 L) OF BEER OR 4 GALLONS (15 L). MY PROBLEM IS THAT I NEVER GET ANYWHERE CLOSE TO 5 GALLONS (19 L).**

TIM JENNINGS
CHICAGO, ILLINOIS

A This question reminds me of a phone call I once received from a winemaker who was considering building a brewery, and the plan was to build a 400-barrel brewhouse (12,400 gallons per batch). This made my ears perk up as I was thinking that the brewery in planning would have an annual capacity of at least 500,000 barrels per year. I was wrong. The idea this fellow had was to install very large equipment and only brew once a week. While this may be appealing from a labor point of view, the capital investment required for this person's sort of plan is impossible to justify based on labor savings over a rational time frame. But the general concept does indeed have merit.

The first thing I would consider is to brew larger batches if you want more beer for one very simple reason; there is always some loss encountered during brewing. If you simply want to improve your efficiency for the challenge involved, that's one thing, but if you feel like you are not generating enough beer from a batch to justify the time required or to satisfy your demand, brewing larger batches can help address that problem.

But there are some techniques to help improve the yield from a batch. The most common sources of loss in brewing are encountered during extract recovery from malt (mashing and lautering), wort loss associated with hops and trub, and beer loss associated with foaming during fermentation, yeast, racking and/or filtration, packaging and beer dispense. The most common topic discussed by brewers is brewhouse yield. Although this is an important topic for a number of reasons, such as ability to formulate new beers, ability to consistently brew and economic considerations, poor brewhouse yield does not equate to loss of volume. A brewer with an inefficient brewhouse can make up for this by simply using more malt than a brewer with a more efficient brewhouse to produce the same wort volume.

As the popularity of very hoppy beers continues to spread, brewers continue pushing the hop addition envelope. One of the huge downsides to some of the methods being used is wort and beer loss. Wort loss increases in the whirlpool process used to remove pellet hop solids when hopping rate increases and beer loss increases during racking when dry hopping is used. Some large commercial brewers are using centrifuges to reduce wort loss after whirlpooling.

Although this method is out of the reach of the homebrewer, and most small commercial brewers, the idea is pretty simple; recover wort typically discarded with hop solids. An easy and relatively inexpensive method that can

be used at home is to collect the trub and separate the wort from the solids using an Imhoff cone. I will leave the details of this method for another day, but this basic idea will definitely reduce loss. Kettle finings, e.g. Irish moss, are very effective at increasing the density of protein flocs precipitated during boiling and improve the separation of trub from wort. And if you really want to push the homebrewing envelope, the use of hop extracts can all but eliminate hop solids from the whirlpool process . . . there is much more to using hop extracts than simply replacing hop cones or pellets with extracts, so calm down if this seems like a silver bullet!

Beer loss during fermentation is so common that many brewers assume that "blow-off buckets" are a requisite of a well-appointed brewery. This sort of loss drives me crazy and is not limited to homebrewing. While tepid fermentations with little activity are often indicative of real problems with yeast pitching rate or yeast health, fermentations that gush beer from the top of the fermenter are certainly not models of perfection. Properly sized fermenters are large enough to accommodate foam, designed to safely vent carbon dioxide out of the fermenter and permit the beer to ferment without losing product. This is easy to address by simply using a larger fermentation vessel. There are some fermentation methods that are designed to skim *brandhefe* (literally translated as "burned yeast") or *braun hefe* (brown yeast) from fermenting beer. These include Yorkshire Squares, Burton Unions and a variety of lager fermenter designs with foam chambers, but all of these methods are designed to minimize beer loss, whereas the blow-off bucket is simply a method to control the mess associated with this unmanaged loss.

Racking loss is a loss that is pretty difficult to eliminate because the greatest source of the loss is beer tied up with the yeast at the bottom of the fermenter, and unless a centrifuge is used to separate beer from yeast, this loss is always present. Racking loss can be minimized, however by selecting

HELP ME, MR. WIZARD

yeast strains that have good flocculation traits that lead to thick sediments that are easy to leave behind in the bottom of the fermenter.

Like wort loss, racking losses are affected by hopping. Dry hopping is a great method, but with it comes inherent losses. There are numerous methods being explored by some of the larger craft brewers to address this very real and expensive loss. Additionally, the traditional method of simply adding hops to the fermenter is not the most efficient method of extracting hop aroma compounds. So the losses are two-fold when it comes to dry hopping, and both forms are expensive. Some of the newer dry hopping methods include containing the hops in a small vessel through which beer is pumped, for example, the Torpedo method developed by Sierra Nevada, hop removal using a centrifuge, and methods aimed at increasing the aroma yield from pellet hops by more effectively dissolving the pellets prior to addition. Many brewers are also looking at hop extracts to address these issues.

And finally there is loss associated with packaging and dispense. Most homebrewers are either bottle conditioning or kegging their beers and these methods typically do not result in high packaging losses, as compared to packaging carbonated beer.

Beer dispense, however, frequently does result in high losses that are, for the most part, entirely controllable. The use of refrigerated keg boxes, "jockey boxes" with cold plates or cooling coils, and the elimination of sections of beer line exposed to ambient temperatures help to reduce foaming associated with warm lines. Proper pouring techniques — specifically the implementation of patience — help to further reduce dispense losses. Emulating the practices seen in most bars where bartenders pour foam down the drain is something to avoid since beer foam is about 50% beer. If a foamy pour is allowed to settle and patience is used during dispense, losses, which typically hover around 10% for many bars, can virtually be eliminated at your home bar.

Q I AM LOOKING FORWARD TO BEGIN AERATING HIGH GRAVITY WORTS WITH PURE OXYGEN. FIRST, I'VE READ THAT ONE SHOULD USE A PEDIATRIC OXYGEN REGULATOR DESIGNED TO DELIVER LOW FLOW RATES WITH AN INCORPORATED FLOW METER TO ACCURATELY ASSESS AND CONTROL THE AMOUNT OF OXYGEN BEING DELIVERED INTO THE WORT. WHERE CAN SUCH A REGULATOR BE PURCHASED? SECOND, DOES A 2 MICRON DIFFUSION STONE WORK JUST AS WELL AS A 0.5 MICRON STONE? FINALLY, AT WHAT ORIGINAL GRAVITY (OG) DOES IT BECOME NECESSARY TO AERATE WITH PURE O_2, AND HOW LONG SHOULD A FLOW RATE OF ~1 L/MINUTE BE DELIVERED TO THESE HIGH GRAVITY WORTS?

KEVIN KOEHNTOP
SALT LAKE CITY, UTAH

A Before jumping into the mechanics of oxygenation, I want to touch on oxygenation versus aeration. Yeast require oxygen to grow since oxygen is a component of healthy cellular membranes. When brewing fermentations are lacking in oxygen, fermentation rate, yeast health, and beer flavor are all affected. The simplest and cheapest way of adding oxygen to wort is through aeration, since air is comprised of 21% oxygen. The primary challenge with this method is that the solubility of oxygen from air is about 8 ppm (8 mg/liter) in 12 °Plato wort and begins to drop as wort gravity increases. This is not a major problem up to about 18 °Plato if you have a good aeration method and plenty of healthy yeast. For these reasons, many brewers prefer using oxygen instead of air as the source of oxygen when brewing higher gravity brews.

One major difference between aeration and oxygenation is that the latter requires more control because the aeration method cannot result in too

much oxygen in wort, but using pure oxygen can. Practical experience from brewers who routinely oxygenate wort demonstrates a range of real issues with excess oxygenation. Fermentations often begin vigorously with lots of yeast activity and growth, but end up stalling before fermentation ends. And yeast harvested from these batches has lower viability and vitality compared to yeast from batches with less oxygen going into fermentation. Beer aroma is also affected by wort oxygen levels – with increased sulfur production and reduced ester production being two flavor notes associated with increased oxygen. To complicate the discussion, all of these factors are yeast strain-dependent. The bottom line is that yeast need oxygen during the early stages of fermentation and more problems result from insufficient oxygen than too much.

The bottom line is yeast need oxygen during the early stages of fermentation and more problems result from insufficient oxygen than too much.

I have used the sort of set up you describe to oxygenate yeast during propagation and think I can give you some helpful pointers about this method. I totally agree with the idea that oxygen should be delivered at a low flow rate. This really does two things for you. The first is that the low flow rate, especially when put through a small diffusion stone, can result in nearly 100% transfer of the oxygen into solution. I will get back to the significance of this in a moment. The other practical result of oxygenating at a very low flow rate is that you can more easily time and control the oxygenation process, where small variation in oxygenation time have little effect on the process. I don't have any data comparing the performance of 0.5 micron stones to 2 micron stones, but believe based on the availability of sintered stones intended to facilitate gas diffusion that pores in this size range work well for the application. The system I built for small scale yeast propagation (30 gallon/114 L batch sizes) used a 2 micron aeration stone.

So let's begin with the type of regulator. The regulator I purchased for my project was a medical-grade regulator made by Victor, with a regulated flow range from 16 mL/min. to 500 mL/min. The advantage to producing a very slow and steady gas flow through porous stones is that the small bubbles release from the surface of the stone and flow as small bubbles into the liquid mass. If the flow rate is too great, the bubbles have a tendency to coalesce.

This phenomenon occurs when two bubbles bump into one another and form a large bubble. This process can rapidly repeat, especially if there is a flooded effect on the stone surface. On a macroscopic level, coalescence leads to large bubbles that float through the liquid and escape at the surface. This process can be seen when boiling water in a pot. Very small steam bubbles adhering to the bottom of the pot gather with other small bubbles to form larger bubbles and the steam bubble rises through the pot and creates turbulence as the bubbles rise and burst at the surface. So what is the big deal with coalescence?

The purpose of wort oxygenation is to dissolve oxygen into wort. If small oxygen bubbles coalesce and rise to the surface of your fermenter, this means that the gas transfer process is inefficient. Although the inefficiency is not going to break the bank, it does make process control difficult because you don't know how much gas dissolves into the wort unless you have a dissolved oxygen meter laying around. This brings up a fundamental question; how much oxygen is needed? I will skip the subject of determining what works best for a given beer type, yeast strain, or fermentation method and use an easy to manipulate target of 10 ppm (10 mg/l) oxygen. This is right in the middle of the range typically used in breweries.

To make this easy I will use a nominal batch size of 20 liters (about 5 gallons) to determine the amount of oxygen that is desired in the wort following oxygenation; and that amount is 20 liters x 10 mg/liter or 200 mg (0.2 grams). The molecular weight of oxygen is 32 grams per mole, so 0.2 grams is equal to 0.00625 moles. One mole of an "ideal gas" occupies 22.4 liters (at standard temperature and pressure), and this tells us that 0.00625 moles is equivalent to about 0.14 liters. So the target total volume of oxygen dissolved in this 20-liter wort volume is 0.14 liters or 140 milliliters (or 7 mL of oxygen per liter of wort). To scale up based on volume just multiply 7 mL/L by wort volume, or to scale up by desired oxygen content, scale up from 10 ppm.

OK, so here is the major assumption in this discussion: All of the oxygen that flows through your gas regulator and into the wort actually dissolves into the wort. This is the really nice thing about oxygenating with oxygen as opposed to aerating with air. Air contains about 79% nitrogen and you will always have undissolved nitrogen bubbles escaping wort, making it difficult to determine what is happening with the oxygen. When using oxygen you don't want to see bubbles making it to the top of the fermenter. This is hard to do with wort, but you can tune your system with water. Remember, coalescence is not the idea and the desired result is a slow flow of small bubbles leaving your stone that disappear before rising to the surface. The truth of the matter is that there will be some loss in this process, but not much if the bubbles are very small.

So let's return to the control of this process. The target is 140 mL of oxygen in your 20 liter batch, and you have a regulator with flow controller that is able to be dialed back to 16 mL/min. If you set this at 20 mL/min. and run for 7 minutes you will have the dose required. Add in some inefficiency and your target oxygenation time is somewhere in the 8-10 minute range. Like everything in brewing, you need to dial this in based on what actually works for your process. I hope this information is useful! BYO

BY GORDON STRONG

GET TO KNOW KENTUCKY COMMON

Louisville's turn-of-the-century session beer

Kentucky common is one of the few truly indigenous beer styles in the United States, along with California common (steam beer) and cream ale.

KENTUCKY COMMON
BY THE NUMBERS

OG:	1.044–1.055
FG:	1.010–1.018
SRM:	11–20
IBU:	15–30
ABV:	4.0–5.5

Photo by Charles A. Parker/Images Plus

If you were drinking beer in the Louisville, Kentucky area between 1900 and 1919, chances are you were enjoying a dark, lively, refreshing Kentucky common (or simply common). At the time of Prohibition, up to 75% of beer sold in some neighborhoods was of this type. Best thought of as a dark cream ale, this beer was an inexpensive and quickly-produced thirst-quencher favored by the working man.

Louisville was the 12th largest city in the United States at the time of the Civil War, and was the 15th largest brewing center in 1900. The large population of Irish and German immigrants brought with them a taste for good beer in large quantities, including an enjoyment of darker beers. The local breweries sought to fill this demand and to make the beers affordable for the laboring classes.

Kentucky common is one of the few truly indigenous beer styles in the United States, along with California common (steam beer) and cream ale. It is a present use ale (or running beer), which is a beer that is distributed for sale immediately after fermentation is done and without aging at the brewery. Kräusened to naturally carbonate in casks, common beer was sometimes also known as lively ale due to its high carbonation level. Present use ale can be contrasted with stock ale (or keeping beer) that are more heavily hopped and aged.

Brewing records from the early 1900s show that Kentucky common fermented in three to five days and was packaged in barrels and ready for sale in six to eight days from when it was brewed. Remember this accelerated production process; it will be a key factor in debunking a common myth about this historic style later in the article. For the consumer, it meant that the beer was fresh and the price was low.

SENSORY PROFILE

Kentucky common is a new style added to the recently released 2015 Beer Judge Certification Program (BJCP) Style Guidelines, listed under the new category of historical beer. I'm indebted to a group of Louisville-area brewers and judges who did the primary research for the new guidelines. Dibbs Harting did the major work in preparing the draft guidelines and an excellent supporting research paper and presentation. Conrad Selle, co-author of the definitive *Louisville Breweries*, provided numerous copies of brewing logs from the original breweries. Leah Dienes, Brewmaster at Apocalypse Brew Works, brews a commercial Kentucky common named Oertel's 1912 in honor of the original brewery just down the street from her brewery. The three of them joined me to sample numerous test batches and discuss the style and their research.

A Kentucky common is a dry, refreshing, highly carbonated dark ale. It has a balanced to malty impression with interesting grainy, biscuity, and toasty flavors and a restrained hop and alcohol level. While called a dark beer, the color is actually in the amber-orange to light brown range, similar to Irish red ales, German altbiers, or Belgian pale ales. The high carbonation level produces a tall foam stand with white to off-white color. Clarity can be bright to somewhat hazy, since this can be served very young.

The flavor profile is grainy with bready, biscuity, toffee, or caramel notes. Moderate to low bitterness keeps the balance somewhat malty. The use of corn can add a rounded mouthfeel with the impression of sweetness, but the body is still medium

KENTUCKY COMMON

(5 gallons/19 L, all-grain)
OG = 1.048 FG = 1.012
IBU = 20 SRM = 16.4
ABV = 4.8%

INGREDIENTS

6.5 lbs. (3 kg) US 6-row malt
3.5 lbs. (1.6 kg) flaked maize (corn)
4 oz. (113 g) UK black malt
3 oz. (85 g) UK crystal malt (77 °L)
2 AAU Vanguard hops (first wort hops) (0.4 oz./11 g at 5% alpha acids)
3 AAU Cluster hops (60 min.) (0.4 oz./11 g at 7.5% alpha acids)
0.4 oz. (11 g) Vanguard hops (0 min.)
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) yeast
1 cup corn sugar (if priming)

STEP BY STEP

Make a 1-qt. (1-L) yeast starter two or three days before brew day, aerating the wort thoroughly (preferably with oxygen) before pitching the yeast.

On brew day, prepare your ingredients; mill the grain, measure your hops, and prepare your water. This recipe uses reverse osmosis (RO) water. Add ¼ tsp 10% phosphoric acid per 5 gallons (19 L) of brewing water, or until water measures pH 5.5 at room temperature. Add 1 tsp. calcium chloride ($CaCl_2$) to the mash.

On brew day, mash in the 6-row and flaked maize at 131 °F (55 °C) in 15 qts. (14 L) of water, and hold this temperature for 15 minutes. Raise the temperature by infusion or direct heating to 145 °F (63 °C) for 30 minutes, then raise to 158 °F (70 °C) for 15 minutes. Finally, raise to 168 °F (76 °C) to mashout. Add the crystal and black malts, and recirculate for 15 minutes. Fly sparge with 168 °F (76 °C) water until 6.5 gallons (25 L) of wort is collected.

Boil the wort for 90 minutes, adding the hops at times indicated in the recipe. First wort hops are added to the kettle before the wort is run off. After adding the final hops when the heat is turned off, let the wort stand for 15 minutes before chilling the wort. Chill to 64 °F (18 °C).

Oxygenate, then pitch the yeast starter. Allow fermentation temperature to rise to no more than 72 °F (22 °C) until fermentation is complete. Rack and allow the beer to drop bright, using crash cooling or fining if necessary. Prime and bottle condition, or keg and force carbonate to 3 to 3.5 volumes.

I used Fawcett black malt (455 °L) and Crisp Crystal 77L malt in this recipe, with US 6-row and flaked maize. I add the dark and crystal malts during recirculation to keep the harsh flavors down. I use minimal water treatments since I prefer the flavor profile of beers without excessive mineral additions. If you mash the dark and crystal malts, you likely will not have to use the phosphoric acid in the mash, but you should still use it in the sparge water.

If you want to perform a single step infusion mash, use a rest temperature of 152 °F (67 °C).

Cluster hops are common for bittering but nearly any other hop variety could be used in their place. The flavor and aroma hops should be some kind of noble-type hop, such as Hallertauer, Tettnanger, or Saaz (if using European hops), or my favorite US-grown substitutes, Vanguard, Santiam, and Sterling.

Any relatively neutral, well-attenuating and well-flocculating, aggressively-fermenting ale yeast can work, but you should avoid those that are described as malty or fruity, since those can produce flavors that interfere with the malt flavors. If you want to try a British yeast, I might choose Wyeast 1335 (British II).

KENTUCKY COMMON

(5 gallons/19 L, extract with grains)
OG = 1.048 FG = 1.012
IBU = 20 SRM = 16.4 ABV = 4.8%

INGREDIENTS

6.8 lbs. (3.1 kg) light liquid malt extract
4 oz. (113 g) UK black malt
3 oz. (85 g) UK crystal malt (77 °L)
3 AAU Cluster hops (60 min.) (0.4 oz./11 g at 7.5% alpha acids)
2 AAU Vanguard hops (15 min.) (0.4 oz./11 g at 5% alpha acids)
0.4 oz. (11 g) Vanguard hops (0 min.)
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) yeast
1 cup corn sugar (if priming)

STEP BY STEP

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

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

After adding the final hops when the heat is turned off, let the wort stand for 15 minutes before chilling the wort. Chill to 64 °F (18 °C).

Oxygenate the wort, then pitch the yeast starter. Allow the fermentation temperature to rise to no more than 72 °F (22 °C) until fermentation is complete. Rack and allow the beer to drop bright, using crash cooling or fining if necessary. Prime and bottle condition, or keg and force carbonate to 3 to 3.5 volumes.

As is true with the all-grain recipe, just about any hop variety can be substituted for the bittering hop addition, and the flavor and aroma hops should be some kind of noble-type hop.

to medium-light. Floral or spicy hops can be both tasted and smelled. The beer doesn't have a roasty character, and shouldn't have a coarse or harsh quality of bitterness. The finish is relatively dry, with black malt providing some of the dryness.

The fermentation profile is generally clean, but there may be some faint berry esters, especially if Cluster hops are used. The clean profile, lightish body, dry finish, restrained alcohol, sparkling carbonation, and balanced, pleasant flavors combine to make this a tasty and refreshing style. Historically, the beer was served young and very fresh, so it's best to try this one as soon as it's ready (similar to German weissbiers). With modern production methods, this beer should be relatively stable, so it shouldn't degrade quickly.

BREWING INGREDIENTS AND METHODS

The beer was most commonly made with mostly American ingredients, with only imported finishing hops providing a refined aroma and flavor. The base malt (around 60% of the grist) was locally-available pale 6-row brewer's malt. Corn grits comprised the bulk of the remaining grist, with small percentages of black malt and caramel malt (up to 2% of each) providing color and some additional malt flavor.

Native American hop varieties were used for bittering, including first wort hop additions. Imported (and expensive) noble-type German or Czech hops were used as the final aroma addition. Bitterness levels are modest, since this should be a balanced or slightly malt-focused style; aim for around 20 to 25 IBUs.

As a sessionable beer, the alcohol was also modest. Starting gravities in the range of 1.044 to 1.055 were common, and the alcohol level is around 4.5 to 5% by volume. Since this is a dry beer, I'd avoid going too high on the starting gravity because you do want it to be well-attenuated.

Most breweries had their own proprietary yeast strains, but none were known for imparting significant byproducts. The fermentation schedule was short, so aggressive top-fermenting ale yeast should be used. I'd go with a strain with a relatively neutral profile, high attenuation, and good flocculation characteristics.

The corn grits in the grist are normally mashed using a separate cereal mash, where all the grits and about a quarter of the 6-row are combined in a separate vessel and treated differently than the main mash. The cereal mash would step through a brief (15 minute) rest at 104 °F (40 °C) to help break down the cellular structures, before resting at 156 to 158 °F (69 to 70 °C) for conversion. The cereal mash was then boiled for 15 minutes, before being mixed back with the main mash (which had gone through a 15-minute protein rest at 122 °F/50 °C). Combining the mashes resulted in a final conversion temperature of 156 to 158 °F (69 to 70 °C), before mashing out at 168 °F (76 °C).

In a way, the cereal mash has a similar feel as a decoction mash, in that two mashes are used, one mash is boiled, and they are combined to create a mash rest temperature increase. The difference is that the grist of the cereal mash was not removed from the main mash; it started out as a separate mash before being combined.

