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DECEMBER 2011, VOL.17, NO.8

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Brewing Brown Porter

Experimenting with Dry Yeast

+ Chilling with Counterflows

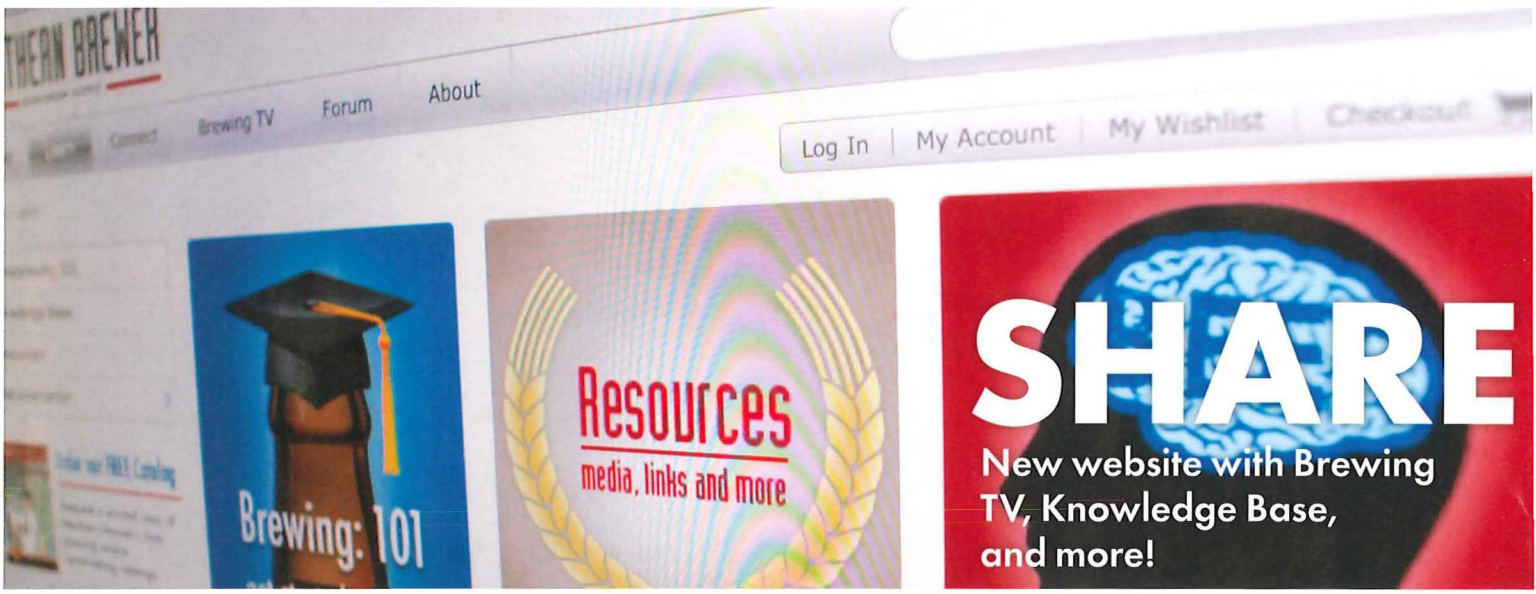
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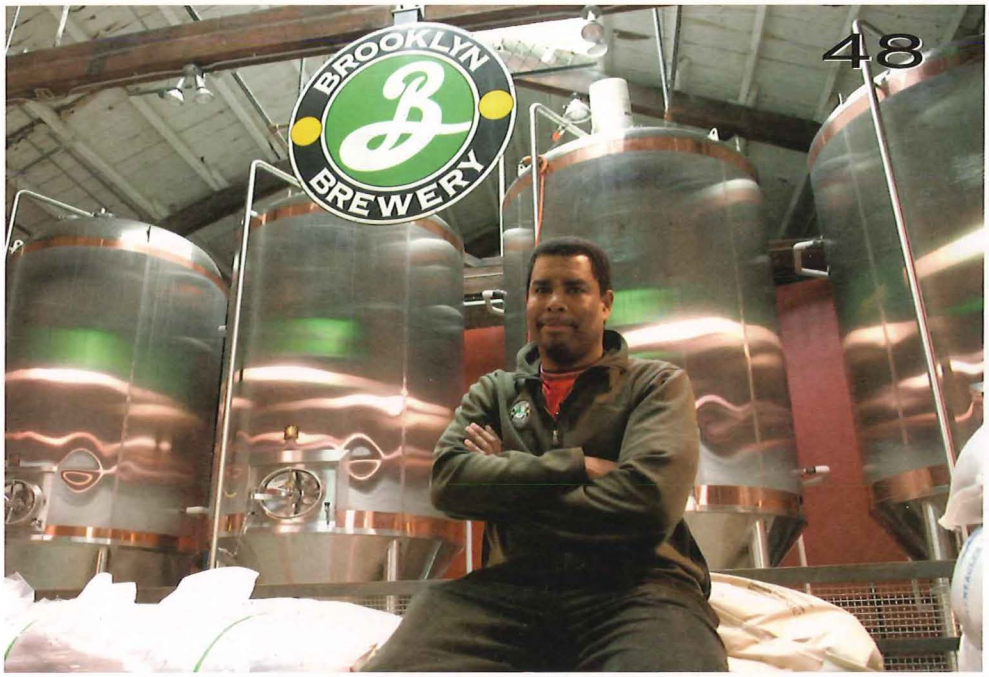
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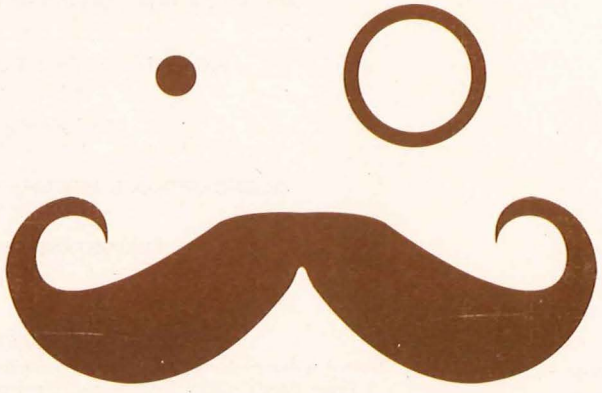
Extract efficiency: *65% (i.e. — 1 pound of 2-row malt, which has a potential extract value of 1.037 in one gallon of water, would yield a wort of 1.024.)*

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.





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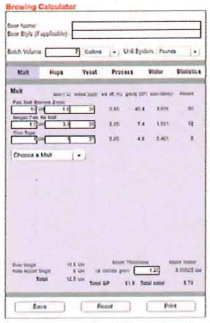
Homebrewer to Pro Brewer



This spring, *BYO*'s "Style Profile" author, Jamil Zainasheff, launched Heretic Brewing Company, a 30-barrel brewery in the East Bay region of California's San Francisco Bay area. Follow along with his blog as he transitions from homebrewer to brewmaster.

www.byo.com/blogs/blogger/Jamil/

Calculate Your Next Homebrew



The *BYO* recipe calculator aids brewers in formulating their beers. The calculator allows you to input the size of your batch of beer, your ingredients and some process variables (how long you boil the hops, for instance). From these, the calculator will estimate your original gravity (OG), final gravity (FG), bitterness (in IBUs), color (in SRM) and alcohol content (in ABV).

www.byo.com/resources/brewing

Brew Your Own — The How-To Homebrew Beer Magazine

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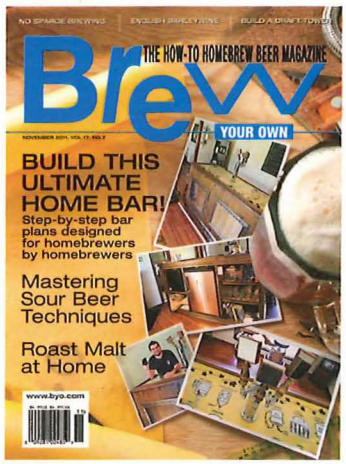
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Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for $28.00 per year by Battenkill Communications, 5515 Main Street, Manchester Center, VT 05255; tel: (802) 362-3981; fax: (802) 362-2377; e-mail: BYO@byo.com. Periodicals postage rate paid at Manchester Center, VT and additional mailing offices. Canada Post International Publications Mail Agreement No. 40025970. Return undeliverable Canadian addresses to Express Messenger International, P.O. Box 25058, London BC, Ontario, Canada N6C6A8. 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 subscription rate to Canada and Mexico is $33; for all other countries the subscription rate is $45.

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Volume 17, Number 8: December 2011



No-sparge notion

I read the article by Dave Louw on no-sparge brewing (November 2011) and in the article Dave commented that he perceived the beer brewed with the no-sparge method had a "greater intensity of fresh malt character," but he has yet to see a good explanation for why this is the case. Perhaps it's the contributions of the no-sparge technique combined with the fact that if you were previously brewing with an efficiency of 85% and then reduced the efficiency to 72%, you would have to add 15-16% more grain to the grain bill to obtain the same specific gravity thus adding 15-16% more flavor compounds.

Bob Kerns
via email

The perception of more maltiness in no-sparge beers may indeed be for this straightforward reason. Malt flavors come from the kilned husks of malted grains. The lower your efficiency, the more husk components your wort contains per unit of extract. ("Extract" here meaning the amount of carbohydrates and other compounds from the malt that contribute to the beer's original gravity (OG), not malt extract.)

Not only is this idea plausible, it's testable. One experiment that could shed some light on the question would involve brewing one batch of beer the "normal" way — using continuous sparging and achieving a high extract efficiency. The same beer would be brewed again using no-sparge brewing, with more malt added to the grain bill compensating for the lower efficiency of the technique. The idea would be to have the same OG for both beers.

Finally, the beer would be brewed a third time using continuous sparging, but the brewer would purposely try to obtain a lower extract efficiency, ideally on par with the no-sparge batch. (To get a lower efficiency, the brewer could crush his or her grain less finely and keep mash stirring to a minimum. In addition, knowing the OG of the first two beers — which would hopefully be the same — the brewer could calculate the total weight of the extract obtained from the malt. He or she could then monitor the specific gravity and volume of the wort collected and quit collecting wort



Gordon Strong is President of the Beer Judge Certification Program (BJCP), the organization that trains homebrew judges and sanctions homebrew contests. Strong led the development of the currently-used 2008 BJCP Style Guidelines. An active homebrewer, he won the Ninkasi Award — the award for the brewer who scores the most points at the National Homebrew Competition (NHC) — three years in a row.

Strong has recently published a book, "Brewing Better Beer," (2011, Brewers Publications), geared towards advanced homebrewers.

On page 40 of this issue, he interviews award winning lager brewers and gives six homebrew recipes for lager beer, from American Pilsner to Eisbock.