Traditionally, the wort was boiled for two hours, and Irish moss was likely used to improve clarity. The wort was chilled to around 60 °F (16 °C), and fermentation was carried out at 66 to 68 °F (19 to 20 °C) for three to four days before the beer was racked and kräusened with actively fermenting wort to complete the fermentation and to carbonate the beer in a cask. The entire brewing process was fast, with the finished beer ready for delivery to thirsty customers in six to eight days. The finished carbonation level is estimated to be 3 to 3.5 volumes of CO_2, which is quite lively. The beer was delivered to local saloons in pitch-lined barrels and often allowed to settle for one to three days before serving, although this was not always the case. The beer was traditionally dispensed at cellar temperature (58 °F/15 °C), but it could also be poured using gravity dispense directly from the barrel.

The details about the mash, fermentation, yeast, and delivery to trade are all important because of a persistent myth about the style, in that it was a sour beer. Modern homebrew lore has it that a sour mash was used, probably because it was typical for Kentucky bourbon distillers in the area. However, a sour mash takes days, and there is no record of this in the mash program of breweries whose records were examined. Similarly, there is no record of lactic bacteria being added. The mash program, hopping rates, and boil would certainly not allow lactic bacteria to survive.

The only mention of sourness is in one edition of Wahl & Henius' *American Handy-book of Brewing, Malting, and Auxiliary Trades*. Another edition makes no mention of sourness. Modern speculation is that the sourness was detected in beer that had been out in the trade, not at the brewery, and that infection could have been introduced through packaging or handling, and that it is simply spoilage bacteria at work. Perhaps smaller breweries were less rigorous with cleaning and sent out some bad beer; that happens even today. But it does not define a style. The fact of the matter is that if you prepare the beer using the same methods, techniques, and schedules as the historical brewers used, you will not produce a sour beer unless your cold-side sanitation is seriously deficient or you allow the beer to sit around long enough to spoil. Neither of those were the case with the major producers historically, as the brewing records show.

HOMEBREW EXAMPLE

Having spent time reviewing the brewing records and talking with the re-

search team and sampling their brews, I felt like I had sufficient information to try to make a modern version of the style. I have made several simplifications in the process that should make the recipe more homebrewer-friendly, but you are certainly welcome to use my recipe with the traditional ingredients and processes I outlined.

The first change that I made is to use flaked maize instead of corn grits. This allows me to omit the cereal mash and just mash the corn and 6-row directly. As modern 6-row malts are better modified, I also didn't feel the need to do the lower temperature glucan and protein rests. A more typical German step mash program is what I chose, but even that could be simplified to a single step infusion as my recipe notes explain.

Since I am looking to avoid harshness in the beer, I use my typical approach of using reverse osmosis (RO) water, acidified to pH 5.5, with a small amount of calcium chloride in the mash, and dark/crystal malts added during mashout. This extracts the color and flavor without any unwanted flavors. I use English dark and crystal malts, as I prefer the flavor profile and lower harshness levels. However, these are still a small percentage of the grist.

I've selected a very common yeast, Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale), as the yeast strain. This should give a neutral fermentation profile, good attenuation, and quick fermentation performance. I selected American hops, as these are often easier to find and fresher in homebrew shops, using first wort hopping for the flavor addition and adding aroma hops at knockout. Any noble-type hops would work well for flavor and aroma, however.

I picked very middle-of-the-road numbers for this beer, shooting for average numbers for the style. I also like making this beer lower in gravity to make it a bit more sessionable (particularly as a modern lawnmower beer for the summer), trying to come in closer to the bottom of the ABV scale. But I think the version here presents a nice modern tribute to a misunderstood and almost-forgotten beer style from the Bluegrass State. BYO

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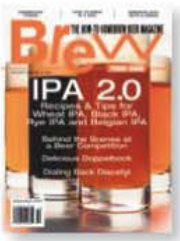

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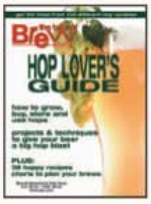

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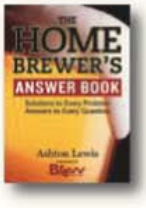

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GRILLING WITH HOMEBREW

PUT SOME BREW IN YOUR NEXT BARBECUE

Twenty years of professional cooking and teaching has taken me across the United States and introduced me to some amazing cooks. Now as the Executive Chef Lecturer in the School of Hotel & Restaurant Management at Northern Arizona University, I am thrilled to be teaching the techniques I've learned throughout my professional career to the amazing students here in the southwestern United States. An added bonus is that I am the faculty advisor for our on-campus brewing club here. Having homebrewed for the past three years, and earning a gold certificate in the first round American Homebrewers Association (AHA) competition, I eagerly swallowed the "red pill" and am discovering how deep the craft beer hole really is.

Beer and food pairing is a match made in Heaven. No other beverage has such heights, depths and breadths with which a cook can explore. I introduce local craft beers in my hands-on cooking class demonstrations and encourage students to be playful, but profitable in their creations. For example, students have made an IIPA seafood stew with grapefruit zest and tarragon, Bierwurst with spent grain pretzels, and milk stout sorbet. This "craft-beer-food" world is just carbing up and I am bubbling over with excitement to see where it heads. The adventurous nature of craft brewers paired with the artistic nature of passionate cooks is a recipe for continued hope in American daring ingenuity.

Many of my favorite foods to pair with homebrews come from the barbecue. And I'm sure many a backyard grillmaster-slash-homebrewer would agree. Here are some of my favorite barbecue recipes paired with some of my favorite homebrew recipes — guaranteed to make this summer's homebrew club meeting in your backyard a success!

HONEY CURED BACON (WITH HONEY KÖLSCH)

INGREDIENTS

1 each pork belly, skin on, trimmed 2 square and cut so you have equal halves (approximately 5 pounds/2.3 kg for each half)
10 oz. (283 g) Kosher salt
1.5 oz. (43 g) sodium nitrite (aka: "pink salt"
16 oz. (453 g) honey

Photo by Mark Molinaro

Honey cured pork bellies are slowly smoked with hickory chips at about 130 °F (54 °C) for about one hour to become delicious homemade bacon.

STEP BY STEP

1. Mix the Kosher salt and sodium nitrite with the honey to make a sticky paste.

2. Slather half the mixture on half of the pork belly and place the whole thing in Ziploc bag, removing as much air as possible.

3. Repeat steps 1 and 2 with other half of the pork belly. Label the skin sides of the bacon with date on the outside of the bag. Place the curing bellies on a plate and place them in a refrigerator.

4. Flip the bags every day to ensure proper overhauling (think even curing).

5. After five to six days remove the cured bellies and rinse them very well under cold running water.

6. Once the bellies are dry, smoke the bellies with indirect heat using your favorite moist wood, or even spent grains, until you get your desired color and flavor. I usually smoke my bellies with hickory at 130 °F (54 °C) for about one hour.

7. Once the smoking is complete, keep the bellies in the refrigerator until you are ready to slice and cook.

HONEY KÖLSCH

(5 gallons/19 L, all-grain)
OG = 1.048 FG = 1.007
IBU = 23 SRM = 4 ABV = 5.4%

INGREDIENTS

7.5 lbs. (3.4 kg) German Pilsner malt (2 °L)
12 oz. (0.34 kg) Munich malt (9 °L)
4 oz. (113 g) dextrin malt (2 °L)
1 lb. (0.45 kg) honey (0 min.)
2 AAU Hallertuer Mittelfrueh hops (first wort hop)
(0.5 oz./14 g at 4% alpha acids)
2 AAU Perle hops (90 min.)
(0.25 oz./7 g at 8% alpha acids)
1.1 AAU Tettnang hops (20 min.)
(0.25 oz./7 g at 4.5% alpha acids)
2 AAU Hallertuer Hersbrucker hops (15 min.)
(0.5 oz./14 g at 4% alpha acids)
1 Servomyces® tablet (10 min.)

½ whirlfloc tablet (5 min.)
Wyeast 2565 (Kölsch) or White Labs WLP029 (German Ale/Kölsch) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Create a 2-qt. (2-L) yeast starter in advance of brew day.

This is a single infusion mash. Heat 3.16 gallons (12 L) strike water to 162 °F (72 °C) to stabilize the grain bed at 149 °F (65 °C) and hold for 90 minutes. Double-batch sparge with 6.62 gallons (25 L) of water to raise mash bed to 168 °F (76 °C). Toss in the first wort hop during the sparge.

Bring the wort to a boil and boil for 90 minutes, adding the hops as indicated in the ingredients list. After the 90 minute boil is complete, remove the wort from the heat and add the honey. Quickly cool the wort to 60 °F (15.5 °C), oxygenate well, and pitch the yeast. Ferment for 10 days at 60 °F (15.5 °C). Once the primary fermentation is complete, transfer the beer to a secondary vessel. Drop the temperature to 50 °F (10 °C) and allow the beer to condition for one month. Bottle or keg as normal.

HONEY KÖLSCH

(5 gallons/19 L, extract only)
OG = 1.048 FG = 1.007
IBU = 23 SRM = 6 ABV = 5.4%

INGREDIENTS

3.3 lbs. (1.5 kg) Pilsen dried malt extract
1.5 lbs. (0.68 kg) Munich liquid malt extract
1 lb. (0.45 kg) honey (0 min.)
2 AAU Hallertuer Mittelfrueh hops (first wort hop) (0.5 oz./14 g at 4% alpha acids)
2 AAU Perle hops (90 min.) (0.25 oz./7 g at 8% alpha acids)
1.1 AAU Tettnang hops (20 min.) (0.25 oz./7 g at 4.5% alpha acids)
2 AAU Hallertuer Hersbrucker hops (15 min.) (0.5 oz./14 g at 4% alpha acids)
1 Servomyces® tablet (10 min.)
½ whirlfloc tablet (5 min.)
Wyeast 2565 (Kölsch) or White Labs WLP029 (German Ale/ Kölsch) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Create a 2-qt. (2-L) yeast starter in advance of brew day.

Bring 5 gallons (19 L) of water up to about a boil. Turn off the heat and stir in the dried and liquid malt extracts as well as the first wort hops. Stir until all the extract is dissolved then return the brewpot to the heat. Boil for 90 minutes, adding the hops as indicated in the ingredients list. After the 90 minute boil is complete, remove the wort from heat and add the honey. Quickly cool the wort to 60 °F (15.5 °C), oxygenate well, and pitch the yeast.

Ferment for 10 days at 60 °F (15.5 °C). Once the primary fermentation is complete, transfer the beer to a secondary vessel. Drop the temperature to 50 °F (10 °C) and allow the beer to condition for one month. Bottle or keg as normal.

HOP RUBBED BEEF BRISKET (WITH INDIA RED ALE-BRUNHILDE)

INGREDIENTS

1 each beef brisket, silver skin removed, trimmed fat to about ¼-inch thick (approx. 8–12 lbs./4–5 kg)

HOP RUB:

2 oz. (57 g) salt
1 oz. (28 g) brown sugar
½ oz. (14 g) ground cumin
½ oz. (14 g) smoked chili powder
¾ oz. (21 g) freshly ground black peppercorns
¼ oz.(7 g) cayenne
2 oz. (57 g) smoked paprika
¼ oz. (7 g) granulated garlic
¼ oz. (7 g) Simcoe® hops (crushed pellets)

ZIP SAUCE:

32 oz. (0.9 kg) Heinz ketchup
1 cup balsamic vinegar
1.5 cups brown sugar

1 Tb. crushed red chili flakes
½ cup Jack Daniels
¼ oz. (7 g) Amarillo® hops (crushed pellets)

STEP BY STEP

1. Combine the ingredients for the hop rub and either use a mortar and pestle to combine, or pulse the mixture in a food processor until it is well combined.

2. Combine the ingredients for the zip sauce in a separate container and reserve.

3. Rub the brisket evenly with the hop rub, wrap it with plastic wrap, and place it in a refrigerator for 24–48 hours (longer = stronger flavor).

4. Using indirect heat, barbecue the brisket with the fat side up between 300–350 °F (150–175 °C) until the internal temperature is around 200 °F (~90 °C).

5. Once you hit your internal temperature, wrap the brisket completely in aluminum foil, coat it with the Zip Sauce, and place it in a 275 °F (135 °C) oven for two to three hours until the brisket is quite tender. Slice the meat against the grain and serve with hop BBQ sauce drippings.

BRUNHILDE INDIA RED ALE

(5 gallons/19 L, all-grain)
OG = 1.064 FG = 1.016
IBU = 75 SRM = 15 ABV = 6.6%

INGREDIENTS

7.5 lbs. (3.4 kg) 2-row pale malt
5 lbs. (2.27 kg) Munich malt (10 °L)
10 oz. (0.29 kg) caramel malt (120 °L)
8 oz. (0.23 kg) caramel malt (40 °L)
1 oz. (28 g) black patent malt
13 AAU Simcoe® hops (60 min.) (1 oz./28 g at 13% alpha acids)
8.5 AAU Amarillo® hops (30 min.) (1 oz./28 g at 8.5% alpha acids)
5.5 AAU Cascade hops (5 min.) (1 oz./28 g at 5.5% alpha acids)
13 AAU Simcoe® hops (5 min.) (1 oz./28 g at 13% alpha acids)
1 oz. (28 g) Amarillo® hops (dry hop)
1 oz. (28 g) Cascade hops (dry hop)
1 oz. (28 g) Simcoe® hops (dry hop)
0.25 oz. (7 g) gypsum salt
1 Servomyces® tablet (10 min.)
½ Whirlfloc® tablet (5 min.)
White Labs WLP051 (California Ale V) or Wyeast 1272 (American Ale II) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

This is a single infusion mash. Heat 4.78 gallons (18.1 L) of strike water to 169 °F (76 °C) to stabilize the grain bed at 152 °F (67 °C) and hold for 60 minutes. Double-batch sparge with 5.13 gallons (19.4 L) of water to to raise the mash bed to 168 °F (76 °C).

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

Cool the wort to 67 °F (19 °C), oxygenate well, and pitch the yeast. Ferment for 10 days at 67 °F (19 °C). Once the primary fermentation is complete transfer the beer to a secondary, add the dry hops and wait seven days. Bottle or keg as normal.

BRUNHILDE INDIA RED ALE

(5 gallons/19 L, extract with grains)
OG = 1.064 FG = 1.016
IBU = 75 SRM = 15 ABV = 6.6%

INGREDIENTS

6.6 lbs. (3 kg) Munich liquid malt extract
1.25 lbs. (0.57 kg) extra light dried malt extract
10 oz. (0.29 kg) caramel malt (120 °L)
8 oz. (0.23 kg) caramel malt (40 °L)
1 oz. (28 g) black patent malt
13 AAU Simcoe® hops (60 min.) (1 oz./28 g at 13% alpha acids)
8.5 AAU Amarillo® hops (30 min.) (1 oz./28 g at 8.5% alpha acids)
5.5 AAU Cascade hops (5 min.) (1 oz./28 g at 5.5% alpha acids)
13 AAU Simcoe® hops (5 min.) (1 oz./28 g at 13% alpha acids)

1 oz. (28 g) Amarillo® hops (dry hop)
1 oz. (28 g) Cascade hops (dry hop)
1 oz. (28 g) Simcoe® hops (dry hop)
0.25 oz. (7 g) gypsum salt
1 Servomyces® tablet (10 min.)
½ Whirlfloc® tablet (5 min.)
White Labs WLP051 (California Ale V) or Wyeast 1272 (American Ale II) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Place the crushed grains in a large steeping bag. Steep the bag of grains in 1 gallon (3.8 L) water at 170 °F (77 °C) for 15 minutes. Lift the bag out of the wort and into a colander over the brewpot and rinse with 2 qts. (2 L) of 170 °F (77 °C) water. Add water to make at least 3 gallons (11 L) of wort (more if your brewpot can hold the volume). Bring the wort to a boil, adding the dried malt extract, and boil for 60 minutes, adding gypsum directly to the boil and the hops as indicated in the ingredients list. With 15 minutes remaining add the liquid malt extract.

Cool the wort to 67 °F (19 °C), transfer to a fermenter, and top off to 5 gallons (19 L). Oxygenate the wort and pitch yeast. Ferment for 10 days at 67 °F (19 °C). Once primary fermentation is complete transfer to secondary, add dry hops and wait seven days. Bottle or keg as normal.

COFFEE MALT PULLED PORK (WITH THREEFOLD CORD ROBUST PORTER)

INGREDIENTS:

1 boneless pork butt (5–6 lbs./2–3 kg)

CHOCOLATE MALT RUB:

1 oz. (28 g) chocolate malt, ground fine in coffee grinder
1 oz. (28 g) sweet paprika
1 oz. (28 g) brown sugar
1 oz. (28 g) kosher salt
1 oz. (28 g) freshly ground black peppercorns

HOP MOP SAUCE:

1 cup hop tea (¼ oz./7 g Cascade hops and 1 cup boiling water)
½ cup malt vinegar

Photo by Mark Molinaro

Two boneless pork butts that have been coated with a chocolate malt rub. They will be smoked and then oven baked until they are fork tender.

½ stick unsalted butter (melted)
1 Tb. of chocolate malt rub (above)

STEP BY STEP

1. Rinse the pork with cold water, pat dry, then rub evenly with the chocolate malt rub. Let rest in refrigerator overnight uncovered.

2. Using indirect grilling, smoke the pork butt at 200–250 °F (95–129 °C) with wood chips of your choice (apple/cherry or even spent grains) for two to three hours, mopping with sauce every 20–30 minutes. Wrap pork butt completely with foil and

place in 250 °F (129 °C) oven until fork tender (4–6 hours).

3. Once cooked to fork tender, shred the pork, roughly adding any leftover mop sauce and extra malt vinegar if needed.

4. Serve with your favorite BBQ sauce, coleslaw, homemade pickles, and a nice soft bun.

THREEFOLD CORD ROBUST PORTER

(5 gallons/19 L, all-grain)
OG = 1.064 FG = 1.014
IBU = 35 SRM = 38 ABV = 6.5%

INGREDIENTS

11 lbs. (5 kg) English 2-row pale malt (3 °L)
1 lb. (0.45 kg) crystal malt (40 °L)
1 lb. (0.45 kg) chocolate malt (450 °L)
8 oz. (0.23 kg) flaked barley
3 oz. (85 g) black patent malt (500 °L)
1 oz. (28 g) roasted barley (600 °L)
12 oz. (0.34 kg) maltodextrin (20 min.)
8.5 AAU Northern Brewer hops (60 min.) (1 oz./28 g at 8.5% alpha acids)
2.8 AAU Cascade hops (60 min.) (0.5 oz./14 g at 5.5% alpha acids)
2.8 AAU Cascade hops (0 min.) (0.5 oz./14 g at 5.5% alpha acids)
⅓ tsp. (2 g) table salt
1 Servomyces® tablet (10 min.)
½ Whirlfloc® tablet (5 min.)
Lallemand Nottingham or White Labs WLP013 (London Ale) or Wyeast 1028 (London Ale) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

This is a single infusion mash. Heat 4.8 gallons (18.2 L) of strike water to 164 °F (73 °C) to stabilize the grain bed at 150 °F (66 °C) and hold for 60 minutes. Double-batch sparge with 5.1 gallons (19.3 L) to order to raise mash bed to 168 °F (76 °C). Bring to a boil and boil for 60 minutes, adding the salt directly to the boil and the hops as indicated in the ingredients list. With 20 minutes left in the boil, add the maltodextrin. After the final

addition of Cascade hops, remove the wort from heat and wait about 5–10 minutes prior to chilling the wort.

Cool to 67 °F (19 °C), oxygenate wort and pitch yeast. Ferment for 14 days at 67 °F (19 °C). Once the primary fermentation is complete transfer to the secondary, and condition the beer for another 7 days at 67 °F (19 °C). Bottle or keg as normal.

THREEFOLD CORD ROBUST PORTER

(5 gallons/19 L, extract with grains)
OG = 1.064 FG = 1.014
IBU = 35 SRM = 38 ABV = 6.5%

INGREDIENTS

6 lbs. (2.7 kg) Muntons light dried malt extract
1 lb. (0.45 kg) crystal malt (40 °L)
1 lb. (0.45 kg) chocolate malt (450 °L)
5 oz. (142 g) dextrin malt
3 oz. (85 g) black patent malt (500 °L)
1 oz. (28 g) roasted barley (600 °L)
12 oz. (0.34 kg) maltodextrin (20 min.)
8.5 AAU Northern Brewer hops (60 min.) (1 oz./28 g at 8.5% alpha acids)
2.8 AAU Cascade hops (60 min.) (0.5 oz./14 g at 5.5% alpha acids)
2.8 AAU Cascade hops (0 min.) (0.5 oz./14 g at 5.5% alpha acids)
⅓ tsp. (2 g) table salt
1 Servomyces® tablet (10 min.)
½ Whirlfloc® tablet (5 min.)
Lallemand Nottingham or White Labs WLP013 (London Ale) or Wyeast 1028 (London Ale) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Place the crushed grains in a large steeping bag. Steep in 1 gallon (3.8 L) of water at 170 °F (77 °C) for 15 minutes. Lift the bag into a colander over the brewpot and rinse with 1 gallon (3.8 L) of 170 °F (77 °C) water. Add water to make at least 3 gallons (11 L) of wort (more if your brewpot can hold the volume). Bring the wort to a boil and boil for 60 minutes, adding the salt directly to the boil and the hops as indicated in the

ingredients list. With 20 minutes left in the boil, add the maltodextrin. After the final addition of Cascade hops, remove the wort from heat and wait about 5–10 minutes prior to chilling the wort.

Cool to 67 °F (19 °C), oxygenate wort and transfer to the fermenter. Top off the fermenter to 5 gallons (19 L) then pitch yeast. Ferment for 14 days at 67 °F (19 °C). Once primary fermentation is complete transfer to secondary, and condition the beer for another 7 days at 67 °F (19 °C). Bottle or keg as normal.

Photo by Mark Molinaro

A meat locker filled with pork butt, cured bacon, and other cured meats awaiting a turn in the smoker and on the barbecue.