Horst Dornbusch is a Massachusetts-based consultant in the international brew industry, former "Style Profile" columnist for *BYO* and the author of several books on beer, including "Prost! The Story of German Beer" (1997, Brewers Publications) and Altbier (1998, Brewers Publications).

Horst is a frequent contributor to industry periodicals in North America and Europe. He was also the Associate Editor of the recently-released "The Oxford Companion to Beer" (2011, Oxford University Press). On page 32 — in conjuction with Swedish homebrewer Peter Högström — he describes Gotlandsdricka, an indigenous *dricka* (drink) from Gotland that has survived for centuries.



Peter Högström started brewing in 1995. Since then he has put some 400 brews behind him. He has been Champion Brewer of the Year in Sweden five times. A member of the board of the Swedish Homebrewer's Association since 1997, Peter was its chairman from 2000 to 2005 and co-founded the Swedish BJCP in 1998. Peter's passion is experimental brewing and he has formed, "The truly extravagant and innovative brewclub," consisting of the weirdest brewers in Stockholm. They brew one really strange brew per year. Professionally Peter works at Sweden's largest home and craft brewing supplier, Humlegårdens Ekolager. Peter's knowledge of modern Swedish homebrewing was invaluable in gaining an understanding of brewing Gotlandsdricka on page 32.

when he has reached the same amount of extract as in the first two beers.)

Comparing the no-sparge beer to the continuously sparged, high-efficiency, beer would show if a difference in maltiness was detected. Comparing the two low-efficiency beers would indicate if it's the technique that is associated with the difference or simply the overall efficiency (or, looked at another way, the husk-to-extract ratio).

For example, let's say the no-sparge beer was judged to be maltier than the high-efficiency beer. If the two low-efficiency beers seemed comparably malty, then the difference in husk-to-extract ratio would explain the flavor difference between the high and low efficiency beers. If one or other of the low-efficiency tasted maltier (or had a different malt character), then the method itself would be playing a role in addition to the husk-to-extract ratio.

Too long and too much?

I've got a question for Terry Foster. In the November 2011 issue, Terry discusses home kilning to create amber and brown malts used to brew historical British beers. He references the Durden Beer Circle and their excellent booklet on brewing these wonderful styles. In Terry's 1822 Porter recipe (page 67), he calls for a 90-minute mash at 148–150 degrees Fahrenheit.

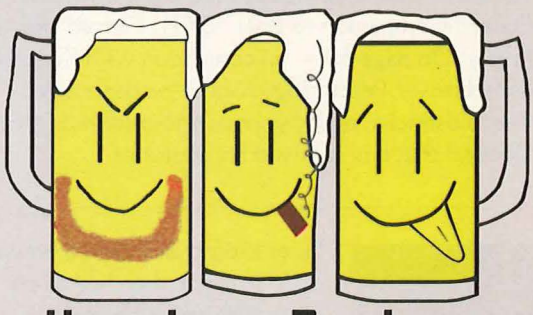
The Durden Beer Circle website recipe, and all of those in their book, call for a 3-hour mash. Isn't 3-hours too long? Wouldn't 90 minutes work well with those recipes? I'd be afraid of over-extraction of tannins with a 3-hour mash. I'd really like to try the recipes in "Old British Beers and How to Make Them," but wanted some feedback about shortening the mash time.

Also, the malt and hop bills for the recipes in "Old British Beers" seem to be very high. When I convert the recipes from 1 imperial gallon to 5 US gallons, the target OG seems way too high, as does the IBU estimate. Your 1822 Porter recipe seems like it was really dialed back in terms of malt and hop amounts. Can you explain that? Thanks for the great publication!

Josh Allfree
Louisville, Kentucky

Author Terry Foster responds: "1. Malt bill. The numbers for malt from Durden Park are indeed very high, probably reflecting poor extraction when working on such a small scale, although it could also be that they are taking only the first portion of very high gravity wort. My Porter recipe takes the entire (or Entire) wort with sparging, and is adjusted to the BYO *standard 65% extract efficiency, as are all our recipes.*

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2. Mash time. Yes, three hours is much longer than necessary! If you look at the "Mash Experiments" article in the September 2011 issue of BYO, *you will see that starch conversion, as determined by the iodine test, is complete in as little as 10–15 minutes, but there is some increase in extract with longer mashing times. I think 60–90 minutes will give you all the extract you are going to get; longer times are not necessary, and may cause unwanted effects as the temperature drops (as it will do unless the mash is reheated). Ninety minutes is traditional for ale brewers, and perhaps goes back to the days when the brewer lived on the premises. He would mash in at 5 or 6 am, then go back to the house for breakfast, and 90 minutes would be a nice time to do justice to a full English breakfast!*

3. For the record, I did not intend to recommend Durden Park's brewing methods, but only their great research on these old beers."

Pondering partial mashing

I came across Chris Colby's October 2006 article on countertop partial mashing and I wonder what sort of efficiency a homebrewer would get with his or her method of using the cooler and batch sparging?

Joe McDonough
via email

Author and BYO *Editor Chris Colby responds: "The extract efficiency you get in any mash — partial or full — depends upon a few variables. The variable that matters the most is how finely you crush your malt. Beyond that, temperature, how thoroughly the mash is stirred and how long you rest your mash also play a role.*

"In general, with a countertop partial mash, you're likely to get a little bit lower extract efficiency than with a full mash (unless you stir the partial mash several times during the saccharification rest, which I usually don't to avoid losing heat from the beverage cooler). Figure on achieving about 60–65% extract efficiency at first and make adjustments, if necessary, to later brews based on the results of your first partial mash.