BLOOD ORANGE AND CORIANDER BRINED CHICKEN (WITH BLOOD ORANGE WIT)

INGREDIENTS

1 whole quality raised chicken

½ GALLON BRINE:

½ cup brown sugar
¼ cup Kosher salt
½ Tb. black peppercorns
1 Tb. coriander seeds
½ Tb. Fennel seed
3 sprigs fresh rosemary
5 sprigs fresh thyme
3 bay leaves
3 blood oranges, quartered

STEP BY STEP

1. Combine all the ingredients with ½ quart (0.5 L) boiling water in 1-gallon (3.8-L) container making sure to squeeze the juice from the oranges. Once the salt and sugar are dissolved, add the remaining 1.5 quarts (1.5 L) of ice water and submerge the whole chicken. Cover and place in a refrigerator for 12 to 24 hours.

2. Rinse the bird completely under cold running water and return to the refrigerator to dry for 12 hours.

3. Heat the oven to 400 °F (~200 °C) and place the chicken breast side up with 1 quartered orange stuffed into the cavity along with 1 Tb. coriander seeds. Cook until the skin achieves desired color (check after 20 min). Now turn the oven down to 325 °F (~160 °C) until the thickest part of chicken breast reaches 160 °F (70 °C). Remove the chicken from the oven and let rest for 10–15 minutes.

4. Serve with fresh herb mesclun salad, blood orange supremes, roasted new potatoes, and coriander beurre blanc.

BLOOD ORANGE WIT

(5 gallons/19 L, all-grain)
OG = 1.051 FG = 1.010
IBU = 15 SRM = 6 ABV = 5.4%

INGREDIENTS

5 lbs. (2.27 kg) Pilsner malt
5 lbs. (2.27 kg) flaked wheat
8 oz. (0.23 kg) flaked oats

4 oz. (113 g) melanoidin malt
0.5 oz. (14 g) Briess roasted barley (300 °L)
1.5 lbs. (0.68 kg) rice hulls
1.2 AAU Hallertauer hops (60 min.) (0.25 oz./7 g at 4.8% alpha acids)
3 AAU Magnum hops (60 min.) (0.25 oz/7 g at 12% alpha acids)
1 oz. (28 g) zested blood orange peel (5 min.)
0.75 oz. (21 g) freshly crushed coriander seed (5 min.)
White Labs WLP400 (Belgian Wit Ale) or Wyeast 3944 (Belgian Witbier)
1 cup corn sugar (if priming)

STEP BY STEP

This is a single infusion mash. Heat 4.34 gallons (16.4 L) of strike water to 164 °F (73 °C) to stabilize the grain bed at 150 °F (66 °C) and hold for 90 minutes. Double-batch sparge with 5.9 gallons (22 l) of water to raise the mash bed to 168 °F (76 °C). Boil the wort for 90 minutes, adding the hops and spices as indicated in the ingredients list. Cool to 70 °F (21 °C), oxygenate the wort and pitch the yeast. Ferment for 14 days while slowly ramping the temperature up to 75 °F (24 °C). Transfer to a secondary and condition for 14 days. Bottle or keg as normal.

* An extract option is not available for this recipe due to the large quantity of unmalted grains that require mashing. It is possible to make a wit with extract and grains using wheat malt extract, however for this recipe the results will not create a similar beer. BYO

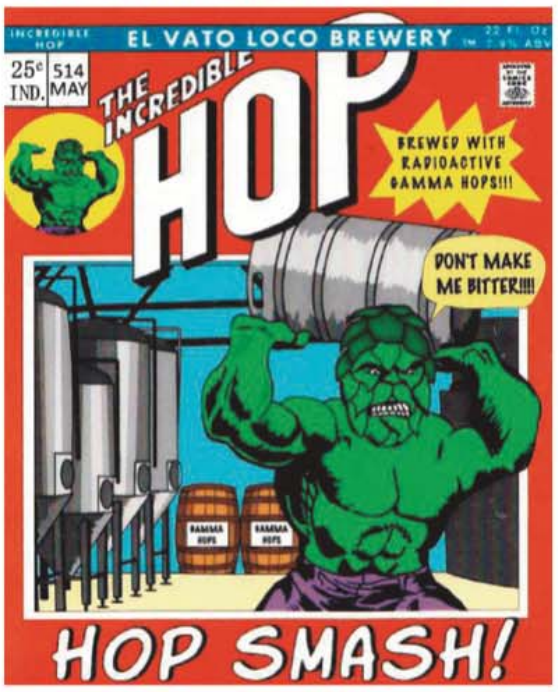
RELATED LINKS:

• "The Homebrew Chef" Sean Z. Paxton worked with Sierra Nevada's Brian Grossman on a food pairing menu for the Brewer's Dinner at the annual Northern California Homebrew Festival in 2012. They raised two pigs on Sierra Nevada brewery byproducts, then "hop aged" them for six days after slaughter. The two pigs were then slow roasted. Read about their project for some more inspiration: http://byo.com/story2784

2015 LABEL CONTEST WINNERS

In 1995 *Brew Your Own* published our first magazine, and in that same year we started our annual homebrew label contest. You'd think by now we'd start seeing the same old same old in the label designs — but that's definitely not the case! It seems like every year people come up with new ways to package their homebrews that are fresh, funny, heartfelt, or even a little freaky. This year we unanimously gave our votes to the Incredible Hop hoisting a half barrel. We also had a lot of love for a Thor-esqe Oktoberfest goat, went around the world in 80 IBUs, and got a little cross culture with a French Canadian "bière" dressed up for Mexico's Day of the Dead. This year we also let readers choose their favorite "People's Choice" through voting on social media (see that label on page 50). Thank you to everyone who entered the contest this year. Congratulations to the winners, and thank you to all of our very generous sponsors for the thousands of dollars worth of great homebrewing prizes. Cheers!

GRAND PRIZE



CARLOS & MIKE ROMERO
Roy, Utah

Carlos and Mike created this design for an IPA they brew in their homebrewery (El Vato Loco Brewery) that is, "not only strong, but so bitter it will go on a rampage in your mouth and leave nothing standing." The two spent countless hours poring over the covers of classic Hulk illustrations to make the label as true to authentic as possible, including the Comics Code of Approval stamp, to researching handwriting fonts for speech bubbles, and making plays on Hulk's catchphrases. The beer in the bottle was loosely based on a recipe for Blue Dot IPA from Hair of the Dog Brewing Co., with a lot of Carlos and Mike's variations thrown in. "Don't worry" they promise, "the hops aren't really radioactive!"

PRIZES: Prize package from the **American Homebrewers Association**; Swirl-Boss wort whirlpool wand from **Brew-Boss®**; Custom 10-gallon brew kettle from **Colorado Brewing Systems**; FastLabel bundle from **FastBrewing – FastRack**; Voucher for $50 off The Grainfather all-grain brewing system from **The Grainfather**; Gift certificate from **GrogTag**; Gift certificate from **Hobby Beverage Equipment**; Brewer's Best® ingredient kit from **LD Carlson Company**; 5-gallon Corny keg & keg cozy from **PicoBrew**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **Seven Bridges Organic Brewing Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**

GOLD PRIZE

TIM SCHAFER
Commerce City, Colorado

Tim's design for his "Mjölnir" Oktoberfest comes from Norse mythology. The Mjölnir is the favored weapon of the god Thor — his hammer. The word Mjölnir in Old Norse means, "That which marks and pulverizes to dust." Tom says, "I knew it needed to be call Mjölnir right after we brewed it. Because of the double decoction and the constant stirring, so that the grains didn't scorch, it felt like you needed the arms of Thor for that brew day."

PRIZES: Prize package from the **American Homebrewers Association**; Swirl-Boss wort whirlpool wand from **Brew-Boss®**; FastLabel bundle from **FastBrewing – FastRack**; Gift certificate from **GrogTag**; Gift certificate from **Hobby Beverage Equipment**; Thermostar digital temperature controller from **Murrieta Homebrew Emporium**; Gift certificate from **Seven Bridges Organic Brewing Supply**; Brew Bucket and hat from **Ss Brewing Technologies**; Gift certificate from **St. Louis Wine & Beermaking LLC**

SILVER PRIZE

STEVEN FRANKS
The Colony, Texas

Steven had a good IPA recipe that only used Cascade hops when he decided to make the beer a journey. "I then researched hops grown around the world that matched some of the characteristics of Cascade hops. I designed the label to wrap completely around the bottle so if you follow the dotted path you will end up back where you started."

PRIZES: Prize package from the **American Homebrewers Association**; A Brew Bag and PVC gloves from **The Brew Bag**; Swirl-Boss wort whirlpool wand from **Brew-Boss®**; Gift certificate, T-Shirt, pint glass & koozie, and bottle opener from **Electric Brewing Supply, LLC**; FastLabel bundle from **FastBrewing – FastRack**; Gift certificate from **GrogTag**; Gift certificate from **Hobby Beverage Equipment**; Gift certificate from **iCustomLabel**; Gift certificate from **St. Louis Wine & Beermaking LLC**

BRONZE PRIZE

LAURENT FOUCTIERE
Montreal, Quebec

Laurent's Day of the Dead design was crafted for a Halloween party that featured beers from his homebrewery, "Brasseurs de l'"Ombre" — which translates to "The Shadow Brewers." The beer, "La Muerte," was a special batch brewed using chrysanthemums with a witbier base, and also using honey malt, grape concentrate, and Nelson Sauvin hops. Laurent's friend, Charlotte Lebris, created the design.

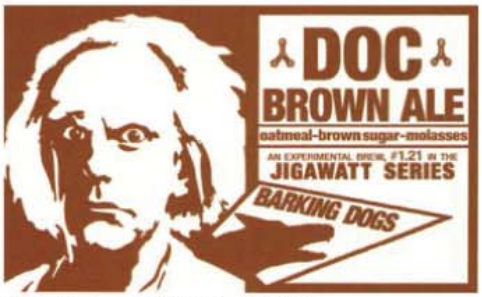
PRIZES: QuickConnectors™, brewing gloves, & BrewMometer™ from **Blichmann Engineering, LLC**; Swirl-Boss wort whirlpool wand from **Brew-Boss®**; Case of 1-Liter amber bottles from **E.Z. Cap**; FastLabel bundle from **FastBrewing – FastRack**; Promo items and yeast from **Fermentis**; Gift certificate from **GrogTag**; Gift certificate from **Hobby Beverage Equipment**; Gift certificate from **St. Louis Wine & Beermaking LLC**

READER'S CHOICE

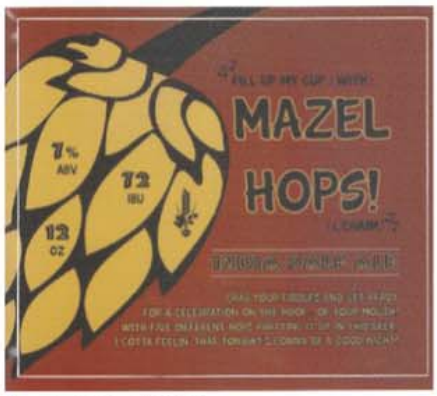
Dan Tirpak
Griffith, Indiana
Dan's "Reader's Choice" winning label design for his imperial pumpkin ale earned the most votes on social media and is based on the Irish mythology of the Dullahan, which is a headless rider. "It is said that the heads of the perished turn into jack-o-lanterns as he rides. This label was hand drawn by a friend as I described the tale of the Dullahan to him."

PRIZES: A Brew Bag and PVC gloves from **The Brew Bag**; Palmer amber ale kit from **Briess Malting** and **Palmer Brewing Solutions**; Voucher for $25 off The Grainfather all-grain brewing system from **The Grainfather**; Gift certificate from **Great Fermentations**; Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **St. Louis Wine & Beermaking LLC**

HONORABLE MENTION



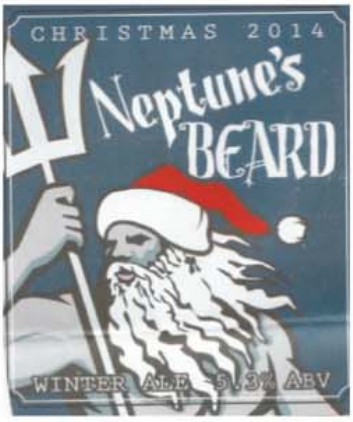
Adam Kramer & Matthew Schmid
Evansdale, Iowa
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**



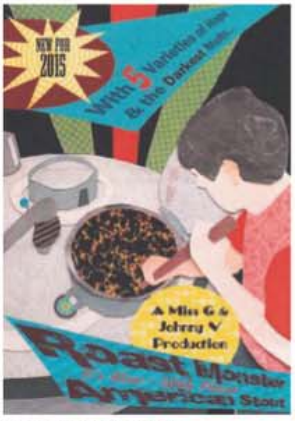
Angela & Paul DiGioia
Dublin, California
Prizes: Gift certificate from **GrogTag**; Gift certificate from **Hop Tech Home Brewing Supplies**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **St. Louis Wine & Beermaking LLC**

Bill Bartman
Lake Oswego, Oregon
Prizes: Gift certificate from **Bader Beer & Wine Supply**; Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **St. Louis Wine & Beermaking LLC**

Benny Lee & Byungchoon Choi
Seoul, Korea
Prizes: Gift certificate from **GrogTag**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**



Matt Ellis
Silver Spring, Maryland
Prizes: Gift certificate from **GrogTag**; Gift certificate from **How Do You Brew?**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **St. Louis Wine & Beermaking LLC**



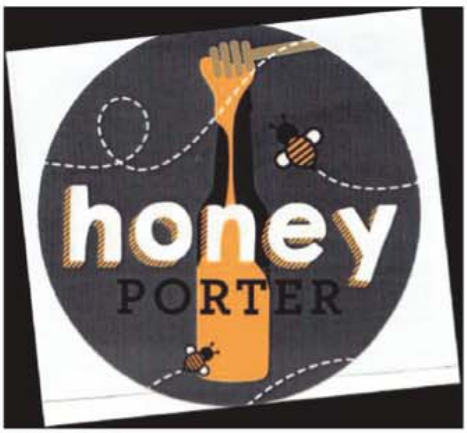
Gera Exire LaTour
Minneapolis, Minnesota
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**

Mike Raggo & Bill Engelhardt
Auburn, Georgia
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Noontime Labels**; Gift certificate from **St. Louis Wine & Beermaking LLC**

David Rheaume
St. Albans, Vermont
Prizes: Fedora hat from **Drop-In Brewing**; Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **St. Louis Wine & Beermaking LLC**

Keith Hartman
Columbia, Pennsylvania
Prizes: Gift certificate from **The Brewer's Apprentice**; Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **St. Louis Wine & Beermaking LLC**

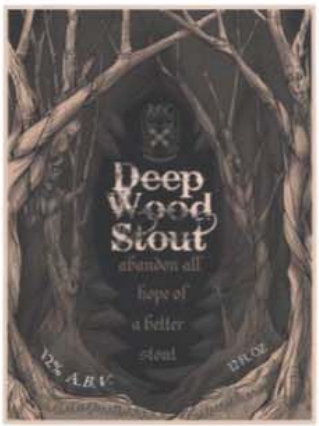
Sarah Sallmann
Waukesha, Wisconsin
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **St. Louis Wine & Beermaking LLC**; Gift certificate from **Wine & Hop Shop**



Justin Olsson
New Berlin, Wisconsin
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**

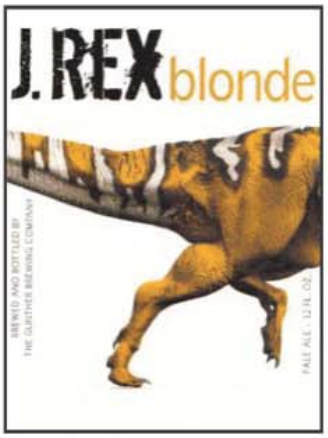
HONORABLE MENTION

Erik Borreson
Stevens Point, Wisconsin
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**



Robert Connolly & Anneliese Ronda
Phoenix, Oregon
Prizes: Gift certificate from **Bader Beer & Wine Supply**; Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **St. Louis Wine & Beermaking LLC**

Todd Sochowicz
Hazel Park, Michigan
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**

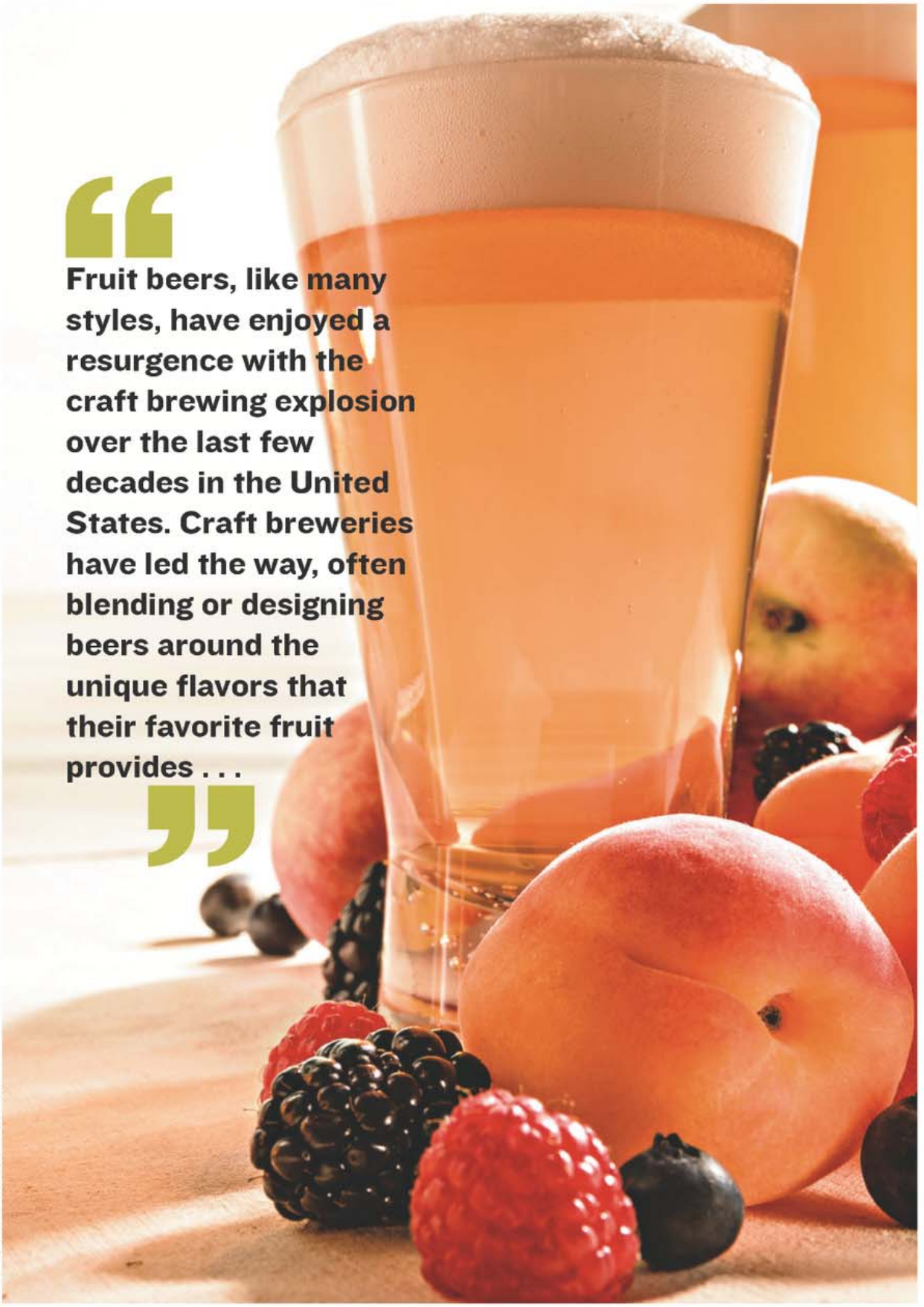


Frank Gunther
Hydes, Missouri
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**

Hannah Strong
Miles City, Montana
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**

Mat Kelly
Portsmouth, Virginia
Prizes: Gift certificate from **GrogTag**; Two sachets of Mangrove Jack's dried yeast from **iMake Ltd.**; Gift certificate from **Quality Wine and Ale Supply**; Gift certificate from **St. Louis Wine & Beermaking LLC**

View this year's Editor's Choice labels at http://byo.com/2015labelcontest



Fruit beers, like many styles, have enjoyed a resurgence with the craft brewing explosion over the last few decades in the United States. Craft breweries have led the way, often blending or designing beers around the unique flavors that their favorite fruit provides . . .

Photos by Charles A. Parker/Images Plus

CRAFTING AWARD-WINNING FRUIT BEERS

FARM-FRESH FERMENTATIONS FOR SUMMER

story by **Brad Smith**, recipes by **Joe Vella**

Fruit beers are refreshing and enjoyable, yet elusive for many brewers. Brewing with fruit brings new challenges, not the least of which is finding the proper balance between malt, hops, and fruit flavors.

Fruit can add color, flavor, acidity, and even wild yeast and bacteria that can either enhance or detract from the beer. Selecting the right fruit and carefully designing your beer around those flavors and maturing the beer to perfection is the key to brewing great fruit beer.

HISTORY

According to Randy Mosher's book *Radical Brewing*, fruit beer is both an ancient and modern 20th century invention. He notes that ancient Egyptians referred to the use of dates and pomegranates, and some Scottish ales used gooseberries and elderberries, but references can be found for fruit in intervening years until the 1930s. Many of the most famous Belgian fruit beers like kriek emerged at that time, with framboise to follow 20 years later.

While the use of fruit does predate the use of hops, it was more widely used in wines and liquors due both to the added expense of fruit and the fact that fruit enhances rather than reduces the sweetness of malt.

Fruit beers, like many styles, have enjoyed a resurgence with the craft brewing explosion over the last few decades in the United States. Craft breweries have led the way, often blending or designing beers around the unique flavors that their favorite fruit provides, and wheat-based fruit beers, in particular, have even been adopted by major US breweries.

UDESIGNING A FRUIT BEER

Homebrewing beer with fruit involves a little bit of art and a bit of science. Fruit beers are frequently formulated to be light tasting, light bodied, and also lightly hopped. The reason for this is simple; Most fruits lose a lot of their sweet flavor during fermentation. The sugars we taste in fruit is easily fermented into alcohol, leaving little in the way of residual sweetness or body. A strong malt or hop flavor can overpower the subtle fruit flavors, making the fruit undetectable in the finished beer. A wide variety of beer styles can use fruit, however — even stout!

For hops, I recommend low alpha bittering hops, often with a single boil addition. This minimizes hop aroma and flavor which allows the fruit aroma and flavor to shine through. Noble hops are often a good choice. Use whirlpool or dry hops sparingly.

For yeast, I've had the greatest success with clean finishing, high attenuating yeasts. This is not to say you could not try a more complex yeast, butstrains that are low flocculating as well as low attenuating yeasts generally take longer to fully ferment the sugars in the fruit. The complex flavors of the yeast don't always complement the fruit flavor itself. Also, the low flocculating yeasts create more clarity problems — which is already an issue with most fruit beers.

Keep in mind that many fruits carry some wild bacteria and wild yeast with them, which can often add some sourness or complexity to your fruit beer. This is also the reason why many fruit beers take additional time to reach full maturation.

Another factor to consider when brewing with fruit is that most fruits have a substantial amount of simple sugars in them. Most of these sugars ferment directly into alcohol. If you are adding 1–3 lbs. (0.45 to 1.4 kg) of fruit per gallon (3.8 L), this will drive up the alcohol content of your beer almost as much as adding an equivalent amount of malt extract. Fruit will not add any maltiness to your beer, however, just alcohol. The flavor and aroma of fruit is also often fermented away, so if you brew a beer with a lot of fruit and not much malt in attempt to keep the gravity under control you will end up with a thin beer. Similarly, if you start with too much malt you will end up with a malty beer with too much alcoholic warmth that can mask the fruit flavor. Finding the right balance between fruit, malt and hop flavors can be a real challenge and sometimes will take more than one attempt to perfect.

THE FRUITS TO USE IN BEER

Not all fruit flavors hold up well to fermentation. Some fruits fair much better in beer than others. Fruits like uncooked blueberry, strawberry, and peach tend to lose much of their flavor when fermented out. Others, like apricot and raspberry, hold up well, while fruits like cherry are somewhere in the middle, but often require extensive aging. Here are a few popular fruits to consider for fruit beer:

APPLE - Apples in beer produce only a mild flavoring. Apples are (generally) best used with meads and hard cider as they tend to be acidic in flavor and don't provide a strong profile. Apple can be added as either fruit pulp or as cider/juice. If using fresh fruit start with about 2 lbs. per gallon (0.9 kg per 3.8 L) and experiment.

APRICOT - Apricot works much better in beer than peach, and it produces a peach-like flavor in the finished beer. If you want peach flavor, use apricots at a rate of 1.5–4 lbs. per gallon (0.6–1.8 kg per 3.8 L). Apricot extract also produces good results.

BLACKBERRY - Blackberry, like raspberry, is another great fruit to use in beer. However, they do not come through as intensely as raspberry, requiring a larger usage rate of 1–3+ pounds per gallon (0.45–1.4+ kg per 3.8 L). The color also carries over well to the finished beer.

BLUEBERRY - Another fruit that does not hold up well in beer. Some brewers claim that cooked blueberry holds up better than uncooked, but

Fruit Beer Made the Easy Way

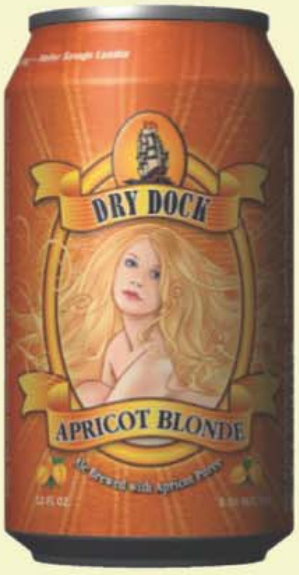
Before you dive into brewing with real fruit, I should point out that many of the commercial "fruit beers" on the market contain no fruit at all. Instead they are made with fruit-flavored extracts. These are the same artificial flavor extracts used to make soda.

There are some substantial advantages to using fruit flavor extracts over actual fruit. First, extract is inexpensive. You can purchase a bottle of fruit flavored extract for a whole batch of homebrew for a few dollars, which is some 10–20 times less than the cost of purchasing 1–3 lbs of fruit per gallon of beer.

Artificial extracts also can add the same sweetness you get from something like a cherry coke so the beer will taste sweet and cherry-like. This is almost impossible to achieve with real cherries, as the sweetness will all be fermented away. For very light flavors like strawberry, fruit extracts are often the best choice.

Finally, fruit extracts give you the flexibility of adjusting the fruit flavor in your beer. A homebrewer typically adds the fruit extract at bottling time. You can add just a bit of extract at a time until you achieve the exact flavor profile you are looking for. This is something you simply can't do when brewing with real fruit.

Fruit flavor extracts or artificial flavor additives often (but not always) contain no fermentable sugars, so they may be added directly to the beer just before bottling. The best method is to add a little at a time until you achieve the fruit balance needed. In general, fruit flavor extracts are great at providing a burst of fruity flavor with minimum fuss, but they can also produce a somewhat flat artificial flavor profile compared to real fruit.



DRY DOCK BREWING CO. APRICOT BLONDE CLONE

(5 gallons/19 L, all-grain)
OG = 1.044 FG = 1.013
IBU = 8 SRM = 6 ABV = 4.9%

2014 Great American Beer Festival – Bronze (American-Style Fruit Beer)
Original gravity is calculated prior to fruit addition while ABV is calculated post fruit addition.

INGREDIENTS

8.5 lbs. (3.9 kg) Pilsner malt
0.38 lb. (0.17 kg) crystal malt (60 °L)
3.1 lbs. (1.4 kg) Oregon Specialty Fruit apricot purée (added at the end of primary fermentation)
1-4 oz. (28-113 g) apricot extract (added at bottling)
2.3 AAU Cascade hops (60 min.) (0.33 oz./10 g at 7.1% alpha acid)
Fermentis Safale S-04 or Wyeast 1099 (Whitbread Ale) yeast
4 oz. (113 g) corn sugar (if priming)

STEP BY STEP

Mill the grains and mash in 3 gallons (11.3 L) of water at 150 °F (65 °C) for 60 minutes. Vorlauf until the runnings are clear and sparge the grains with enough 168 °F (75 °C) water to obtain a 6-gallon (23-L) pre-boil volume. Boil the wort for 60 minutes adding the hops at the times indicated in the ingredients list.

After the boil, turn off the heat and chill the wort to about 68 °F (20 °C), transfer the wort to the fermenter, aerate well, and pitch the yeast. Ferment at 68 °F (20 °C). On day three of primary fermentation add the apricot purée. Ferment for an additional seven days and rack to a secondary fermenter for additional clearing if desired. When fermentation and clearing is complete, transfer the beer to a bottling bucket or keg and add apricot extract 0.5 oz. (14 mL) at a time, gently stirring and tasting in between additions until the desired intensity of fruit flavor and aroma is obtained. Carbonate and package the beer as desired.

DRY DOCK BREWING CO. APRICOT BLONDE CLONE

(5 gallons/19 L, extract with grains)
OG = 1.044 FG = 1.013
IBU = 8 SRM = 7 ABV = 4.9%

2014 Great American Beer Festival – Bronze (American-Style Fruit Beer)
Original gravity is calculated prior to fruit addition while ABV is calculated post fruit addition.

INGREDIENTS

6 lbs. (2.7 kg) Pilsen liquid malt extract
0.38 lb. (0.17 kg) crystal malt (60 °L)
3.1 lbs. (1.4 kg) Oregon Specialty Fruit apricot purée (added at the end of primary fermentation)
1-4 oz. (28-113 g) apricot extract (at bottling)
2.3 AAU Cascade hops (60 min.) (0.33 oz./10 g at 7.1% alpha acid)
Fermentis Safale S-04 or Wyeast 1099 (Whitbread Ale) yeast
4 oz. (113 g) corn sugar (if priming)

STEP BY STEP

Add 1.5 to 5 gallons (6 to 19 L) of water to the brew kettle (the more water the better). Crush the grain and put it into a grain bag. Place the bag in the water and allow the grains to steep at 150 °F (65 °C) for 30 minutes. Remove the grain bag, place it in a colander over the brew pot, allow it to drain, and discard. Remove the kettle from the heat and pour the malt extract in while stirring constantly to keep the extract from burning on the bottom of the pot. Make sure the extract is well dissolved and then return the pot to the heat and bring the wort to a boil. Boil the wort for 60 minutes, adding the hops at the times indicated in the ingredients list.

After the boil, turn off the heat, chill the wort to about 90 °F (32 °C), transfer it to the fermenter and add cold water (if necessary) to bring the total volume up to 5 gallons (19 L). Aerate the wort, ensure that it is below 78 °F (25 °C), and pitch the yeast. Ferment at 68 °F (20 °C). On day three of primary fermentation add the apricot purée. Ferment for an additional seven days and rack to a secondary fermenter for additional clearing if desired. When fermentation and clearing is complete, transfer the beer to a bottling bucket or keg and add the apricot extract 0.5 oz. (14 mL) at a time, gently stirring and tasting in between additions, until the desired intensity of fruit flavor and aroma is obtained. Carbonate and package the beer as desired.

TIPS FOR SUCCESS:

Fruit extracts are an easy and often effective way to add fruit flavor and aroma to a beer, though care should be taken to not overpower the beer by using too much. The intensity of flavor and aroma will vary from one brand of extract to the next, so some experimentation is necessary in order to obtain the correct balance. Try experimenting with a small amount of your beer and then scaling up when you find the right concentration. For more about homebrewing with fruit extract, see the sidebar "Fruit Beer Made the Easy Way" on the facing page. Combining both real fruit and extract in the same beer also helps to round out the fruit character and can enhance the perception of real fresh fruit flavor.

Photos by Charles A. Parker/Images Plus

fermented blueberries are a very subtle flavoring. Use 2 lbs. per gallon (0.9 kg per 3.8 L)

CHERRY - Traditionally used in many Belgian beers. Ripe, sour cherries are best as they blend well with the malt flavors. Cherries should be pitted as the seed contains cyanide compounds. Generally a lot of cherries are needed, as much as 1–3 lbs. (0.45–1.3 kg) per gallon (3.8 L) of beer, which is why many cherry-based Belgian beers are expensive.

CRANBERRY - Cranberries add a dry tartness and color to a beer, but unfortunately do not contribute much flavor. Freeze and purée them before adding them to the secondary. Use Use 1.5–4 lbs. per gallon (0.6–1.8 kg per 3.8 L).

LEMON OR LIME - Both of these citrus fruits have very strong flavor additions that are acidic as well. These should be used sparingly as they can easily overpower the flavor of a beer. If using fresh juice, add the juice of 10 or so lemons or limes per 5 gallon (19 L) batch.

PEACH - Peach is a fruit that fades when used in beer, though its sugar will add alcohol. Apricot is a good substitute that creates a flavor similar to peach in the finished beer. Peach flavoring is also a possibility. Use 1.5–4 lbs. per gallon (0.6–1.8 kg per 3.8 L).

PEAR - Like apples, pears are more widely used in ciders and meads. They only provide a subtle flavor to the beer, but can be a refreshing addition. Like apples, pear juice/perry can be added or you can use fresh fruit. If using fresh fruit target about 2 lbs. per gallon (0.9 kg per 3.8 L).

PINEAPPLE - This tropical fruit provides a very subtle, acidic flavoring. Requires 2+ pounds per gallon (0.9+ kg per 3.8 L) to generate any significant flavor in the finished beer.

PLUM - Plums are a great addition to a variety of beer styles, including

funkwerks

Raspberry Provincial

BELGIAN-STYLE SOUR ALE

FUNKWERKS, INC. RASPBERRY PROVINCIAL CLONE

(5 gallons/19 L, all grain)
OG = 1.044 FG = 1.012
IBU = 13 SRM = 3.5 ABV = 4.2%

2014 Great American Beer Festival – Gold (Belgian-Style Fruit Beer)

INGREDIENTS

4.3 lbs. (1.9 kg) Pilsner malt
2.2 lbs. (1 kg) wheat malt
0.5 lb. (0.23 kg) Carapils® malt
0.5 lb. (0.23 kg) flaked wheat
0.5 lb. (0.23 kg) flaked oats
1.2 lb. (0.55 kg) acidulated malt (added in the last 20 minutes of mash)
25 oz. (0.74 L) Oregon Specialty Fruit raspberry purée (added at the end of primary fermentation)
3.5 AAU Magnum hops (60 min.) (0.25 oz./7 g at 14% alpha acids)
0.75 AAU Styrian Golding hops (15 min.) (0.25 oz./7 g at 3% alpha acids)
White Labs WLP400 (Belgian Wit Ale) or Wyeast 3944 (Belgian Witbier) yeast
4 oz. (113 g) corn sugar (if priming)

STEP BY STEP

Mill grains and mash all the grains except the acidulated malt in 3.3 gallons (12.5 L) of water at 155 °F (68 °C) for 40 minutes. Then add the milled acidulated malt and continue mashing for an additional 20 minutes (60 minutes total mash time). Vorlauf until the runnings are clear and sparge the grains with enough 168 °F (75 °C) water to obtain a 6 gallon (23 L) pre-boil volume. Boil the wort for 60 minutes adding the hops at the times indicated in the ingredients list.

After the boil, turn off the heat and chill the wort to about 65 °F (18 °C), transfer the wort to the fermenter, aerate, and pitch the yeast. Ferment at 68 °F (20 °C) for four days and add the raspberry purée. Ferment for an additional seven days, rack to a secondary fermenter for additional clearing if desired, and then bottle or keg the beer and carbonate.

FUNKWERKS, INC. RASPBERRY PROVINCIAL CLONE

(5 gallons/19 L, partial mash)
OG = 1.044 FG = 1.012
IBU = 13 SRM = 3.5 ABV = 4.2%

2014 Great American Beer Festival – Gold (Belgian-Style Fruit Beer)

INGREDIENTS

2.7 lbs. (1.2 kg) wheat dried malt extract
2 lbs. (0.91 kg) Pilsner malt
0.5 lb. (0.23 kg) flaked wheat
0.5 lb. (0.23 kg) flaked oats
1.2 lb. (0.55 kg) acidulated malt (added in the last 20 minutes of mash)
25 oz. (0.74 L) Oregon Specialty Fruit raspberry purée (added at the end of primary fermentation)
3.5 AAU Magnum hops (60 min.) (0.25 oz./7 g at 14% alpha acids)
0.75 AAU Styrian Golding hops (15 min.) (0.25 oz./7 g at 3% alpha acids)
White Labs WLP400 (Belgian Wit Ale) or Wyeast 3944 (Belgian Witbier) yeast
4 oz. (113 g) corn sugar (if priming)

STEP BY STEP

Mill the grains and mash all of the grains except the acidulated malt in 1.3 gallons (1.5 L) of water at 155 °F (68 °C) for 40 minutes. Once this is complete add the milled acidulated malt and continue mashing for an additional 20 minutes (60 minutes total mash time). Rinse the grains with about 1 gallon (4 L) of hot water. Top off your kettle to 6 gallons (23 L) pre-boil volume (or as high as you can without fear of boil-over problems). Add the dried malt extract and bring to a boil. Boil the wort for 60 minutes adding the hops at the times indicated in the ingredients list.

After the boil, turn off the heat and chill the wort to about 65 °F (18 °C), transfer the wort to the fermenter, top off to 5 gallons (19 L), aerate and pitch the yeast. Ferment at 68 °F (20 °C) for four days and add the raspberry purée. Ferment for an additional seven days, rack to a secondary fermenter for additional clearing if desired, and then bottle or keg the beer and carbonate.

TIPS FOR SUCCESS:

In order to give this beer the desired tartness, Funkwerks does a fermentation of the wort with *Lactobacillus* for 24 hours until they hit their target acidity before boiling. Although this can be attempted at home by the adventurous homebrewer, an alternative method using acidulated malt has been provided to simplify the process. The brewer suggests adding the acidulated malt in the last 20 minutes of the mash to ensure the mash pH does not drop too low.

many darker styles. Use 0.5–2 lbs. per gallon (0.23–0.9 kg per 3.8 L).

RASPBERRY - Raspberry is one of the best fruits for brewing. The flavor and aroma hold up well to fermentation, and come through well in the finished beer. The flavor is strong even at a rate of 0.5–1 lb. per gallon (0.23–0.45 kg per 3.8 L), making raspberry a favorite fruit choice of brewers.

STRAWBERRY - Strawberry is generally a poor choice. The flavor and color fade quickly in beer and the aroma is very subtle. If you are going to use strawberry in a beer you need to use fully ripe berries, you must use a lot of them (2–5 lbs./.09–2.3 kg per gallon), and you must drink the beer as young as possible as the flavor and aroma will be gone before you know it.

WATERMELON - Watermelon provides a subtle creamy flavor to beer, though it takes quite a bit of watermelon to get any pronounced flavor. Ripe or overripe watermelon works best, and you can use as much as 3–5 lbs. per gallon (1.4–2.3 kg per 3.8 L). Adding watermelon rind to the beer will sour it.

OTHER FRUITS - A variety of other fruits are less commonly used in beers and meads, such as dates, bananas, mangos, pomegranate, etc. Most of these fruits produce only a mild flavor and aroma, though they add considerable fermentable sugars.

HOMEBREWING WITH FRUITS

Freeze whole fruit once and thaw it before adding it to the beer. Freezing fruit breaks open the cell walls, allowing more flavor and aroma to permeate the beer. Thaw the fruit before use and bring it up to room temperature before adding it to your beer, however, to avoid shocking the yeast.

Add the fruit to the secondary fermenter if at all possible. Since whole fruit in particular contains a lot of microbes and bacteria, adding fruit too early in the fermentation process can lead to infection. By the time your

ROADHOUSE BREWING CO. SAISON EN REGALIA CLONE

(5 gallons/19 L, all-grain)
OG = 1.057 FG = 1.006
IBU = 31 SRM = 4 ABV = 7%

2014 Great American Beer Festival – Silver (Belgian-Style Fruit Beer)

INGREDIENTS

10 lbs. (4.5 kg) Pilsner malt
1.25 lbs. (0.57 kg) wheat malt
4 oz. (113 g) honey malt
4.5 AAU Bravo hops (60 min.) (0.3 oz./9 g at 15% alpha acids)
2.4 AAU Glacier hops (15 min.) (0.4 oz./11 g at 6% alpha acids)
4.4 AAU Zythos® hops (15 min.) (0.4 oz./11 g at 11% alpha acids)
2 lbs. (0.9 kg) Oregon Specialty Fruit peach purée (added at the end of primary fermentation)
2 lbs. (0.9 kg) Oregon Specialty Fruit apricot purée (added at the end of primary fermentation)
White Labs WLP566 (Belgian Saison II) yeast
5 oz. (142 g) corn sugar (if priming)

STEP BY STEP

Mill the grains and mash in 3.9 gallons (14.7 L) of water at 148 °F (64 °C) for 45 minutes. Vorlauf until your runnings are clear and sparge the grains with enough 168 °F (75 °C) water to obtain a 6-gallon (23 L) pre-boil volume. Boil the wort for 90 minutes adding the hops at the times indicated in the ingredients list.

After the boil, turn off the heat and chill the wort to about 69 °F (21 °C), transfer the wort to the fermenter, aerate, and pitch the yeast. Allow the fermentation temperature to free-rise up to 78 °F (26 °C), ferment for 10 days and add the peach and apricot purée. Ferment for an additional seven days, rack to a secondary fermenter for additional clearing if desired, and then bottle or keg the beer and carbonate.

ROADHOUSE BREWING CO. SAISON EN REGALIA CLONE

(5 gallons/19 L, extract with grains)
OG = 1.057 FG = 1.006
IBU = 31 SRM = 4 ABV = 7%

2014 Great American Beer Festival – Silver (Belgian-Style Fruit Beer)

INGREDIENTS

6.6 lbs. (3.3 kg) Pilsen liquid malt extract
1 lb. (0.45 kg) wheat dried malt extract
4 oz. (113 g) honey malt
4.5 AAU Bravo hops (60 min.) (0.3 oz./9 g at 15% alpha acids)
2.4 AAU Glacier hops (15 min.) (0.4 oz./11 g at 6% alpha acids)
4.4 AAU Zythos® hops (15 min.) (0.4 oz./11 g at 11% alpha acids)
2 lbs. (0.9 kg) Oregon Specialty Fruit peach purée (added at the end of primary fermentation)
2 lbs. (0.9 kg) Oregon Specialty Fruit apricot purée (added at the end of primary fermentation)
White Labs WLP566 (Belgian Saison II) yeast
5 oz. (142 g) corn sugar (if priming)

STEP BY STEP

Place the crushed grains in a muslin bag and steep in the brewing water as it heats up. Remove the grain bag when the temperature reaches 168 °F (75 °C). Add the liquid and dried malt extracts and bring to a boil. Boil the wort for 60 minutes adding the hops at the times indicated in the ingredients list.

After the boil, turn off the heat and chill the wort to about 69 °F (21 °C), transfer the wort to the fermenter, aerate, and pitch the yeast. Allow the fermentation temperature to free-rise up to 78 °F (26 °C), ferment for 10 days and add the peach and apricot purée. Ferment for an additional 7 days, rack to a secondary fermenter for additional clearing if desired, and then bottle or keg the beer and carbonate.

TIPS FOR SUCCESS:

Roadhouse Brewing Co. utilizes White Labs WLP566 (Saison II) yeast in this beer because they love the fruitiness and subtle tartness it creates in their beer. It also produces a velvety characteristic, which gives it a unique mouthfeel. They are able to coax this profile out of the yeast by giving it a longer primary ferment and allowing the temperature to free-rise up to 78 °F (25 °C). It is important that this yeast be allowed to do its work and reach the proper terminal gravity as an under attenuated saison will not have the proper flavor profile.

Because of the long fermentation period required, and the sometimes fickle nature of saison yeast, it's not a bad idea to pitch the yeast as a yeast starter to ensure a good, healthy population of cells. Try using a 0.5 gallon (~2 L) starter for a 5-gallon (19-L) batch. Aerate the wort well, and even consider using a pure oxygen setup in the fermenter to be cautious.

Regarding the "additional cellaring" as referenced in the recipes, *BYO* author Horst Dornbusch recommends, laying a saison down for three months of bottle-conditioning and maturation at a room temperature of 73 °F (23 °C). He adds, "However, serve the brew at a cool cellar temperature of roughly 50–55 °F (10–13 °C)."

beer is in the secondary fermenter, it has a higher alcoholic content, is more acidic and also nutrient depleted but yeast rich, all of which serve as a guard against potential infection.