"Personally, I don't worry about the efficiency of partial mashes too much. With only a few pounds of grain, the cost difference between good and bad efficiency is minimal. The point of partial mashing is to get lots of malt flavor and aroma into an extract-based beer, and this method — like all partial mash methods — does that well. Another benefit of partial mashing is the ability to utilize base malts that do not get made into malt extract." BYO

Do you have an editorial question? Write to BYO's *editors at edit@byo.com.*

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CLUB BREW

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Bourbon-Barrel Aged Chocolate Imperial Stout

About three years ago, the members of the Evanston Homebrew Club in Evanston, Illinois started talking about acquiring a used bourbon barrel to flavor a large batch of beer for our club. We kicked the idea around for a few years until October of 2010 when my wife and I (Sean Curry) were in Michigan for a wedding. During our drive from Chicago to Charlotte, we made pit stops along the way at Three Floyds, Bell's, Dark Horse, Arcadia, Founders and New Holland (all in three days!). We even got a personal tour at New Holland Brewery where the assistant brewer was brewing a batch of homebrew and gave me a tour of the barrel aging room; right then I decided that this was going to be the year that our club got a barrel!

John Haggerty, the Head Brewer of New Holland, gave me the phone number of Tom Griffin, the barrel guy for all of the breweries across the US, and my wife and I had the good fortune of catching Tom the night he was driving from Madison, Wisconsin to Grand Rapids, Michigan to drop off some bourbon barrels at Founders. We drove out to a not-so-local tollway and met Tom at 1:30 a.m. to get our barrel.

Once we had the barrel, the club members all agreed on brewing a chocolate imperial stout recipe, because we knew that it would stand up to the aging process and absorb the flavor of the barrel the best. Within four days we were brewing batches, and ended up racking nine batches, for a total of 57 gallons (216 L), into our bourbon barrel. We closed the bung on the barrel on December 20, 2010. Every three months we removed a small sample to taste the maturing of the bourbon flavor. By March 20, 2011 there was definitely a strong bourbon taste with a slight malty backbone, but we decided to come back in three months to try again. As of the writing of this section, the barrel is still filled. In hindsight, we should have built a rack for the barrel to sit on prior to filling, but that did give one of our members the chance to mine his woodworking skills and build a great stand.

The best part about the barrel brew is that it has given all of us a reason to come together on a combined project, appreciate the way that everyone brews and create something that we can all say we had an active part in. Barrel fill #2 is quickly approaching and we have decided on an Avery Hog Heaven clone to put in the barrel at our next fill. Next step: finding 558 clean 12-oz. bottles to fill with the first batch . . .



The Evanston Homebrewers gather to taste their barrel-aged homebrew project.



The Evanston Homebrew Club brewed a big batch of beer to fill this bourbon barrel.

club recipe

Big Bourbon Chocolate Stout
(5 gallons/19 L, extract with grains)
OG = 1.066 FG = 1.017
IBU = 42 SRM = 97 ABV = 6.4%

Ingredients

8.25 lbs. (3.7 kg) of pale liquid malt extract
1.0 lb. (0.45 kg) Simpsons (UK) roasted malt
0.50 lb. (0.23 kg) Simpsons (UK) chocolate malt
0.50 lb. (0.23 kg) Simpsons (UK) dark crystal malt
0.50 lb. (0.23 kg) Crisp (UK) black malt0
0.50 lb. (0.23 kg) Crisp (UK) pale chocolate malt
8 AAU German Northern Brewer hops (90 min.) (1.0 oz./28 g at 8% alpha acids)
4 AAU UK Fuggle hops (30 min.) (1.0 oz./28 g at 4% alpha acids)
Wyeast 1098 (British Ale) or White Labs WLP007 (Dry English Ale) yeast

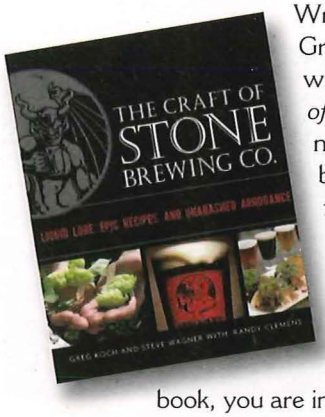
Step by Step

Steep the specialty grains in 150 to 170 °F (66 to 77 °C) water for 30 minutes. Remove steeping grains, and bring water to boil. Turn off flame and stir in the liquid malt extract. Return flame and add Northern Brewer hops. At 30 minutes add the UK Fuggle hops. After 90 minutes, chill your wort and transfer into your primary fermentation vessel. Aerate and pitch yeast starter.

Ferment the beer at 68 to 72 °F (20 to 22 °C) for another seven to ten days. Transfer to a secondary fermenter and hold for seven to ten days. Finally, transfer the beer to your personal bourbon barrel and age for ten months. If a barrel is not available, use 1.5 oz. (43 g) of medium toast oak chips soaked in bourbon in the secondary. Also, add 0.4 oz. (11 g) of bourbon to secondary to give the finished beer the right flavor.

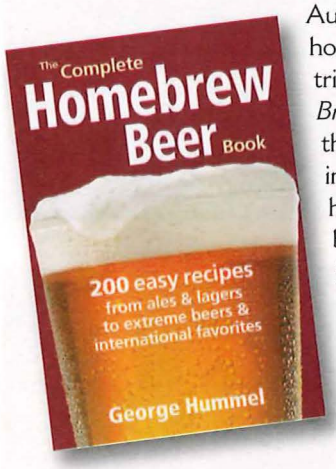
what's new?