One cautionary note when working with glass carboys as a secondary fermenter: Adding fruit to your beer will cause rapid and vigorous fermentation, which requires several gallons or liters of headspace above the beer. Be sure you have adequate headspace and ventilation in your fermenter to prevent the bubbling trub from blocking your airlock, which could make a bomb out of a glass carboy.

Juices, concentrates, and aseptic fruit purees can also be used much like whole fruit — adding them to the secondary. Adjustments must be made for concentration however — concentrated fruit juice contains more flavor/fermentables than natural juice.

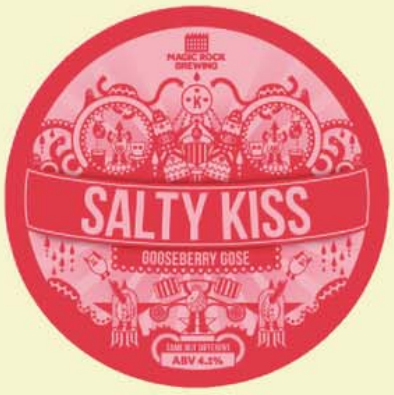
Beer clarity can be a significant problem when brewing with fruits. Most fruits contain pectins, carbohydrates and proteins that contribute to haze or cloudiness in the finished beer. If you boil your fruit, in particular, you may see a pectic haze unless you use a pectic enzyme to reduce it (for more on using pectic enzyme, visit http://byo.com/story1602). I recommend using a fining agent when brewing with fruit, and best results may be achieved using a combination of methods to achieve better clarity.

Aging is another issue when working with fruit beers. Fruits contain many wild yeasts that can that secrete enzymes that breakdown malt dextrins and lead to more fermentation. For bottle-conditioned beers this can be a significant problem as the bottle that was perfectly carbonated a month or two after bottling may be an overcarbonated gusher a month or two later.

The second aging issue is that the flavor profile of fruit beer will inevitably change over time. Young fruit beers may have a poor flavor profile due to unfermentables, as well as the pectins, proteins and other complex fruit materials in the beer. At some point the flavor of the beer will definitely peak, but for some fruit beers this can take six months to even a year or more. Finally, as the fruit continues to change you may see a drop in quality once the beer is past its peak.

Many brewers also blend fruit beers with other beers or fruit extract before bottling. Many Belgian styles like lambic are blended beers using a combination of well-aged and younger brews. Craft breweries also blend fruit-heavy beers with a lighter brew to balance the flavor. It's also not uncommon to add fruit extract to a fruit beer to either enhance the fruit flavor or complement it by adding another flavor.

Brewing with fruit is a complex, challenging task that is not for the weak at heart! However a properly balanced fruit beer can be a refreshing reward for the adventurous brewer.



MAGIC ROCK BREWING SALTY KISS CLONE

(5 gallons/19 L, all-grain)
OG = 1.044 FG = 1.011
IBU = 17 SRM = 3 ABV = 4.2%

2014 World Beer Cup – Gold (Fruit Wheat Beer)

INGREDIENTS

4.2 lbs. (1.9 kg) Pilsner malt
3.3 lbs. (1.5 kg) wheat malt
1.3 lbs. (0.6 kg) acidulated malt
1.34 oz. (38 g) sea buckthorn, dried berries
1 lb. (0.45 kg) gooseberries (frozen and defrost before use)
0.14 oz (4 g) sea salt
0.8 AAU Cascade hops (60 min.) (0.15 oz./4 g at 6.6% alpha acids)
7.7 AAU Cascade hops (10 min.) (1.4 oz./40 g at 6.6% alpha acids)
White Labs WLP051 (California Ale V) or Wyeast 1272 (American Ale II) yeast
5 oz. (142 g) corn sugar (if priming)

STEP BY STEP

Mill the grains and mash in 3.3 gallons (12.5 L) of water at 149 °F (65 °C) for 60 minutes. Vorlauf until your runnings are clear and sparge the grains with enough 168 °F (75 °C) water to obtain a 6-gallon (23 L) pre-boil volume. Once you have collected the full volume, remove enough wort to cover the sea buckthorn berries and begin steeping them separately. Boil the wort for 60 minutes adding the hops at the times indicated in the ingredients list.

After the boil, turn off the heat, add the sea buckthorn berries with their steeping liquid and rest for 20 minutes. Chill the wort to about 64 °F (18 °C), transfer it to the fermenter, aerate, and pitch the yeast. Ferment for two days at 66 °F (19 °C). After two days mash the gooseberries to a pulp and bring them to a boil. Cool the gooseberries to 68 °F (20 °C) and add them to the fermenter at the peak of fermentation. Ferment for an additional seven days then rack to a secondary fermenter for additional clearing if desired.

Once fermentation is complete, mix the sea salt into a ½ cup (0.12 L) of boiling water, cool, add to the beer, and then bottle or keg the beer and carbonate.

MAGIC ROCK BREWING SALTY KISS CLONE

(5 gallons/19 L, extract only)
OG = 1.044 FG = 1.011
IBU = 17 SRM = 4 ABV = 4.2%

2014 World Beer Cup – Gold (Fruit Wheat Beer)

INGREDIENTS

4 lbs. (1.8 kg) wheat dried malt extract
1 lb. (0.45 kg) Pilsen dried malt extract
0.57 oz. (17 g) lactic acid (88% solution)
1.34 oz. (38 g) sea buckthorn, dried berries
1 lb. (0.45 kg) gooseberries (frozen and defrost before use)
0.14 oz (4 g) sea salt
0.8 AAU Cascade hops (60 min.) (0.15 oz./4 g at 6.6% alpha acids)
7.7 AAU Cascade hops (10 min.) (1.4 oz./40 g at 6.6% alpha acids)
White Labs WLP051 (California Ale V) or Wyeast 1272 (American Ale II) yeast
5 oz. (142 g) corn sugar (if priming)

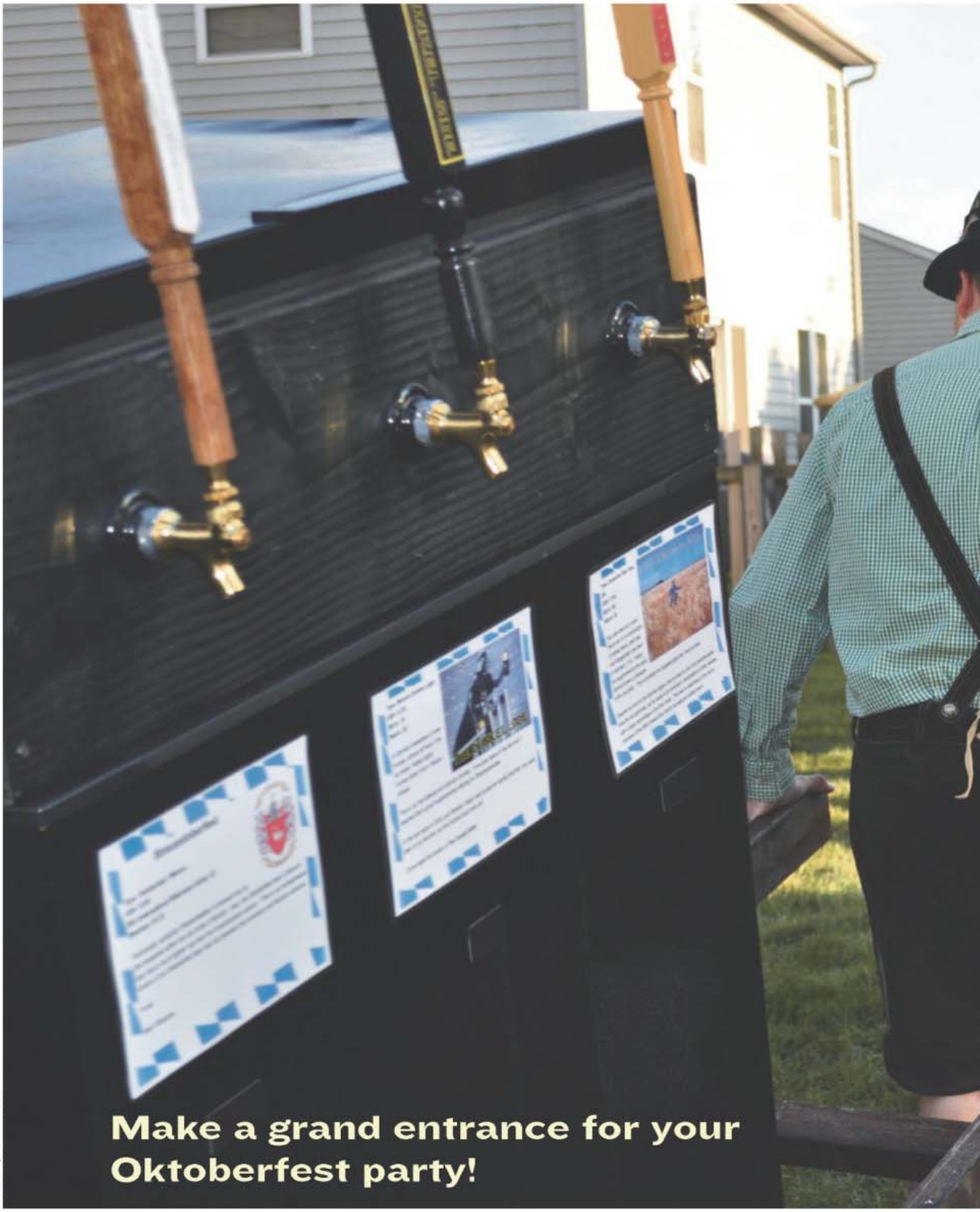
STEP BY STEP

Add 5 gallons (19 L) of water to your brewpot and raise to a boil. Turn off the heat and stir in all the dried malt extract. Once all the extract is dissolved, remove enough wort to cover the sea buckthorn berries and begin steeping them separately. Return the brewpot to a boil and boil the wort for 60 minutes adding the hops at the times indicated in the ingredients list.

After the boil, turn off the heat, add the lactic acid and sea buckthorn berries with the steeping liquid and rest for 20 minutes. Chill the wort to about 64 °F (18 °C), transfer the wort to the fermenter, top off to 5 gallons (19 L), aerate and pitch the yeast. Ferment for two days at 66 °F (19 °C). After two days, mash the gooseberries to a pulp and bring to a boil, cool to 68 °F (20 °C) and add to the fermenter at the peak of fermentation. Ferment for an additional seven days then rack to a secondary fermenter for additional clearing if desired. Once fermentation is complete, mix the sea salt into ½ cup (0.12 L) of boiling water, cool, add to the beer, and then bottle or keg the beer and carbonate.

TIPS FOR SUCCESS:

Salty Kiss is a traditional German Gose. Gose is a top-fermented beer style from the German city of Leipzig, which uses at least 50% wheat in the grist, they are by definition tart, herbal and refreshing but what really characterises them is a defined saltiness which traditonally would have come from the particular water in the area they were brewed. Dried sea buckthorn berries can be purchased online. Sea buckthorn is a unique sour-flavored berry that is considered a "super-food" as it is rich in nutrients and phytochemicals such as vitamin C, carotenoids, vitamin E, amino acids, essential fatty acids, minerals, sterols and flavonols. Sea buckthorn berries can be used to make pies, preserves, fruit wines, and cosmetics, and their inclusion in this recipe along with sea salt will give your beer a very unique flavor twist.
For more about Magic Rock's story of brewing Salty Kiss, visit their website: http://www.magicrockbrewing.com/blog/salty-kiss-gooseberry-gose/ BYO



Make a grand entrance for your Oktoberfest party!

Photos by Eric Strauss

story by **Eric Strauss**

BUILD A BIER-WAGEN

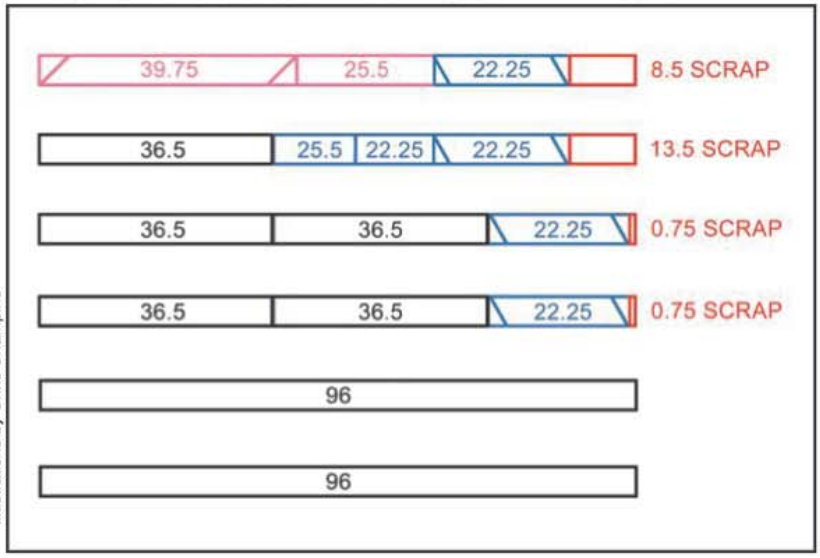
My wife and I throw our annual Strausstoberfest party every year on the last Saturday in September. This occurs during the traditional Oktoberfest celebration. Oktoberfest is synonymous with beer, awesome food and a certain amount of over the top pomp and circumstance. For the last part, I decided that the beer I've spent the last couple of months caring for MUST have a grand entrance. With that in mind, I present you with my design for a bierwagen to roll your keezer around on.

I had several constraints when designing the cart, starting with a few obstacles to navigate around during its trip from the garage to the backyard.

- It must fit through our gate.
- It must be able to navigate large bumps (edge of driveway and protruding tree roots in the grass).
- It must allow quick assembly and disassembly for storage under our deck during the other 364 days of the year.
- It must utilize our bike tires.
- It must have an integrated ramp system for easy loading/unloading of my keezer dolly.
- It must be sturdy enough to stand on to switch over kegs during the party.

In addition to these, the weight of the keezer must be carefully balanced so that the bierwagen does not tip when set to rest, yet far enough back that lifting from the front is easy.

Illustration 1: Cut List



Illustrations by Chris Champine

MATERIALS AND TOOLS

(6) 2x4 boards, 8-feet (2.4 m) long
2.5-inch drywall/deck screws
L-channel (AKA angle iron or L bracket)
(8) 3/16-inch lag bolts and washers
(4) Thick washers with approximately 1/2-inch inner diameter (will vary depending on your bike axles)
Circular saw or miter saw
Hack saw or cut off saw
Drill
Step bit
Other common woodworking tools
* You will also need a keezer and dolly to roll your keezer into place to utilize the bierwagen.

Illustration 2: Side View Diagram

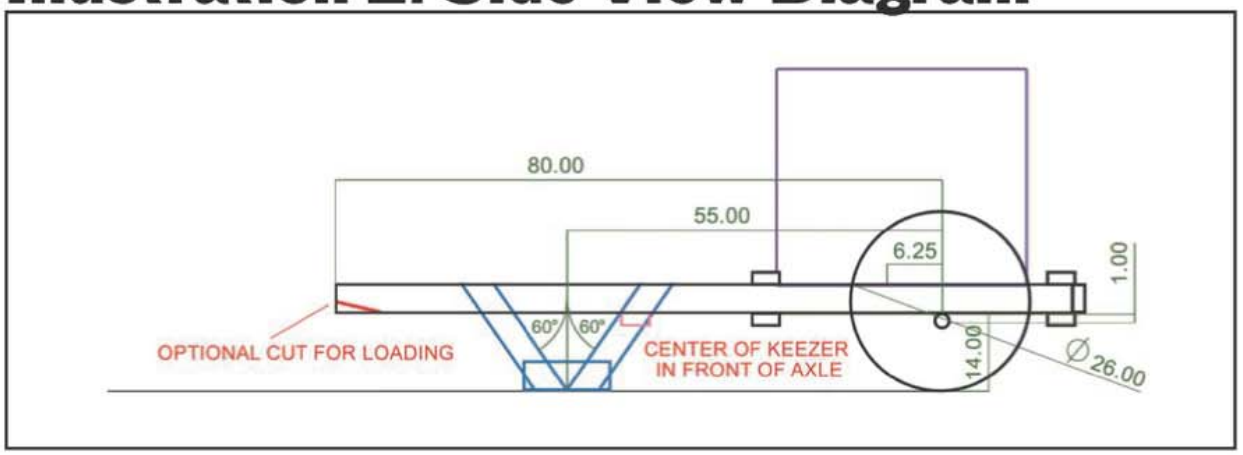
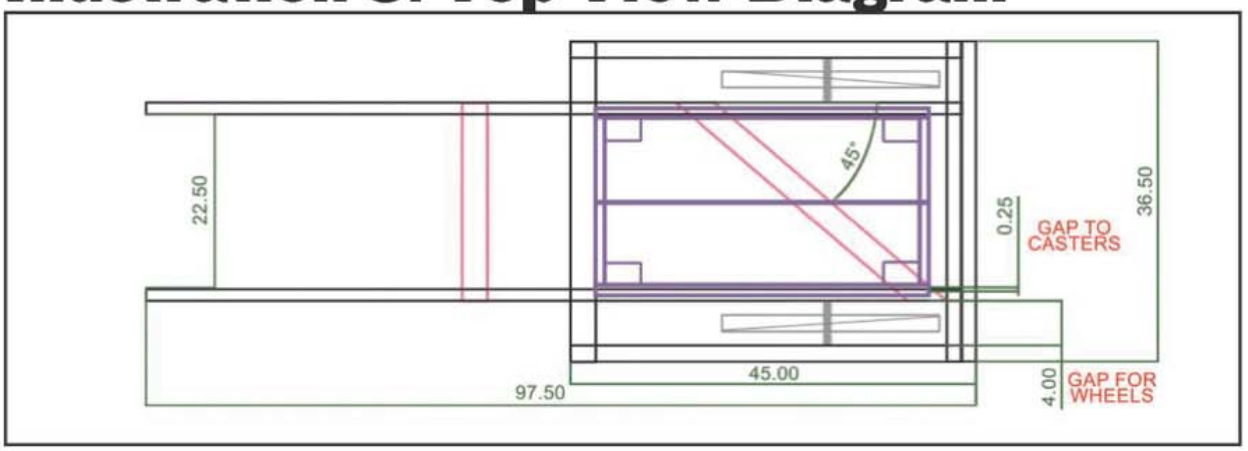


Illustration 3: Top View Diagram



STEP 1: CUT LIST

Illustration 1 (page 66) shows the cut list if you wish to make your bierwagen the same dimensions as mine. I was able to build my cart from a quantity of six 2x4 boards, eight feet (2.4 m) long. The color-coding in Illustration 1 correlates with Illustrations 2 and 3. Where:

Black = Frame
Pink = Cross-member supports
Blue = Legs
Gray = Bicycle tires
Purple = Keezer on dolly base
Red = Estimated scraps

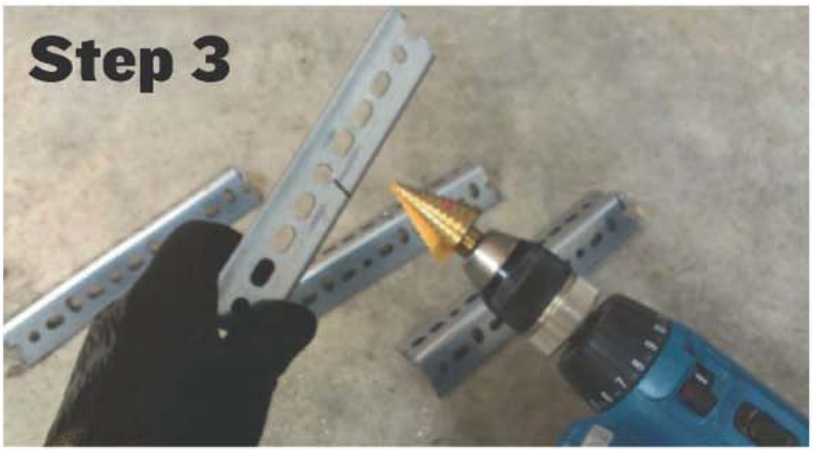
The legs and cross-member supports required mitered ends. The lengths shown are for the full-length board that you will then trim the angles in the boards.

Of course, your keezer is most likely a different size and you may not even have a keezer dolly, so take my plans and modify them to suit your needs. The cut list is in an ideal world, so you may have to buy an extra 2x4 or if you are like me, you've always got some on hand for whatever needs may pop up.

STEP 2: ASSEMBLE FRAME

Use the illustrations on page 66 as your guide to build the base.

Illustrations 2 and 3 include all of the major dimensions of my bierwagen and locations of the boards. As you can see, it is 97.5 inches (2.48 m) long and 36.5 inches (0.93 m) wide counting the wheels. If needed, you can adjust the dimensions of your own beirwagen to fit your own needs. You can see the profile of the keezer (in purple) in Illustrations 2 and 3 shows that the center of it is sufficiently in front of the axle line to prevent tipping. I added an extra ¼-inch (0.6-cm) clearance to the outer edges of the casters so they would not rub on the frame rails when moving. I also had to add about 4 inches (10 cm) of clearance for the bike wheels. The bierwagen is probably overbuilt and it is pretty heavy to lift, but it serves it's purpose that one day of the year where it counts!



When changing kegs over during the party it is important to stand between the keezer and the legs. This will also prevent tipping.

The Step 2 picture (pg 67) shows the cart prior to installing the support legs for additional reference.

STEP 3: BICYCLE WHEEL ATTACHMENT

You'll need four short sections of L bracket to attach both wheels to the frame. I cut approximately 6-inch (15-cm) sections.

You'll then pick one of the already round holes and open it up using the step bit, illustrated in the Step 3 picture (pg 67). I measured the diameter of the opening on the forks of both of our bikes and matched the hole size on the bracket. The wheel actually rides on a very narrow section of the axle that sticks out of the wheel hub on both sides, then a cam clamp snugs it up tight.

After you have opened up the hole, you'll need to make the hole a slot that the wheel can drop into. You are basically going to mimic what is on the bicycle fork as shown in the Step 3A picture (pg 67).

You'll also want some lag bolts to attach the new mounting brackets to the frame. I used some 3/16-inch lag bolts with a washer. This is where you'll need some careful measurement and alignment. Since the L bracket is much thinner than the bike fork attachment point, you'll need some washers to add thickness. The only washers I could find that were thick enough were some lock washers or split washers. They will stack up like shown in the Step 3B picture (top left)

The Step 3C picture (at left) offers a view of the cart (still without the support legs attached) flipped upside down so you can get a look at the wheel attachments.

STEP 4: GETTING THE KEEZER ONTO THE BIERWAGEN

The first time you build your bierwagen you should wait on installing the

support legs, but if it is already built you will need to remove the support legs at the front of the Bierwagen in order to load your keezer. Then with it right side up, you'll brace it against a wall. You'll need to remove the lateral board to get the keezer all the way up, as shown in the Step 4 picture (pg 68).

Next, you need to line up your keezer dolly at the tip of the cart. You can see in the Step 4A picture (at right) that my keezer dolly just clears the leading edge of the cart. If yours isn't tall enough, you can either cut the bottom side of the handles (front of cart) or lift up a bit to get it up on the rails. Keep pushing the cart up the "ramp."

Once the keezer is all the way up, reinstall the lateral board.

Now just wheel the bierwagen over and prop the front up on something so that you can reinstall the legs. I used some jack stands as shown in Step 4B (at right) and they worked great.

There you have it. Now you are ready to serve beer this Oktoberfest in style!

STEP 5: STORAGE

After the party is over, I am left with this gigantic bierwagen sitting in the garage. Where am I going to put this? At first I was thinking I would completely disassemble the bierwagen into its independent pieces, but then I'd have to reassemble it again next year. The thing is huge, so I've got to put it somewhere and I am not parking outside and scraping ice all winter. I thought about a few different options, but settled on storing it under my deck.

Get your keezer off the bierwagen and reclaim your bicycle tires. Then remove the legs and screw them back on the underside of the cart like shown in the Step 5 picture (at right). Nice and flat and ready to go under my deck, or leaning up against a wall where it won't take up much space.

For more details and printable plans for my bierwagen, go to: http://fermware.com/mein-bierwagen/ BYO

SPEED cidermaking

You were probably introduced to alcoholic cider as a sweet, mass-produced beverage. While I don't mind a pint of this type of cider occasionally, it's a far cry from many of the traditional ciders created around the world. Luckily, these drier traditional ciders are becoming more popular and accessible than ever.

My introduction to artisanal ciders came in 2001, when I read about an up-and-coming American cider maker in a food magazine. After I tracked it down, I took one sip and was completely captivated. This was nothing like the ciders I had tried before—it was dry, it was slightly tart, and it captured the beauty of that first bite of a fresh-picked apple in the fall. A trip to England cemented my love for this unique beverage, when I happened upon a cider stand at an outdoor market in London. I ordered a dry cider (in spite of the proprietor's warnings that it wasn't like American cider), and I savored every slightly tart sip as I browsed the market. A few days later I attended a traditional English cask festival and was introduced to a whole new world in the cider and perry corner. These were funky, earthy beverages with all kinds of depth, and I loved every one of them. I returned home and made my first batches of cider. Three gallons of fresh apple juice from the Green Market were divided into three gallon jugs: one got Champagne yeast, one a *Brettanomyces-Saccharomyces* yeast blend, and the last a wild culture I had grown up from the skin of an organic apple also purchased at the market. I've never looked back!

by Mary Izett

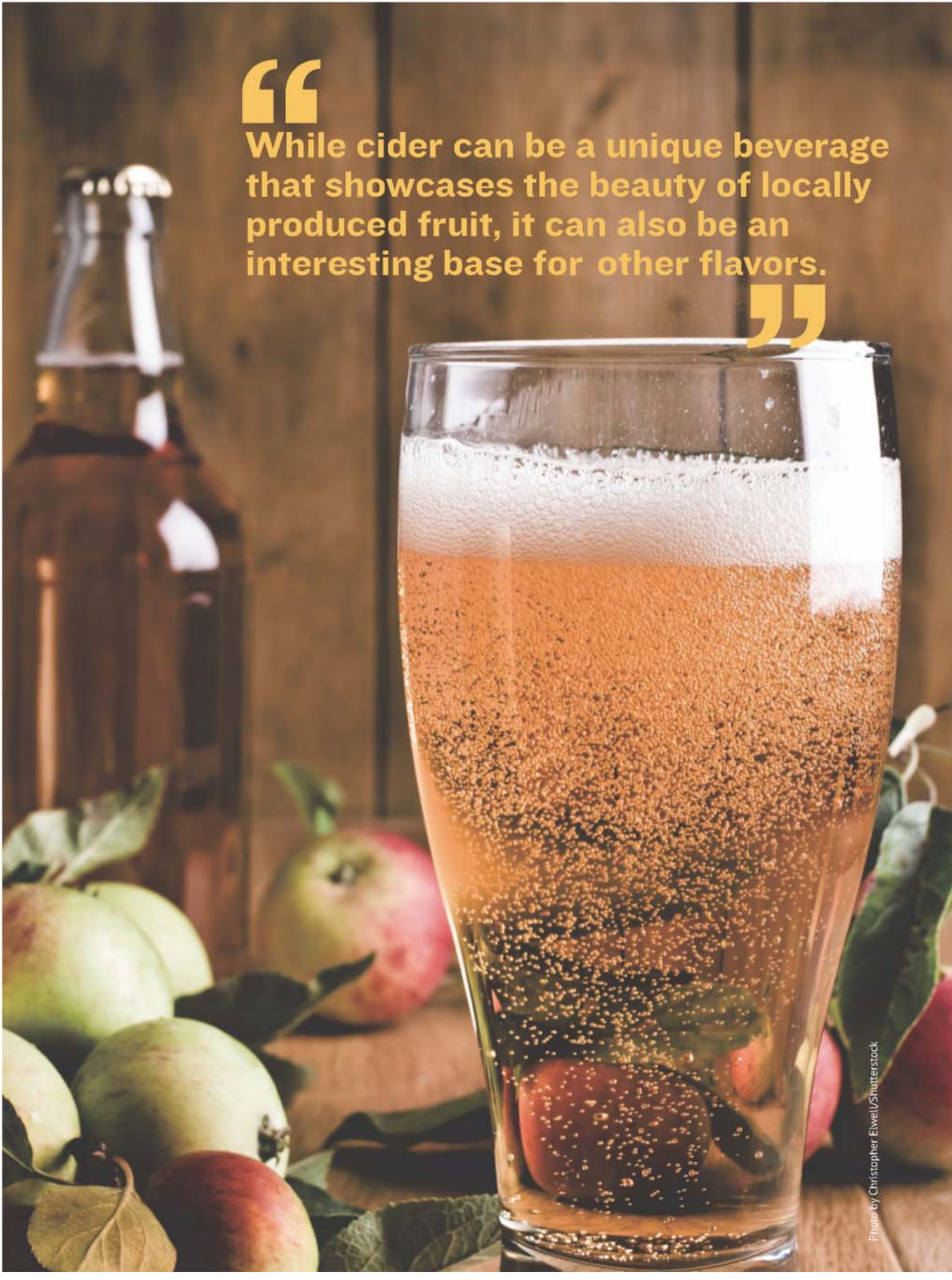


Photo by Christopher Elwell/Shutterstock

CIDERS AROUND THE WORLD

Traditional ciders were made from the juice of what we would consider inedible apples. They're tart, chalky, bitter and unpleasant in the mouth but ferment into a wonderfully complex beverage. These varieties of apples, high in acidity and tannins, are what drive the aroma and flavor of traditional ciders. Unfortunately, they've taken a backseat to the edible version in orchards in many parts of the world and can be difficult to find. You can source and press them at home, or you may be able to find fresh-pressed juice from traditional cider apples from a local artisanal cider maker. Homebrew stores are beginning to source fresh juice in the fall as well, and I encourage you to check availability with your local shop. However, you can also make wonderful cider at home using juice bought from your local grocery store or farmer's market. It's one of the simplest beverages to make; you simply pitch yeast into a jug of apple juice and let it ferment. The aroma and flavor of these ciders aren't dependent on the apples they are made from; the yeast and other additions, such as fruit, wood, and even hops, can create a wonderful array of delicious ciders to enjoy at home.

Although I'm lucky enough to be able to buy heirloom apple juice in my area, I enjoy making cider from store-bought juice just as much. Apples are a seasonal fruit, and fresh juice is available only for a limited amount of

Photos courtesy of Voyageur Press

HOW TO MAKE A SPEEDY CIDER

MATERIALS

- 1-gallon (3.8-L) jug or wide-mouth jar
- 1 gallon (3.8 L) unfermented apple cider or juice
- Sanitizer
- Long-handled, stainless-steel spoon
- Hydrometer
- Liquid or dry yeast
- Brewing notebook

INSTRUCTIONS

1. Clean and sanitize all equipment, including the 1-gallon (3.8-L) jug or wide- mouth jar that will be used as the fermentation vessel.

2. If using dried herbs or spices, first make a tea by steeping herbs and spices in off-boil water for 10 to 15 minutes.

3. Add apple juice, flavorings, and/or tea to the 1-gallon jug or wide-mouth jar.

4. Stir with a sanitized spoon, or cap and shake to thoroughly combine.

5. Take a gravity reading, if desired.

6. Pitch yeast and ferment at 65 °F (18 °C) to 70 °F (21 °C) for 5 to 10 days.

time, but prepackaged juice can be found year round. So while cider can be a unique beverage that showcases the beauty of locally produced fruit, it can also be an interesting base for other flavors.

Store-bought apple juice can be treated as a complementary base flavor or a neutral sugar source, depending on the yeast used and the other flavorings added. I view ciders as I do burgers: Sometimes I start with the grass-fed organic beef patty, other times a veggie patty, and then I build from there. Sometimes it doesn't need anything; other times I stack it with cheese, bacon, a fried egg, the works.

United Kingdom

Several different regions are known for their cider making, particularly the West Country and Kent. "Real" cider, cider made from 100 percent unpasteurized, unprocessed apple juice with traditional methods, is enjoying a comeback in the United Kingdom. Dry, medium, and sweet varieties of cider are produced, usually from a blend of apples, although single varietal ciders are made as well. They may be fermented naturally or with commercial yeasts, in wood barrels or stainless steel fermenters. English ciders vary in alcohol from 1.2 to 8.4 percent and range in aromas and flavors. West Country ciders tend to be drier and funkier, while ciders from the eastern areas tend to be sweeter.

France

The regions of Normandy and Brittany are best known for their *cidres*. French *cidre* making is often approached like winemaking, using more intricate processes than other cider makers worldwide. Two varieties are common. *Cidre Doux* is a sweet style under 3 percent ABV that is typically produced through a complex process called keeving, while *Cidre Brut* is over 4.5 percent ABV and ranges in sweetness. *Cidre* is often sparkling and tends to be drier, lighter-bodied, and more acidic than English varieties.

Spain

Most Spanish *sidra* comes from the north, in the Asturias and the Basque region. They're fermented from local apples with natural yeast and no processing. Most *sidras* are still (have no carbonation); are around 5 to 6 percent ABV; and are complex, with a musty, funky, slightly acetic character and a dry finish. They are often poured into the glass from great heights to aerate the sidra, giving the sensation of carbonation.

Canada

Cider was outlawed during the Canadian Prohibition in the 1910s and didn't truly resurface until the late 1980s, when craft cideries were legalized. Ice cider, known as *cidre de glace*, was invented in the province of Quebec shortly thereafter, and cider has been gaining in popularity since. Ice cider is made from apples that have been frozen naturally and is typically between 9 and 13 percent ABV. Still and sparkling ciders with varying levels of alcohol are also made, as well as ciders flavored with local maple syrup, berries, and honey.

United States

Americans have a cider tradition that goes as far back as the first colonists. The Pilgrims brought apple seeds and cider making equipment with them to North America, and later John Chapman, fondly known as Johnny Appleseed, planted many an orchard across America, likely not for eating but for making cider. Apples picked from trees grown from seed are typically sour and considered inedible, but they make a very drinkable alcoholic cider. Unfortunately, many of these cider orchards were destroyed during Prohibition and the years following and were replaced with edible apple orchards. Artisanal cider resurfaced in the late 1990s and is now exploding. American cider makers are not only reviving traditional ciders but also taking cues from both international cider makers and craft brewers. Yep, not only are American cideries producing single heirloom varietal ciders and Spanish-style *sidras* but also flavored, dry-hopped, bourbon barrel-aged, and beer yeast-fermented ciders.

CIDER INGREDIENTS

Apple Juice

Look for apple juice that is free of additives and preservatives. You can use juice from a variety of sources: grocery stores, health food stores, farmers markets, or your local orchard or cider maker. Containers labeled "100 percent apple juice" are best; avoid sulfites, sorbates, and benzoates, as they impair fermentation. Apple juices containing malic acid, citric acid, and ascorbic acid may be used but are less desirable than 100 percent juice. If you're purchasing fresh locally-pressed apple juice, ask if it is pasteurized and if so, what technique was used. If you find unpasteurized juice, it likely has a number of yeast and bacteria present. You can treat this in two ways: try to ferment it naturally or kill the existing bugs and ferment with a yeast of your choice. Fermenting naturally may produce an absolutely killer cider but is riskier. You are dealing with not only the natural yeast and bacteria on the fruit but also those that may be present on the pressing and packaging equipment.

When I use fresh juice, I usually ferment a gallon (3.8 L) naturally and treat the rest with commercial yeast. When using unpasteurized juice, you can eliminate the existing bugs by heating your cider or by using a form of potassium metabisulfite called Campden tablets. Heating your cider can drive away some flavor and aroma, so I find Campden tablets the better choice. Add one crushed Campden tablet per gallon (3.8 L) of apple must, wait twenty-four to thirty-six hours, and pitch the commercial yeast of your choice. If you're buying pasteurized juice, ultraviolet (UV) pasteurization is the best choice, as it leaves more aroma and flavor than heat pasteurization does. Go with the flow; let your apple juice source help determine the type of cider you're making.

Beer Yeast Nutrient

Beer yeast nutrient will provide the yeast nutrition that the apple juice naturally lacks.

Hops
The hops that brewers use to balance and add aroma and flavor to their beer are a wonderful addition to ciders. Whole hops and pellet hops may be used and can be found through homebrew suppliers.

Yeast
A variety of yeasts, liquid or dry, may be used to create cider, including Champagne, American ale, English ale, German wheat, Belgian, and saison strains. The yeast used to ferment will impact the aroma, flavor, mouthfeel, and dryness of the resulting cider.

Flavorings
You can affect the flavor of your cider by using any number of ingredients.

Fruit. Fruit is a great way to flavor your cider. Fresh or frozen fruit, frozen puree, freeze-dried fruit, and fruit juices all work well in cider. Regardless of the form, fruit and fruit juice free of additives and preservatives is recommended.

Herbs and Spices. Both fresh and dried herbs and spices may be used. You can opt to add herbs and spices directly to the cider or make a tea first, with either apple juice or water as the base liquid.

CITY CIDER

This is the simplest of ciders — 100 percent apple juice fermented with yeast. But the yeast you choose will make a significant difference in the resulting cider. Choose an American or English ale yeast for a sweeter cider with pronounced apple character, a white wine yeast for a drier cider with residual fruitiness, a Champagne yeast for a dry cider, or even a saison yeast for an earthy, herbal cider.
Yield: 1 gallon (3.8 L)

INGREDIENTS

- 1 gal. (3.8 L) 100% apple juice
- Liquid or dry yeast
- 1/16 tsp. beer yeast nutrient

INSTRUCTIONS

1. Add the juice and yeast nutrient to a sanitized 1-gallon (3.8-L) jug or jar.

2. Take a gravity reading, if desired.

3. Pitch the yeast and top with a stopper or grommeted lid and filled airlock.

4. Ferment for 4 to 7 days at 65 °F to 80 °F (18 °C to 27 °C).

5. Bottle.

Cranberry spice cider is a wonderful cider for fall festivities. It's beautiful paired with food or as a stand-alone sipper. Although cranberry juice blends are common, 100 percent cranberry juice can be a little tougher to find. Check local health food and gourmet stores if you don't see it on your local grocers' shelves. You can also cook down fresh cranberries, which are inexpensive and abundant in the fall months. I place fresh cranberries in a saucepan, add water to cover, and simmer for 15 to 20 minutes. Cool slightly and strain the juice. You can use a variety of spices in this recipe; take inspiration from your favorite thanksgiving cranberry recipe. I've added cloves to the mix, substituted orange peel for the lemon, and so forth.
Yield: 1 gallon (3.8 L)

CRANBERRY SPICE CIDER

INGREDIENTS

- 15 cups 100% apple juice (1 cup short of 1 gallon/3.8 L)
- 1¼ cup 100% cranberry juice
- 2 star anise
- 2 allspice berries
- ½ stick cinnamon
- 1 in. lemon peel (zest only, no pith)
- English ale yeast
- 1/16 tsp. beer yeast nutrient

INSTRUCTIONS

1. Place the spices in a microwaveable container and cover with ¼ cup of cranberry juice. Cover and microwave on high for 45 seconds. Remove and steep for 10 minutes.

2. Add the yeast nutrient and remaining cup of cranberry juice to sanitized 1-gallon (3.8-L) jug or jar.

3. Strain out spices and add flavored juice to the container.

4. Add the apple juice to reach 1 gallon (3.8 L).

5. Stir with sanitized spoon, or cap and shake to combine.

6. Take a gravity reading, if desired.

7. Pitch the yeast and top with a stopper or grommeted lid and filled airlock.

8. Ferment for 4 to 7 days at 65 °F to 80 °F (18 °C to 27 °C).

9. Bottle.

Editor's Note: This story is excerpted from the newly-released book Speed Brewing *(Voyageur Press, 2015), by Mary Izett.*

DRY-HOPPED CIDER

Cider expresses the unique aroma and flavor of hops beautifully — particularly the juicy, fruity varieties. This is such a simple process, and it has become one of my go-to fast-fermented beverages to make for parties and other celebrations. While ciders display single hop varieties to perfection, blends are an option as well. This is a wonderful drink for anyone who loves the aroma and flavor of hops, particularly those with an aversion to the bitterness of hoppy beers or an intolerance to gluten. Use an American or English ale yeast if you'd like more sweetness and apple character or a Champagne yeast for a drier, more neutral cider.

Yield: 1 gallon (3.8 L)

INGREDIENTS

- 1 gallon (3.8 L) 100% apple juice
- Liquid or dry yeast
- ¼ oz. (7 g) hop pellets
- ½ tsp. beer yeast nutrient

INSTRUCTIONS

1. Add the apple juice and yeast nutrient to a sanitized 1-gallon (3.8-L) jug or jar.
2. Take a gravity reading, if desired.
3. Pitch the yeast and top with a stopper or grommeted lid and filled airlock.
4. Ferment for 4 to 7 days at 65 °F to 80 °F (18 °C to 27 °C)
5. Add hop pellets and rest at 32 °F to 40 °F (0 °C to 4 °C) for 2 days. (A refrigerator works well for this.)
6. Bottle.

CULTURING YOUR OWN LOCAL YEAST AND BACTERIA

I have cultured wild yeast and bacteria several times for use in fermenting cider. It's a bit more work, and riskier as far as results, but is a fun side project and definitely a conversation starter at homebrew meetings and parties. And you might end up with the best cider you have ever tasted! In the worst-case scenario, you don't like it, and you let it go to the best apple cider vinegar you've ever had. I have started with wild raspberries from my Brooklyn backyard and organic apples from the Green Market. You'll want to make a couple of starters to see if you get any activity. The easiest method is to use a sanitized twelve- to twenty-ounce water or soda bottle; fill it one-third to halfway full with apple juice and add your yeast or bacteria source—either the actual fruit if it is small enough or the peel. Cap it and place it in a dark area between 65 °F (18 °) and 75 °F (22 °C). Check on it two to three times a day; once you see bubbling or foaming activity or the bottle begins to have less give when you press the sides, untwist the cap just enough to "burp" the bottle and take a whiff. If it's pleasant, you can start planning your cider. I typically let my starters go another twelve to twenty-four hours after activity first begins before using. Strain the fruit out and use the liquid as your yeast and bacteria, pitching as you normally would with a commercial yeast. If the starter smells unpleasant, don't use it — let it go to vinegar or discard it. I typically begin with two to four starters — I'm bound to have at least one turn out to be pitchable. You can use other containers as well; if you're using glass, use an airlock, and once it begins to bubble, uncap your vessel and take a whiff. I prefer culturing from locally grown untreated or organic fruit, but you can also collect wild yeast and bacteria by placing juice in an open container; fasten some fabric over the top with a rubber band to keep out flies. Take advantage of your local yeast and bacteria; use a few different wild starters in half-gallon cider batches and see what happens. You can bottle them as-is or blend. Have fun! BYO

Illustration by Chris Champine

HOPS FORGOTTEN

Garlick, Canterbury brown, Finess, Farnham pale, Flemish, Grape, and Colgate hops have all died away in England. As have Grape, English Cluster, Pompey, and Red Bine in the US. There are many reasons why brewers would discard a hop variety, such as flavor and perceived quality, price, and disease resistance. There are many diseases that attack hops, such as molds (including mildew), and damage caused by various insects; all these impact quality and especially price (by decreasing yields of the cones). Therefore, there has always been an incentive to breed hop varieties that would be resistant to infections. But also, hop quality and flavor are subjective, and brewer's opinion has often decided the value of a hop. This, of course, is why Goldings and Fuggles became pre-eminent in Britain, and the so-called noble hops of Germany came to dominate the lager market.

Things changed, however, when in the 20th century the importance of alpha acids was first realized, and the concept of breeding hops specifically for high alpha acid content was born. By the second half of the last century some of the commercial brewers had grown so big that their hop requirements dictated what the growers should produce. And since the big brewers had moved away from using low alpha-acid aroma hops, high alpha-acid hops became the order of the day, so much so that in the 1980s aroma hops formed only a small part of the world crop. They might have even vanished entirely had it not been for the craft brewing revolutions in the US and in Britain.