The Craft of Stone Brewing

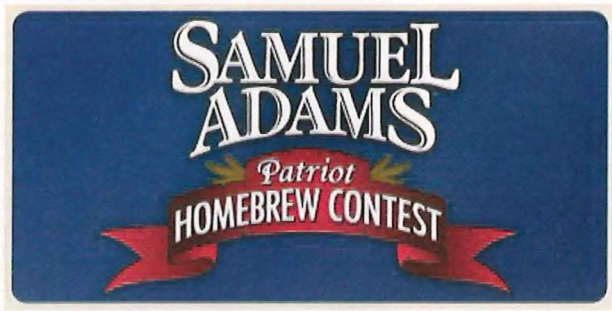


Written by Stone co-founders Greg Koch and Steve Wagner, with Randy Clemens, *The Craft of Stone Brewing* includes 18 never before published homebrew recipes for Stone beers, food recipes from the Stone Brewing World Bistro & Gardens and stories behind every Stone beer. And, if you're in the Escondido, California area and own the book, you are invited to try Stone's limited barrel-aged versions of 2010 Stone Old Guardian Barley Wine in corked 500-mL bottles. Just bring your copy of the book to the Stone Company Store and you can purchase a bottle for $25 +tax and California redemption value.
http://www.stonebrew.com/book/

The Complete Homebrew Beer Book



Authored by Philadelphia-area homebrewer and frequent contributor to the *Mid-Atlantic Brewing News* George Hummel, this how-to homebrew book includes 200 step-by-step homebrew recipes categorized by degree of difficulty — including mead, cider and soda. Also a great resource for information about ingredients and equipment.
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calendar



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Lucette Brewing Company Winter Home Brew Competition
Menomonie, Wisconsin

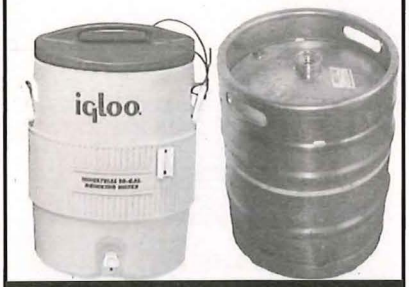
Any homebrewer is welcome to enter their beers in Lucette Brewing Co.'s annual competition. Beer entries must be entered into a BJCP style. All beer styles are accepted except all sour ales.
Entry Fee: $1
Deadline: December 1
Phone: (262) 490-5110
Contact: Jon Christiansen: jdchristiansen1@hotmail.com
Web: www.lucettebrewing.com

December 10
Happy Holidays Homebrewing Competition
St. Louis, Missouri

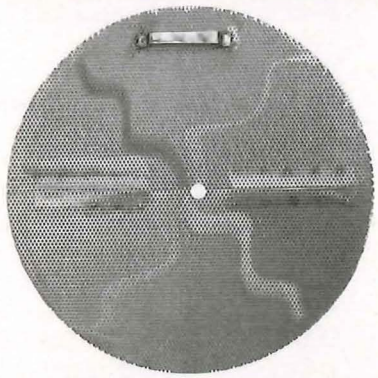
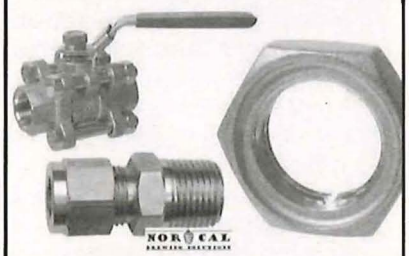
Celebrate the 20th anniversary of the St. Louis Brews homebrew club's annual holiday homebrew competition. This year's judging will take place on the evenings of Wednesday, December 7 and Friday, December 9, 2011 and the main judging will go on all day on Saturday, December 10, 2011. 2008 BJCP guidelines apply.
Deadline: December 2
Phone: (314) 703-7226
Contact Email: Drew Lewis: drew.lewis@gmail.com
Web: www.stlbrews.org/competition/hhhc/index.asp

December 12
Samuel Adams Patriot Homebrew Competition
Boston, Massachusetts

Samuel Adams' yearly Patriot Homebrew Competition invites New England-area homebrewers to compete for the chance to have their homebrew recipe brewed by Samuel Adams and served at Gillette Stadium throughout the 2012/2013 New England Patriots football season. The contest uses the 2008 BJCP guidelines, but only includes style numbers 1 to 23.
Deadline: Between December 5 & 15
Entry Fee: Free
Phone: (603) 498-8152
Contact: Rob North: rob.north@gmail.com
Web: www.samueladams.com/promotions/PatriotHomebrew2011/rules.aspx

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A Boy and His Mill

David Naugle • Poughkeepsie, New York

Back in the early 90s BI (before the internet) a few friends and I got the bug to open a brewery/brewpub. I worked as a mechanical engineer in an engineering group with full shop capabilities to build pretty much anything. My coworkers were enthusiastic and more than willing to help me build brewing equipment and a few of us got together and started to assemble what we called our pico brewery, which included this mill.



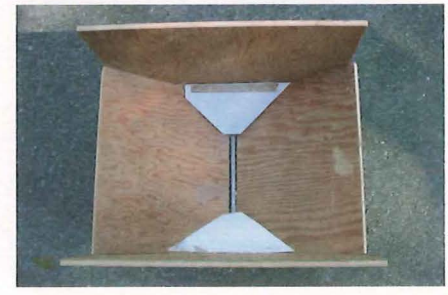
Long story short, I was the last one standing on the project, and now I have all of the equipment and accessories needed to brew 100 gallons (379 L) of beer. The three 100 gallon (379 L) stainless steel tanks are in storage and have never been christened. At the time when we built the mill there really wasn't much information available on mill design and the only book I could find on the subject was "Malting and Brewing Science I and II." There is a great section on mill design but it is for commercial mills only, not scaled-down mills for home. So I went with an 8-inch (20-cm) diameter roller as calculated by the formulas in the book to get the proper crush.