As craft brewing flourished aroma hops came back into favor, especially when brewers returned to the idea of dry hopping, notably in IPAs. But brewers were not always happy with the "old" hop varieties, whether used for bittering or aroma. One reason for this is that established varieties, such as Goldings and Saaz for example, tended to be low in alpha acids. Many of the new-wave brewers had systems that relied on whirlpools to separate the trub from the wort, which often meant they were limited in the sheer amount of hops they could use. For example, at BrüRm@BAR in New Haven, Connecticut, where I brew, we have a whirlpool with a baffle just in front of the outlet, which holds back the trub. If we were to brew with a hop variety low in alpha acids for bittering and aroma in many of our beers we would have so much trub that it would overflow the baffle and either run into the fermenter, or severely limit the amount of clean wort we could run off. Therefore, we, like many other craft brewers, use high alpha-acid hops for bittering to limit how much trub we have to deal with.

Brewers still want and need aroma hops, however. Along with the growing popularity of IPAs with more intense hop aromas and character there has been a clear need for growers to continue to develop high alpha-acid hops — preferably varieties with both high alpha-acid and good aroma properties. Cascade is not really an old (and certainly not a forgotten) variety since the first test plots were not harvested until 1969. However, Cascade became favored by craft and homebrewers following its release, and was the lead in to the development of high alpha-acid hops with pronounced citrus character. The most famous of these are of course Chinook, Centennial, Columbus, Citra®, and Simcoe®. These and other new varieties with lots of citrus character now seem to be the first choice of craft and homebrewers, and have certainly ousted older varieties, especially in pale ales and IPAs.

Isn't that a good thing? Haven't the hop research groups and growers done such a good job in developing interesting new varieties? Well, yes, up to a point. I certainly use many

story by **Terry Foster**

Photos courtesy of Charles Faram Inc.

Some traditional hop varieties to reconsider for your next brew, including (clockwise): Styrian Golding, Fuggles, UK Goldings, and Whitbread Golding Variety (WGV).

of those hop varieties in my brewing and will continue to do so. However, I can't help wondering whether sometimes we have gone too far in seeing citrus type hops as being the only ones of any consequence in brewing a good IPA. To find inspiration for brewing more balanced beers that will stand out among the hop bombs of today, I say look backwards at some of the older hop varieties that have too often been forgotten. When I say "older" and "forgotten" I do not mean hop varieties that are no longer grown, but rather those that are available but that are not the first to come to mind when choosing or formulating a recipe.

LESS IS MORE

Perhaps the keyword to the hop varieties I am discussing in this article is subtlety, because the hops that fit my loose definition of "forgotten" are indeed much more subtle in aroma characteristics than the popular citrus or tropical fruit varieties. But the more traditional hops may contribute to a more drinkable beer. That means that these are varieties more suited to brewing session beers than aggressively flavored IPAs. And by session beers I am referring to those around or below 5% ABV (there is much debate about what constitutes a "session" beer, but that's for another article).

There are quite a number of "older" hop varieties still around, but for this article I intend to concentrate on some very traditional varieties, namely: English Fuggles and Goldings, Whitbread Golding Variety (WGV), German Hallertau and Tettnanger, Czech Saaz, Slovakian Styrian Goldings, US Cluster, and Brewer's Gold. Yes, I know all but the last two are Old World hops that have been around for a long time (over 200 years in the case of Goldings — and perhaps Hallertau goes back a few hundred years more), but the very fact that these varieties had such staying power shows that they work well in many beer styles. And, interestingly, I consider Fuggles to be the most important of these, both in its own right and because WGV and Styrian Goldings are Fuggle derivatives, as is US Willamette, and no less a hop than Cascade. Note that some of the European varieties are cultivated in the US, and can be substituted for English or Continental varieties, but will show some differences in character.

Fuggles: It is believed that Fuggles were discovered in 1861. They were found in George Stace Moore's flower garden in Kent and introduced to brewers in 1875 by Richard Fuggle. Martyn Cornell has recently shown, however, that although the variety was discovered in Moore's garden it was probably cultivated before 1875, Also, the role of Richard Fuggle in its development has not been clearly established, and interestingly that around that time the variety was sometimes referred to as "Fuggle's Goldings." Be that as it may, Fuggles became a popular hop and is still around today despite its high susceptibility to disease. Note that it is also grown in the UK's southwest Midland counties of Hereford and Worcester, as well as in Kent.

UK Fuggles are generally low to medium in alpha-acid (3.0-6.0%), but do provide a clean bitterness, and give the beer a mild, spicy, some say woody or earthy aroma and character. Once used as a bittering hop it is now mainly only used for its aroma, partly because of its scarcity. Also, many brewers find it more economical to use a high alpha-acid hop (your choice) for bittering and to reserve the Fuggles for late boil addition or dry-hopping. I have used it with good results as the only hop in brewing an English-style pale ale (see the recipe for this on page 82). It is ideal as an aroma hop for most English ales, pale ale, bitter and especially mild ale where its character does not overwhelm the light maltiness of the beer.

UK Goldings: UK Goldings, sometimes called East Kent Goldings, is believed to have been discovered as far back as 1785. This variety is normally around 4-7% in alpha acid, with an aroma variously described as smooth, resiny, lightly spicy, and even peppery. It provides a very smooth bitterness when used for bittering, but it is mostly used these days as an aroma hop. It is often held to be the pre-eminent aroma hop for English pale ales and bitters, especially when used for dry hopping. In fact, I have often used it for bittering, and it is reasonably economical to use in low gravity beers

"Forgotten" Hop Recipes

EURO PALE LAGER

(5 gallons/19 L, all-grain)
OG = 1.058 FG = 1.013
IBU = 27 SRM = 5 ABV = 5.9%

INGREDIENTS

12 lbs. (5.4 kg) Pilsner malt
4.4 AAU German Tettnang hop pellets (90 min.) (1 oz./28 g at 4.4% alpha acids)
4.4 AAU German Tettnang hop pellets (0 min.) (1 oz./28 g at 4.4% alpha acids)
3 AAU Czech Saaz hop pellets (0 min.) (1 oz./28 g at 3% alpha acid)
2 packs Wyeast 2124 (Bohemian Lager) or White Labs WLP830 (German Lager) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Mash the grains with 14 qts. (13 L) hot water to achieve 152–154 °F (66.7–67.8 °C) in the tun. Hold 60 minutes, run off wort and sparge to collect 6 gallons (23 L), and bring to a boil. Add first portion of German Tettnang hops and boil the wort for 90 minutes. When the boil is finished, turn off the heat and add the second portion of German Tettnang and the Saaz hops. Let the wort stand for 30 minutes, run wort off trub, cool to 40–45 °F (4.4–7.2 °C) and pitch yeast, preferably as a 2-qt. (2-L) starter. Maintain this temperature for seven days, then bring up to about 65 °F (18 °C) for 3-4 days (diacetyl rest). Rack to secondary and lager at 32–35 °F (0–2 °C) for three to four weeks, then rack and bottle or keg as usual.

EURO PALE LAGER

(5 gallons/19 L, extract only)
OG = 1.057 FG = 1.013
IBU = 27 SRM = 7 ABV = 5.7%

INGREDIENTS

6 lbs. (2.7 kg) Pilsen liquid malt extract
1.5 lbs. (0.68 kg) Pilsen dried malt extract
4.4 AAU German Tettnang hop pellets (60 min.) (1 oz./28 g at 4.4% alpha acids)
4.4 AAU German Tettnang hop pellets (0 min.) (1 oz./28 g at 4.4% alpha acids)
3 AAU Czech Saaz hop pellets (0 min.) (1 oz./28 g at 3% alpha acids)
2 packs Wyeast 2124 (Bohemian Lager) or White Labs WLP830 (German Lager) yeast
¼ cup corn sugar (if priming)

STEP BY STEP

Dissolve the dried malt extract (DME) and about one third of the liquid malt extract (LME) in 2–3 gallons (7–11 L) of warm water, stirring carefully to make sure all the extract is properly dissolved, then top up the volume to 5 gallons (19 L). Bring the wort to a boil and add the first portion of Tettnang hops at the start. Boil for 60 minutes, adding the remainder of the LME 15 minutes before the end of the boil. At the end of the boil, turn off the heat, add the second portion of Tettnang and the Saaz hops, and allow the wort to rest for 30 minutes. Let the wort stand for 30 minutes, run off the trub, cool to 40–45 °F (4.4–7.2 °C) and pitch yeast, preferably as a 2 qt. (2 L) starter. Maintain this temperature for 7 days, then bring up to about 65 °F (18 °C) for three to four days (diacetyl rest). Rack to secondary and lager at 32–35 °F (0–2 °C) for three to four weeks, then rack and bottle or keg as usual.

TIPS FOR SUCCESS:

You could do a decoction mash with this if you wish — this recipe is about the hops after all. A decoction mash would be historically accurate, and might produce some subtle differences, but I find a simple infusion works well as long as you choose a good quality Pilsner malt. For more about performing a decoction mash, visit http://byo.com/story537. For extract brewers, be sure to choose high quality malts that you know are fresh.

Be sure to ferment this with a healthy population of yeast. For the yeast strains suggested here, shoot for around 400 billion cells, which is easily achieved by making a simple yeast starter 24 hours before brew day. If you do not want to make a starter, you can also use multiple yeast packs.

For a pale European pale lager recipe using only Saaz hops, plus tips and techniques for brewing European lagers, check out Jamil Zainasheff's "Style Profile" column on brewing Bohemian Pilsener from the November 2009 issue of *Brew Your Own*, online at: http://byo.com/story1929.

"Forgotten" Hop Recipes

FUGGLEMANIA PALE ALE

(5 gallons/19 L, all-grain)
OG = 1.050 FG = 1.012
IBU = 42 SRM = 13 ABV = 4.9%

I decided I wouldn't make the all-grain and extract recipe hops identical, because I wanted to "showcase" the different varieties, and I chose Styrian Goldings for the extract version because this variety is really a Fuggle, so I could still call it Fugglemania! If you want, though, you can use the same Fuggle additions as those listed in the all-grain recipe (or use the Styrian Goldings in the all-grain recipe).

INGREDIENTS

9 lbs. (4.1 kg) Maris Otter pale malt
1 lb. (454 g) Briess Munich malt (10 °L)
0.5 lb. (227 g) Briess caramel malt (40 °L)
8 AAU UK Fuggle hop pellets (90 min.) (2 oz./57 g at 4% alpha acids)
8 AAU UK Fuggle hop pellets (0 min.) (2 oz./57 g at 4% alpha acids)
1 oz. (28 g) Fuggle hop pellets (dry hop)
Wyeast 1028 (London Ale) or White Labs WLP013 (London Ale) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Mash the grains at 150–152 °F (65.6–66.7 °C) with 13 qts. (12 L) of hot water for 60 minutes. Run off the wort and sparge with hot water to give a final volume of about 6 gallons (23 L) in the brew pot.

Bring the wort to a boil and add the first portion of Fuggle hops. Boil for 90 minutes, turn off the heat and add the second portion of Fuggle hops. Let the wort stand 30 minutes, run off from the trub and cool to about 70 °F (21 °C). Pitch the yeast, preferably as a 1-qt. (1-L) starter. Ferment for five days at 65–70 °F (18–21 °C), then rack to a secondary fermenter, adding the last portion of Fuggles in a sanitized, weighted mesh bag. Let the hops sit in the beer for seven to 10 days before racking. Bottle or keg in the usual manner, and drink as soon as the beer is conditioned.

FUGGLEMANIA PALE ALE

(5 gallons/19 L, extract with grains)
OG = 1.048 FG = 1.012
IBU = 40 SRM = 14 ABV = 4.6%

I decided I wouldn't make the all-grain and extract recipe hops identical, because I wanted to "showcase" the different varieties, and I chose Styrian Goldings for the extract version because this variety is really a Fuggle, so I could still call it Fugglemania! If you want, though, you can use the same Fuggle additions as those listed in the all-grain recipe.

INGREDIENTS

6 lbs. (2.7 kg) Maris Otter liquid malt extract
1 lb. (0.45 kg) Briess caramel malt (40 °L)
8 AAU UK Fuggle hop pellets (90 min.) (2 oz./57 g at 4% alpha acids)
7 AAU Styrian Golding hop pellets (0 min.) (2 oz./57 g at 3.5% alpha acids)
1 oz. (28 g) Styrian Golding hop pellets (dry hop)
Wyeast 1028 (London Ale) or White Labs WLP013 (London Ale) yeast
¾ cup corn sugar (if priming)

STEP BY STEP

Steep the grains with 3 qts. (3 L) of hot water at 140–150 °F (60–65.6 °C) for 30 minutes. Pull the grains out of the brewpot and drain the liquid into a brewpot, rinsing with an additional 3–4 qts. (3–4 L) of hot water. Add about half the liquid malt extract, stirring carefully to make sure it is properly dissolved, then top up the brewpot volume with water to 5 gallons (19 L).

Bring the water to a boil, add the Fuggle hops, and boil for 60 minutes. Add the remainder of the liquid malt extract 15 minutes before the end of the boil. Turn off the heat, add the first portion of Styrian Goldings, and allow the wort to rest for 30 minutes. Run the wort off from the trub, cool to about 70 °F (21 °C) and pitch the yeast, preferably as a 1-qt. (1-L) starter. Ferment for five days at 65–70 °F (18–21 °C), then rack to a secondary fermenter, adding the second portion of Styrian Goldings in a weighted, sanitized mesh bag. After seven to 10 days, bottle or keg in the usual manner, and drink as soon as the beer is conditioned.

"Forgotten" Hop Recipes

GOLDEN AGE STOUT

(5 gallons/19 L, all-grain)
OG = 1.064 FG = 1.016
IBU = 62 SRM = 26 ABV = 6.3%

INGREDIENTS

10 lbs. (4.5 kg) 2-row pale malt
2 lbs. (0.91 kg) Munich malt (10 °L)
1 lb. (0.45 kg) caramel malt (80 °L)
0.5 lb. (227 g) black malt
10.5 AAU Cluster hop pellets (90 min.) (1.5 oz./43 g at 7% alpha acids)
7 AAU Cluster hop pellets (0 min.) (1 oz./28 g at 7% alpha acids)
9 AAU Brewer's Gold hop pellets (0 min.) (1 oz./28 g at 9% alpha acids)
2 packs Wyeast 1084 (Irish Ale) or White Labs WLP004 (Irish Ale) yeast
⅔ cup corn sugar (if priming)

STEP BY STEP

Mash the grains at 150–152 °F (65.6–66.7 °C) with 16 qts. (15 L) of hot water for 60 minutes. Run off the wort and sparge with hot water to reach a final volume of about 6 gallons (23 L) in the brewpot.

Bring the wort to a boil and add the first portion of Cluster hops. Boil the wort for 90 minutes, turn off the heat, and add the second portion of Cluster and Brewer's Gold hops. Let the wort stand for 30 minutes, run off from the trub, and cool to about 70 °F (21 °C). Pitch the yeast, preferably as a 2-qt. (2-L) starter. Ferment for five days at 65–70 °F (18–21 °C), then rack to the secondary for seven to 10 days. Bottle or keg in the usual manner, allowing two to three weeks before drinking.

GOLDEN AGE STOUT

(5 gallons/19 L, extract with grains)
OG = 1.063 FG = 1.015
IBU = 62 SRM = 30 ABV = 6.3%

INGREDIENTS

6 lbs. (2.7 kg) amber liquid malt extract
1.25 lbs. (0.57 kg) extra light dried malt extract
1.5 lbs. (0.68 kg) caramel malt (80 °L)
0.5 lb. (227 g) black malt
10.5 AAU Cluster hop pellets (90 min.) (1.5 oz./43 g at 7% alpha acids)
7 AAU Cluster hop pellets (0 min.) (1 oz./28 g at 7% alpha acids)
9 AAU Brewer's Gold hop pellets (0 min.) (1 oz./28 g at 9% alpha acids)
2 packs Wyeast 1084 (Irish Ale) or White Labs WLP004 (Irish Ale) yeast
⅔ cup corn sugar (if priming)

STEP BY STEP

Steep the grains with 3 qts. (3 L) of hot water at 140–150 °F (60–65.6 °C) for 30 mins. Pull the grains out of the brewpot and drain the liquid into a brewpot, rinsing with an additional 3–4 qt. (3–4 L) of hot water. Add the dried malt extract and about a third of the liquid malt extract, stirring carefully to make sure it is properly dissolved, then top up the brewpot volume to 5 gallons (19 L).

Bring the wort to a boil, add the first portion of Cluster hops, and boil for 60 minutes, adding the remainder of the liquid malt extract 15 minutes before the end of the boil.

Turn off the heat, add the second portion of Cluster hops along with the Brewer's Gold hops, and allow the wort to rest for 30 minutes. Run off the wort from the trub, cool it to about 70 °F (21 °C), and pitch the yeast, preferably as a 2-qt. (2-L) starter. Ferment for five days at 65–70 °F (18–21 °C), then rack to secondary. After seven to 10 days, bottle or keg in the usual manner, and allow two to three weeks before drinking.

RELATED LINKS:

• Looking to brew something with Cluster hops that's a little lighter in color? The best known example, Anchor Steam, relies heavily on Northern Brewer hops, but the classic American style of California Common is traditionally brewed with the classic American hop that was growing near San Francisco at the time the beer was invented — Cluster. Check out Jamil Zainasheff's "Style Profile" on brewing California Common: http://byo.com/story2123

• Whether you are trying to duplicate a style or are looking to experiment, *BYO*'s online hop list can help to get you started. Just select a beer style in the menu and a chart will pull up with appropriate hops to consider for your recipe. http://byo.com/hopchart

where you only want an IBU level of, say, 20–35, so that the beer remains balanced and not overly bitter. Goldings also works very well in brown and mild ales where its smooth bitterness does not override the sweetness of those beers.

Whitbread Golding Variety (WGV): WGV is similar to Fuggles (to which it is related), though perhaps somewhat fruitier in aroma than the latter, and can be regarded as a halfway point between Fuggles and Goldings. It comes in slightly higher than those two at 5–8% alpha-acid so can be used for bittering as well as aroma. But like them it works well in most types of English ales, porters and even stouts except those where hop character is not usually present such as barleywines and milk stouts. WGV can be difficult to find these days, so if you do come across some it is probably best to use solely as an aroma hop rather than for bittering.

Styrian Goldings: Like WGV, is not a Golding at all, but a member of the Fuggle "family," and appears to have first been cultivated in the 1930s in Slovenia. Tending to be low in alpha-acid (3–6%), this variety enjoys wide use as an aroma hop, giving a spicy, resiny aroma much favored by brewers. It is a very versatile hop and is used in both ales and lagers. Some very good Pilsners use Styrian Goldings, as do many English pale ales, and especially bitters. In fact one of my favorite English low gravity beers (at 3.8% ABV) is Woodforde's Wherry out of the eastern UK county of Norfolk, which uses a generous amount of this hop in the late stages of the boil.

Hallertau: Hallertau may precede several other hop variety names, but the one I am talking about is Hallertau Mittelfrüh. This is a very traditional German hop, which some would say is the second original "noble hop" (after Saaz). It offers only about 3–5.5% alpha-acid so is not often used as a bittering hop, but it is prized for its characteristic fragrant and spicy aroma. It is, of course, primarily used in lagers, and you would do well to consider using it in a pale lager and bock beers. However, it also works well in English and US pale beers, and I have used it to dry hop a bitter ale. Hallertau Mittelfrüh may be very hard to find, but I have found it in one or two homebrewing supply catalogs.

Tettnang: Tettnang is also a very traditional German hop, and is what is known as a land race variety (as is Hallertau Mittelfrüh). Land race means that it was native to a region rather than deliberately bred (as are most of our modern hops). Again, it is low in alpha-acid at 3–6%, and is principally prized for its mild, somewhat floral aroma. It is considered to belong to the Saaz "family," and is therefore very suitable for brewing Pilsners. However, because of its relatively gentle aroma it is quite versatile and can be used in almost any pale beer. In fact, it can even be a pleasant change from aggressive citrus-type hops. In fact, US-grown Tettnang is used in a variety of craft brewed beers.

Saaz: Saaz from the Czech Republic is also a land race variety, and has been used in brewing over several centuries. Like its German counterparts, this variety is low in alpha-acid (2–5%) and therefore is generally not used by for bittering by craft brewers, although it is the prime hop for brewing Pilsners, and especially for the original-style Czech Pilsner. Actually, alpha-acid levels in Saaz hops tend to vary wildly from year to year which makes it even more difficult for commercial brewers to use it for bittering. The mild aroma of this variety is its chief characteristic, and one reference I used to research this article calls it, "The classic noble aroma hop." It ought to be your first choice when brewing a traditional-style Pilsner (along with soft brewing water and perhaps decoction mashing). But, as with the other varieties, it can work well in almost any beer requiring a subtle but enticing hop aroma.

Brewer's Gold: Brewer's Gold seems to have been bred in Britain back in the first half of the 19th century, but is now grown only in the US and Germany. It is a relative of Bullion, and along with that variety Brewer's Gold was often derided by British brewers as having an "American" character. It has a relatively high alpha acid content at 8–10%, making it one of the early high-alpha hops, and is therefore useful as a bittering hop. It has a distinctive black currant aroma, which is not to everyone's liking and thus not often used commercially as an aroma hop. However, I know many homebrewers who don't like the Cascade aroma either. In short, do not discard Brewer's Gold as an aroma hop, for it may go well in full-flavored beers, especially spiced beers such as Christmas ales. But if you do use it as an aroma hop I recommend using it in combination with something a little more gentle, such as Fuggles.

Cluster: Cluster is the oldest American hop variety. Its origins are unknown, and it has been postulated that it may be a cross between an English variety and North American native male hops. It has not actually been "forgotten" since many craft brewers still use it, but it is no longer as popular as it once was. When big commercial brewers were using it almost exclusively in the last century it made up 80% of the hops grown in the Pacific Northwest. It runs at 5.5–8.5% alpha-acid and has a quite pungent floral aroma, so it works well for both bittering and aroma purposes. It can be used as a bittering hop in lagers and stouts and as an aroma hop in a variety of ales.