The rollers are big enough for the likes of Anheuser-Busch, and are made from ¼-inch (0.6-cm) thick stainless steel pipe with end caps and an axle TIG-welded to them. They were trued up on a lathe for precision and balance. I had him leave very fine tooling marks on them. They are a work of art. Since I only need a small portion of the roller capacity, my hopper funnels the grain down to about a 4-inch (10 cm) opening.



I only drive one roller now. I used to drive both, but I have switched back to only driving a single roller after I chewed through a nylon sprocket one day grinding for my brew day and not having a backup sprocket to replace it with. I also learned that large-diameter rollers require quite a large motor to run — a drill doesn't even come close. It takes a lot of force to crush the grain.



beginner's block

BREWING SUGAR BASICS

by betsy parks

At some point you may hear that fermenting beer with any kind of sugar other than malt is bad. After all, the Reinheitsgebot, the Bavarian brewing purity law of 1516 says that only hops, malt, and water may go into the making of (German) beer. But there are good reasons for using non-malt sugars in your beers.

Why they are used

Brewing sugars have somewhat of a bad reputation, which is mostly because of abuse; adding a few pounds of cane sugar, for example, will speed up the brewing process and lower the cost, but the result is an inferior homebrew. Using brewing sugars properly, however, can also create more interesting flavors while increasing the finished beer's strength.

In fact, many beers are not only made better with a careful balance of malt and sugar adjuncts, sometimes the style requires it. For example, if you like Belgian-style beers, such as tripels, you've had a beer that was brewed with some kind of sugar adjunct — most likely Belgian candi sugar. And English brewers have long used molasses, treacle or turbanado cane sugar in many of their styles, such as bitters, porters and stouts, for years.

Common sugars

There are a variety of different non-malt sugars used in brewing, but the most common varieties you will encounter as a novice brewer are corn sugar, table sugar, brown sugar, honey, molasses and candi sugar. You may also come across recipes that call for maple syrup, treacle and golden syrup, but they are less common. Visit www.byo.com/component/resource/article/330 for more specifics about these sugars.

Using brewing sugars

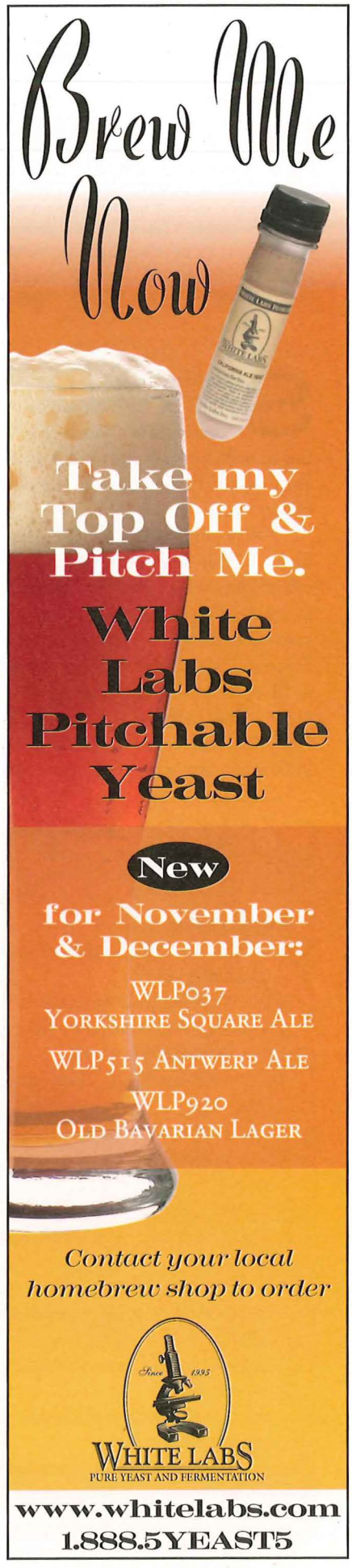
When you are starting out, always follow your homebrew recipes when they call for sugars. Varying too much can alter the gravity and thus the fermentation of your beer. For example, corn sugar will contribute around 1.0085 degrees of gravity per pound (0.45 kg) per 5 gallons (19 L) of beer. As you become a more seasoned brewer, you can experiment, but use restraint — remember, the reason why brewing sugars have a bad reputation is because of overuse. Too much sugar can cause off flavors, or overwhelm the flavors you want to highlight in your beer. For two recipes that use brewing sugar, check out Southern Tier Brewing Co.'s Crème Brulee on page 12, or Brooklyn Brewery's Local 2 on page 51.

grain profile

BROWN MALT



Brown malt is a roasted version of pale malt (50 to 17 °L) that is often used in British beer recipes, especially porters, as well as brown ales and stouts. It has a biscuity, nutty flavor that can also taste smoky. Historically, English porters were brewed exclusively with brown malt. However, modern brown malt has a low amount of diastatic power and is best used as a specialty grain, although it does leave behind some unfermentable sugars that can contribute to body. Brown malt can be made at home using pale malt. Check out the November 2011 issue for details.



by marc martin



DEAR REPLICATOR, MY WIFE AND I TRIED THE MOST AMAZING BEER RECENTLY CALLED CRÈME BRÛLÉE STOUT, WHICH WAS FROM SOUTHERN TIER BREWING COMPANY IN LAKEWOOD, NEW YORK. IT TASTED LIKE A MILK STOUT WITH VANILLA IN IT AND DID NOT TASTE AT ALL LIKE A HIGH GRAVITY BEER. THIS WAS THE FIRST BEER I HAD EVER HAD FROM THIS BREWERY AND I LOOK FORWARD TO SAMPLING THEIR OTHER OFFERINGS. I WOULD LOVE TO BREW A BATCH OF THIS FOR MY WIFE AS A SPECIAL PRESENT FOR PUTTING UP WITH MY HOPPY HOBBY.