HOP COMEBACK

Few of these hop varieties have actually been entirely forgotten, rather they have faded into the background somewhat as newer, more powerful, varieties have become so popular with both craft and homebrewers. Instead, these varieties are forgotten in the sense that for many of us they are no longer first choices when planning out a beer recipe. I urge you not to remove them from your brewer's palette, however, because they still have something to offer your palate. Starting on page 81 I have shared some of my own homebrew recipes that show what can be done with some of these "forgotten" varieties. Consider experimenting with these varieties — and other less popular types — and you may be pleasantly surprised at the results. BYO

BY TERRY FOSTER

KEEP YOUR HEAD!

Perfecting head retention

The proportion of foam-stabilizing proteins can be increased by adding materials rich in them such as flaked barley, flaked wheat and wheat malt.

Photo by Charles A. Parker/Images Plus

Everything seems to be right, the carbonation level is good, the dispense system works well, the CO_2 bubbles break out and the beer pours with a nice full head. But the froth collapses before you can even get the glass to your expectant lips, and disappointment reigns even if the beer still tastes good. It could be argued that this disappointment is merely a mental thing, but the fact remains that we drink with our eyes as well as our palates. There is something profoundly satisfying about seeing a good head on a beer, and watching the rings of foam (sometimes known as "Brussels Lace") that form on the glass as the beer goes down your throat.

What I am talking about here is head retention, a phenomenon that is quite different to that of head formation (which I discussed in this very column in the May-June 2015 issue). A properly carbonated and dispensed beer will always form a head in the glass, but it may not last long if it is brewed in such a way that the components that keep the head in place are absent. Think of American light lagers when you read that — do they hold the head for more than a few seconds?

So, what are these components that are responsible for head retention, and how do we ensure they are present in our beer? Before I go any further, do note that there is an excellent article by Chris Bible dealing with the mathematics of bubble formation and head retention in the March-April 2014 issue of *BYO*. I am going to deal with the subject in a more general manner, in order to try to help you understand this phenomenon so that you can use this knowledge when formulating and brewing your beer.

Gas bubbles break out during dispensing of the beer and form the head on top of it. But the beer is super-saturated with CO_2, which means that the gas is present at a concentration higher than its solubility in the beer. Therefore bubbles will continue to form at nucleation sites on the surface of the glass. These sites are minute imperfections in the glass surface, generally invisible to the eye, although some commercial brewers have actually provided glasses (for example a specially designed glass for Samuel Adams Boston Lager) with some form of etching on the bottom in order to ensure that nucleation can occur in the glass. These bubbles will rise to the top and become part of the head, so why doesn't the head continue to grow and become bigger and bigger?

That is because when the bubbles reach the surface they tend to aggregate and form larger bubbles whose walls start to thin until the gas pressure within the bubble simply bursts it. This process is accelerated if the liquid drains rapidly from the head, leaving the bubbles unguarded. The more viscous the liquid is the slower it will drain, meaning the bubbles are more stable. Viscosity decreases with increasing temperature, so for a given beer the higher the viscosity the lower the temperature, thus the colder the beer the better its head retention. However, head formation is retarded at lower temperatures so this temperature effect is generally small.

But the bubbles can be stabilized by the effects of compounds known as surfactants, which are simply molecules that are hydrophilic (water-loving) at one end and hydrophobic (water hating) at the other end. These can gang up on a bubble, surround it and prevent it from growing bigger as well as hindering drainage of the liquid. There are many such compounds, not all of which we would want in our beer,

but there are some naturally present in beer, thankfully. Their effects are not always clear cut, for there is much that is still not understood about head retention. For example, ethanol has some surfactant property, and it has apparently been shown that up to 5% ABV ethanol aids head formation. Yet at higher alcohol levels it decreases head retention, and many strong beers show poor head retention characteristics, even though they are more viscous than lower alcohol beers.

The most important head retention compounds are protein derivatives, and their importance lies in the fact that they should be present to a greater or lesser extent in every beer. These are thought to be polypeptides derived from malt and they adsorb onto the bubble wall and strengthen it. Their action is reinforced by that of isohumulones, which are the compounds that arise from the isomerization of hop alpha acids. That is they are compounds responsible for most of the bitterness in the taste of beer. These hop-derived compounds exhibit hydrophobicity and so also absorb onto the bubble wall and help the bubble retain its structure. In short, both polypeptides and isohumulones stabilize the foam, which is what we want.

Any procedure that dilutes these chemicals in beer, such as high proportions of adjuncts like corn, rice, and sugar will result in beers with poorer head retention capabilities. On the other hand the proportion of foam-stabilizing proteins can be increased by adding materials rich in them such as flaked barley, flaked wheat, and wheat malt. It is a common procedure in British commercial brewing practice to add a few percent (of the total grain bill) of flaked wheat to the mash. That's because many of the beers (mild, bitter) are of low gravity (by American standards) and therefore use only a small amount of malt and the beers tend to be low in polypeptides. Some of these brewers also use sugar adjuncts that tend to aggravate this problem, so the addition of a little flaked wheat helps to alleviate matters and to ensure that the beers have decent head retention. But note in this respect that there can be problems with head retention when brewing extract beers. They have already been boiled during processing so if your worts are boiled too long there may be further protein degradation and a shortage of the polypeptides mentioned above. For this reason when brewing extract beers keep the boil time down to 45-60 minutes; this is a good argument for late-boil extract addition.

There are other agents that can be added to help head retention, generally coming under the names "heading agents," that may be in the form of powders and liquids. These include certain metal salts, notably those of iron, pepsin derivatives, and alginates. I am very wary at the thought of using metal salts, for a couple of reasons. First, in the 1960s Dow Brewery in Quebec, Canada, used cobalt salts as a heading agent, which was found to cause heart attacks and even death for some drinkers, and the practice was abandoned. Second, there was a period in the 19th century in Britain when adulteration of porter was rife. Some of the compounds used were quite toxic, while others, such as iron salts and sulfuric acid, were employed to ensure good head

formation and retention, but surely also changed the beer's flavor. Further, iron in beer can cause oxidation and development of off-flavors. I am not so certain about pepsin derivatives as I have not experienced their use, but alginates are certainly effective as head retention agents. The latter are propylene glycol esters of alginates derived from seaweed (and are somewhat related to Irish moss copper finings) and in various forms are widely used in foodstuffs, so are quite safe from the health point of view, and are effective in improving beer head retention. There is however some debate as to whether these products affect beer flavor. With the exception of alginates, none of the methods described earlier are used today. Reduced hop extracts (used to produce light-stable beers), however, are used by many breweries globally to stabilize beer foam.

Certain compounds will decrease the stability of the bubbles and cause the foam to collapse. Notable among these are soaps, grease, detergents, fats, and oils. The first three are most likely to get into beer through the use of glasses contaminated with them, and if they have been used to clean the glasses, the latter need to be thoroughly rinsed to ensure no traces of them remain before putting any beer in them. The last two may be more problematic as they can be present in beer due to various flavor additives, such as coffee, chocolate, and oats (or even bacon, as I've seen recently in a couple of craft brews). If you use a lot of chocolate in a beer, particularly if it is also high in alcohol, you might just have to accept poor head formation and retention (but read on).

So far, I talked about head retention in respect of CO_2 being the only gas in the beer. If, instead you use CO_2/nitrogen mixed gas for dispense, head retention becomes less of a problem. That is, nitrogen tends to form smaller, tighter bubbles that collapse less easily than those from CO_2 alone. If you are kegging your beer and have head retention problems, then nitro dispense may be the answer for you.

So let me summarize all this:

WORST CASE SCENARIO FOR HEAD RETENTION:

- High alcohol
- High level of adjuncts especially in low gravity beers
- Low hop bittering
- Carbonation too low
- Serving temperature too high
- Detergent, grease or soap residues on brewing equipment
- Detergent, grease or soap residues in the glass
- High levels of fats and/or oils in ingredients

BEST CASE SCENARIO FOR HEAD RETENTION:

- Beer brewed with all malt, no adjuncts

- Protein rests in mash limited to no more than 20 minutes at about 122 °F (50 °C)
- Added foam reinforcers such as wheat, flaked wheat, and flaked barley, as well as undermodified malts, especially for Pilsner beers.
- High levels of hop bitterness (full, rolling 90-minute boil is best for all-grain; 60-minute boil for extract beer, with late extract addition to limit protein degradation).
- Medium alcohol level (4.5-6% ABV)
- Proper level of carbonation (this is even better with a nitro dispense)
- Proper serving temperature
- Added heading agent
- Brewed without fatty or oily ingredients
- Scrupulously clean equipment and glasses

Obviously, some of these factors may be out of your control, since things like hop bitterness, malt bill, and so on are determined by the style of beer you are aiming to brew. You cannot make a medium alcohol barleywine or imperial stout after all. And hop bittering levels will be dictated by the type of beer brewed; an English bitter at, say, original gravity (OG) 1.045 will taste very, very bitter, thin and unbalanced if you go to a level of 70 IBU just to ensure a good head. Yet, my experience is that anything at 25 IBU and up should be good in terms of head retention (all other things being equal). After all, commercial Pilsners that usually have less than 20 IBU do not retain their head well.

If you want to brew a beer using adjuncts such as corn or sugar, make sure that adjuncts are used at a rate of no more than 20% of the malt plus adjuncts bill. With such a beer, consider using some flaked wheat or barley in the mash, or if you are using malt extract try doing a partial mash with either of these ingredients (along with some pale malt, of course). Just to be certain, you might also want to add some propylene glycol alginate heading agent, although I must admit I have rarely found it necessary to do so.

If you do brew a beer that uses fatty or oily flavoring components, but you still want to keep a good head on it then, again, use of a foam reinforcer or a heading agent can help. But do consider nitro gas dispense, especially when coupled with a stout tap to aid the formation and retention of small, tight bubbles. Since most brews using coffee or chocolate are stouts, this approach is very suited to them.

Basically, you just have to juggle with the points I made according to the type of beer you are producing; control those factors and you can limit the effects of problem-causing factors. But above all, do make sure that every last piece of equipment and drinking receptacle is just as clean as you can make it. It comes back to the fact that cleanliness is everything in brewing, and the brewer is first and foremost a cleaner! BYO

BY MICHAEL TONSMEIRE

THE SCIENCE OF HOP GLYCOSIDES

Hop aroma buried under your nose

Hops don't produce aromatic molecules to make your IPA smell nice, but rather to fulfill a biological need such as defense from insects . . .

When I started homebrewing in 2005, the American hop assault was beginning in earnest. IPAs and Double IPAs were gaining popularity among beer nerds but weren't nearly as ubiquitous as they are today. Hoppy beers seemed to be becoming more bitter without a commensurate rise in hop aroma. Ten years later, that trend has thankfully been reversed. Many breweries are increasing their beers' juicy hop punch without relying on recipes that contribute 200 (theoretical) IBUs. Drinking an IPA doesn't need to send your tongue into spasms for you to smell the citrusy and piney hop aroma from five feet away!

When I fell in love with IPAs my favorites had a raw "nose in the hop bag" aroma that comes from dry hopping fully-fermented bright beer. Many thanks to Vinnie Cilurzo of Russian River Brewing Co., who in addition to inventing double IPA was generous enough to share his tips on brewing hoppy beers with us mortals. #8 from his *10 Factors to Making Better Hoppy Beers* is: "The more yeast you remove, the more beer surface area you'll have exposed to the dry hops." This is the best advice for imparting a "true" hop aroma. Without yeast cells in the way, alcohol extracts hop oils largely unchanged. However, be careful not to introduce any air if you choose this route; without yeast to scavenge oxygen, the hops aromatics will oxidize quickly, muddying their fresh aroma within weeks.

Not all brewers are pursuing beers that smell like hops straight from the freezer, there are those who want pineapple, tangerine, melon, or pine sap aromatics without the "green/pellet" character. One technique that achieves this effect is to steep a large dose of hops in the hot wort for 20 to 60 minutes after flameout before chilling (for more on this, read Dave Green's article "Hop Stands" in the March-April 2013 issue of *BYO* at http://byo.com/story2808). Another is to dry hop before the end of fermentation. In both cases, this gives the yeast an opportunity to enzymatically liberate aromatics and convert others. As an added benefit, adding dry hops while fermentables remain ensures that yeast will metabolize most of the oxygen introduced. The first time I heard this technique suggested was by Matt Brynildson, Brewmaster of Firestone Walker Brewing Co., but many other professional brewers have advanced the topic in the years since.

WHAT ARE GLYCOSIDES?

Plants in general, and hops specifically, are the chemists of the natural world. While animals have the options of flight and fight, plants stand and endure. Accordingly, plant life has evolved a deep bag of chemical tricks for almost any situation. The humble rice plant has more than twice as many genes as we humans do! One plant trick is to attach a sugar molecule to an aglycone (this can be any functional group, for hops these molecules often happen to be aromatic) as a way to make it water-soluble for transport or inactive for storage. The combined molecule is called a glycoside. These are relatively common, with one study of 150 plant species finding glycosides two to five times more concentrated than their volatile aromatic molecule.[1] No specific studies exist for hops, but we can assume it is within this range.

In hops, rather than being located in the lupulin glands with the various

Photo by Michael Tonsmeire

acids and oils brewers usually focus on, glycosides are found in the vegetative material. As a result, extracting them is not an issue if you are adding hops in their more traditional forms (whole or pellets). However, if you are adding only hop extract your beers are missing out because the super-critical CO_2 extraction process targets hydrophobic molecules. Miller Brewing Co. has done extensive research on glycosides because many of their beers are brewed with hop extract to avoid skunking in clear bottles.

Hops don't produce aromatic molecules to make your IPA smell nice, but rather to fulfill a biological need such as defense from insects (although as hop breeders continue their work, that isn't the case as much as it is for wild hops; one could reasonably argue that all domesticated plant crops have been selected to express traits that really have nothing to do with Darwinism). The decreased reactivity and increased water-solubility of glycosides make them easier to convey into the wort or beer. However, if the aglycone is still bound to its sugar molecule by the time you pour a pint, it won't be free to stimulate your olfactory receptors. On the other hand, in Stan Hieronymus' *For the Love of Hops*, Miller hop chemist Pat Ting suggests that even the enzymes and microbes in the mouth of the beer drinker may be able to free some aglycones.

The amount of glycosides in hops differs by variety. Extensive research into the actual amounts in specific hops was done by Miller Brewing Co., whose scientists released a study with results that looked at treating unnamed hops with the enzyme beta-glucosidase. This procedure released: "Benzaldehyde (almond, maraschino cherry), vanillin (vanilla), raspberry ketone, geraniol (floral, rose), linalool (floral), phenylacetaldehyde (honey, floral), and many other primary alcohols, ketones, and aldehydes that are also aromatic."[2]

Glycosides aren't only contributed by hops; they can come from fruit and spices as well. Research focusing on the addition of Schaerbeek cherries to Belgian kriek showed that beta-glucosidase positive yeast strains are able to release "important contributors to sour cherry aroma such as benzaldehyde, linalool and eugenol" during refermentation compared to beta-glucosidase negative strains.[3]

HOW ARE AGYLCONES FREED?

Beer pH plays a role in non-enzymatic freeing of aglycones. As all beers are acidic (even non-"sour" beers usually have a final pH of 4.5-4.0) some of these glycosidic bonds will be broken even without yeast present. The lower the pH, the more effective this will be. There is also an enzymatic route if a yeast is capable of freeing and fermenting the sugar molecule. Unfortunately, the bond holding glycosides together requires a different enzyme than the one used to ferment maltose. What we need is a yeast strain that can break a Beta bond (i.e., those that produce beta-glucosidase). This is the same bond that holds glucose and galactose together to form lactose (making this a test you could theoretically perform yourself).

While there are a few *Saccharomyces* strains capable of breaking glycosidic bonds (e.g., LD40), it is more common for *Brettanomyces* to possess the ability to release aromatic aglycone. Very few *Saccharomyces* strains can release aglycones, and those that do tend to have a lower rate than the most effective *Brettanomyces*.[4] Another reason to try dry hopping beers fermented with *Brett* like New Belgium Le Terroir, Almanac Devil's Advocate, and Pizza Boy Eternal Sunshine!

BIOTRANSFORMATION

In addition to freeing up trapped aroma molecules, yeast also have the ability to convert one aromatic compound into another. For example, yeast can convert floral geraniol provided by hop (especially pronounced in Citra®) into citrusy beta-citronellol.[5] Coriander is another source of geraniol, which is why this spice contributes much of the citrusy flavor in Belgian wits, rather than the pithy dried orange peel that often steals credit. When I want a beer that has a subtle spice flavor that is more integrated, I'll add the spices late in the boil. Spicing post-fermentation (directly, tea, or tincture) is ideal for a true spice aroma, as you might want in a pumpkin or gingerbread ale. Biotransformation is another area where some yeast strains seem to be more effective than others. It may partly explain why certain otherwise clean yeast strains leave muted hop character in their wake, while others produce beers that burst with hop aroma.

BEST PRACTICES

If you want to taste the interaction of yeast and hops for yourself, re-brew a tweaked version of your favorite IPA recipe. Monitor fermentation closely. With the right pitching rate and fermentation temperature, two to four days after brewing you should see fermentation wane. The kräusen will begin to deflate, the swirl of yeast will slow, and airlock burps will grow less frequent. If you are monitoring the gravity, wait until 80-90% of your expected apparent attenuation is achieved (e.g., 1.024–1.020 if you are expecting a 1.060 original gravity (OG) beer to finish at 1.015). At this point, add your standard dose of dry hops, maintaining fermentation temperature near the top of the strain's suggested range. After fermentation stops, the hops will settle out with the yeast and you can package the beer as usual.

Dry hopping during fermentation is an especially valuable technique for homebrewers who do not have a handy source of carbon dioxide, because it is otherwise difficult to introduce dry hops without oxidizing the beer. If you keg (or have a CO_2 tank), place the hops in a sanitized keg or fermenter, purge with CO_2, and then transfer the beer onto the hops. Don't worry, racking the beer off of the yeast cake will not stall fermentation (the yeast at the bottom of the fermenter is mostly dead or dormant).

If you are looking for some raw/fresh hop character as well, you can dry hop a second time after the yeast has flocculated. I often bag and weight whole hops, place them into the serving keg, and purge with CO_2 before racking the beer in. Whole hops can be left in cold beer for several months without developing a "grassy" flavor to my palate. For hoppy beers I add hops at only four points: start of the boil, hop stand, as primary fermentation slows, and in the keg.

As a homebrewer, don't be too concerned about how ef-

ficient your dry hopping process is. This is a hobby after all! While large flame-out additions and earlier dry hopping may sacrifice some hop character to absorption by yeast and scrubbing by CO_2, the quality of the aroma is worth an extra ounce or two of hops!

CONCLUSION

While the research on the interaction between plant compounds and yeast is still in its infancy, it is another consideration for brewers looking to refine their process. It is especially powerful for those brewers who bottle hoppy beers and find that the aromatics taste dull and muted by the time their beer is ready to drink. Hopefully more studies looking into the hop variety and yeast strain specific contribution to glycosides and biotransformation will come out soon, but until then, let your fermenter be your lab! BYO

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BY SCOTT DAVIDSON

HITTING A HOME-BREW HOMERUN

Club partners with Dad and Dude's Breweria

I bet right before you stepped up to the chalk mark on the ground to take a swing, you called your shot. I bet after winning that roller hockey game in the middle of the road, your hockey stick became the Stanley Cup. And I bet there are probably tapes or videos of you announcing the news, the score, or the next band at your house somewhere in a box. We all want to do what the professionals do. We all dream big. As a homebrewer, that dream is to brew on a professional system.

Their beer being on tap was just like stepping up to that white chalk on the pavement, calling their shot, and knocking it out of the park.

Nick Arias pours wort into the kettle on brew day. Along with brewing partner Cole Hinson, the pair won the opportunity to turn their recipe into a commercial batch at Dad and Dude's Breweria in Aurora, Colorado.

Dad & Dude's Breweria in Aurora, Colorado is a homebrewer's dream that came true. After brewing for nine years, Mason Hembree or "Dude," left his corporate job to start a brewpub pizzeria with his father, Tom.

The Fermentologists are a group of friends that started a homebrew club in 2012 when Scott Davidson learned how to brew from his friend Winthrop Dada. The club started with eight original members, all close friends of Scott, and soon expanded to 38 men and women from all around the Denver metro area. When the club was looking for a brewery to meet at, Brian Connery, Head of Brewing Operations, welcomed the small group of friends to Dad and Dude's. Brian quickly became an invaluable resource and friend to the club. He freely offered his advice on recipes, provided critical feedback, and consistently stood behind the club for support and guidance. His experience as a homebrewer and former Senior Brewer at Dogfish Head, provided the Fermentologists with someone with a depth of brewing knowledge and an eagerness to share it with the club.

In November, the Fermentologists and Brian started talking about a homebrew competition where the winner would have the privilege of brewing on Dad & Dude's system. Each member joined a team and brewed a beer that was required to include specific ingredients including something from a Colorado tree, at least one kind of fruit, a type of adjunct sugar, Maris Otter as their base malt, and White Labs WLP002 (English Ale) yeast. Each entry also had to be above 6% ABV.

The winning recipe, a 9.4% ABV chocolate raspberry stout with cinnamon, raspberries, chocolate, spruce tips, and brown sugar was brewed by Cole Hinson and Nick Arias. Using a 10-gallon (38-L) water cooler mashtun and a 13-gallon (49-L) kettle, the two brewed their first Russian imperial stout with some advice from another member of the club, Ryan Knauff. The recipe was crafted from research the two did on big stouts and the raspberries paired well with the bold aroma of cinnamon.

After winning the competition, Brian, Nick, and Cole brewed "Winter Yum Yum" at the Breweria. The team changed a few ingredients in the final beer to maintain cost and scalability, making the stout into a winter warmer that emphasized the raspberries with a lighter body. While a lot of the process is the same on a larger scale, the steps and equipment took some practice to get used to. From stirring the nanobrewery's 1.5 barrel kettle, to pureeing 30 lbs. (13.6 kg) of raspberries, to scooping out the spent grain by hand, the guys learned firsthand how to brew on a professional system. On February 28, the stout was released at Dad & Dude's Breweria and Two Penguins Tap and Grill to rave reviews. For two guys that just started homebrewing but dreamed about brewing on a professional system, their beer being on tap was just like stepping up to that white chalk on the pavement, calling their shot, and knocking it out of the park.

The winning homebrew recipe is online at http://byo.com/story3252.

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