ADAM PUZEREWSKI
DANIEL ISLAND, SOUTH CAROLINA

Southern Tier Co-Founder Phin DeMink's interest in beer and homebrewing began with his first extract kit at the early age of 16, and he continued his hobby in college.

Advancing quickly to 10-barrel batches, Phin landed his first brewing job at Ellicottville Brewing Company in western New York. He attended a two-week extension course at UC-Davis in Davis, California and stayed at Ellicottville for five years while honing his professional brewing skills. In 1998 he attended the Siebel Institute in Chicago and worked for the Goose Island Brewery as their Head Brewer. After five years at Goose Island, he and his father-in-law, Allen Yahn, decided to open a brewery back home. The two located a building and a twenty-barrel system from Old Saddleback Brewing Company, and Southern Tier opened in late 2002.

Stretching the style limits, Phin has always been a fan of creating new and original beers by using unusual ingredients, and Crème Brûlée is certainly an example of his novel creativity. It is part of the brewery's "Blackwater" series of imperial stouts and is released seasonally in June. While officially listed as an Imperial Milk Stout, this beer is unlike any other Milk Stout you will taste. This is a beer that will not pass light and exhibits mouthfeel so full that it is almost chewable. Strong notes of vanilla are present in both the aroma and flavor. The hops are virtually undetectable and only serve to help balance the decidedly sweet finish.

Adam, now you can "Brew Your Own" Crème Brûlée anytime. For more information about Southern Tier and their other beers visit the website www.southerntierbrewing.com or call the brewery at 716-763-5479. BYO

SOUTHERN TIER BREWING COMPANY'S CRÈME BRÛLÉE IMPERIAL MILK STOUT CLONE

(5 gallons/19 L, extract with grains)

OG = 1.106 FG = 1.033 IBU = 65 SRM = 55 ABV = 9.6%

Ingredients

9.9 lbs. (4.5 kg) Briess light, unhopped, liquid malt extract
0.5 lb. (0.23 kg) dried malt extract
1.5 lb. (0.68 kg) 2-row pale malt
1.5 lb. (0.68 kg) flaked barley
1.5 lb. (0.68 kg) Belgian black malt (600 °L)
10 oz. (0.28 kg) lactose (milk sugar)
12 oz. (0.34 kg) caramelized white cane sugar*** (last 2 min.)
14.5 AAU Columbus hop pellets (1.0 oz./28 g at 14.5% alpha acids) (60 min.)
9.2 AAU Chinook hop pellets (0.75 oz /21 g at 12.3% alpha acids) (30 min.)
3 vanilla beans split and deseeded (at end of boil)
1 tsp. ground cardamom powder (at end of boil)
½ tsp. yeast nutrient (last 15 minutes of the boil)
½ tsp. Irish moss (last 30 min.)
White Labs WLP007 (Dry English Ale) or Wyeast 1028 (London Ale) yeast
*** Caramelized white cane sugar - place sugar in a sauce pan over medium heat. Stir constantly until it turns to a thick liquid and becomes a medium amber color. Add to boiling wort immediately before it hardens.

Step by step

Steep the crushed grain in 2 gallons (7.6 L) of water at 155 °F (68.3 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.8 L) of hot water. Add the liquid and dried malt extracts and boil for 60 minutes. Add the hops, Irish moss and yeast nutrient as per the schedule. Add the vanilla beans and cardamom at the end of the boil. Let the wort rest for 20 minutes and remove the vanilla beans. Add the wort to 2 gallons (7.6 L) of cold water in a sanitized fermenter and top off with cold water up to 5 gallons (19 L).

Cool the wort to 75 °F (24 °C). Pitch your yeast and aerate the wort heavily. Ferment at 68 °F (20 °C). Transfer to a carboy, avoiding any splashing to prevent aerating the beer. Allow the beer to condition for one week and then bottle or keg. Allow the beer to carbonate and age for two weeks.

All-grain option:

This is a single step infusion mash using an additional 16 lbs. (7.25 kg) 2-row pale malt to replace the liquid and dry malt extracts. Mix the crushed grains with 5 gallons (19 L) of 174° (79 °C) water to stabilize at 155 °F (68 °C) for 60 minutes. Sparge slowly with 175 °F (79 °C) water. Collect approximately 6 gallons (23 L) of wort runoff to boil for 60 minutes. Reduce the 60-minute hop addition to 1.25 oz. (35 g) Columbus hop pellets (18.1 AAU). Follow the remainder of the extract with grains recipe.

Brewing Sour Beers

Advice for taming the bugs

by Betsy Parks



SOUR BEERS SUFFER FROM THE PERCEPTION THAT THEY ARE HARD TO BREW. PERHAPS, BUT AS THESE THREE PROFESSIONAL SOUR BEER BREWERS SEE IT, SOUR BEERS SIMPLY REQUIRE SOME EXTRA PATIENCE, AND A WILLINGNESS TO LET THE BEERS BE THE BOSS.

We brew sour beers both by mechanically adding the bacteria, which we grow up ourselves, and we also brew beers that are 100 percent spontaneously fermented at Allagash. The spontaneously fermented beers are our Coolship Beers, which are made by designing a wort for long fermentation, which is then transferred into a coolship — a large shallow pan used to cool wort overnight using outside air temperature. The wort is naturally inoculated with resident yeast while it is exposed in the coolship, and then the beer is fermented and aged in barrels throughout the winter. In addition to those fermentations, we will also sometimes add fresh, locally-picked fruit to a beer that is not already on the sour side as there is tons of wild yeast present on the skins of wild fruit.

If you want to brew sour beers, you have to be patient. These beers take a lot of time. As compared to the average homebrew, which you can drink within a month, with sour beers that can translate into a year.

Also, if you want to get into brewing sour beers, you should really consider blending. And for that you need to have more options to blend from, and will need to brew a variety of sour beers to choose from.

Finally, utilize the microbe suppliers, such as Wyeast and White Labs. They have a huge selection of single microbes and blends to choose from. Their lambic blends do a really great job of balancing the microbes and speeding things up, and they prevent you from having to add a little of this and a little of that.



Jason Perkins, Brewmaster at Allagash Brewing Co. in Portland, Maine. Jason started his brewing career as a homebrewer. A Vermont native, Jason started brewing professionally at Kettle House Brewing Co. in Missoula, Montana. He moved back east to Maine in 1998 and worked part-time at Gritty McDuff's (a brewpub in Freeport, Maine) before persuading Rob Tod (owner/president of Allagash) to hire him at Allagash.

When we brew our sour beers at The Bruery, generally we'll try to sour mash them overnight at 120 °F (49 °C). This will let the natural *Lactobacillus* in the grain start fermenting and we'll have a pretty tart wort in the morning (and a horrible smelling brewery!) Some of our other sours will only see a 20-minute boil or maybe just one bacteria strain. If we're emptying sour barrels, we'll just refill the barrel and let the yeast and bacteria ferment it directly in the oak barrel itself. It's all about experimenting and finding out what works for you; the yeast and bacteria are going to do their thing, you just have to make them happy.

When we started brewing almost four years ago we used mixed bacteria cultures from two different labs. Now we keep all of our strains in house and will propagate and blend them as needed. Our blends usually consist of *B. bruxellensis*, *B. claussenii*, *B. lambicus*, *Lactobacillus*, *Pediococcus* and Flor Sherry. We use these because it's all about the flavor they produce. We let the bacteria do their thing, and when they're ready they'll let us know. You can try and predict what they're going to do but it never works out the way you planned, that's why having a good blending program in place is essential to making good sour beer.

Try different blends of microorganisms until you find the one you like. Sour beer should be fun. If you're not happy with your first batch, add some fruit or blend it with another beer; I dumped half of my first homebrewed sour beer because I didn't like it. About seven years and one commercial batch later it won gold at both the GABF and World Beer Cup.



Tyler King, Director of Brewing Operations/Head Brewer at The Bruery in Placentia, California. Developing an interest in creating craft beer at an early age, The Bruery's Tyler King had to convince a brewery to hire him at the age of seventeen. Starting as a cellarman, Tyler was employed by BJ's Restaurant & Brewery for four years while completing his Bachelor's degree. As Director of Brewing Operations/Head Brewer at The Bruery, he has had the rare opportunity to help build a brewery from the ground up.



Vinnie Cilurzo Brewer and Owner of Russian River Brewing Company (RRBC) in Santa Rosa, California. Vinnie was hired as the Brewmaster at RRBC in 1997. At the Great American Beer Festival in 1999, RRBC and Vinnie were awarded "Small Brewing Company of the Year" and "Small Brewing Company Brewmaster of the Year." In 2002, Vinnie and his wife, Natalie bought the brewery.

We primarily make three different sour/barrel beers, which are all focused on matching specific flavors in the beer to the wine that was once in the barrel. For instance, Temptation is a blonde ale aged in Chardonnay barrels, Supplication is a brown ale aged in Pinot Noir barrels and Consecration is a dark beer we age in Cabernet Sauvignon barrels. In all cases we add *Brett*, *Lacto*, and *Pedio* to the beer. We also brew a spontaneously-fermented beer every so often.

If a homebrewer wants to barrel age, filling a 60-gallon (227-L) barrel can be difficult, but if he or she gets together with other homebrew friends or their club it can be easy to fill a barrel. They do make smaller 5- and 8-gallon (19- and 30-L) barrels but, the staves are thinner and thus you have more oxygen diffusion which can cause some acetic acid (vinegar) issues. You can, however, try starting the beer in a small barrel and transferring it to a carboy or a keg at some later date. Also, a new barrel will be all new oak, which would be too much (most likely) for a funky beer. If this is the case, I would recommend running some beer through it to remove the oak first.

Underpitch the bacteria as opposed to over pitching as a little less bacteria in the beer will take a longer time to age out and become sour, but you'll get nicer, softer acidic sour character.

Also, be patient. These beers are hard to make in a short period. You have to think more like a winemaker than a brewer from a timing standpoint.

Finally, let the beer talk to you and let you know when it is ready as opposed to putting it on a calendar and saying this is when it will be bottled. In some ways you won't have too much control over the production of these beers, when you don't have a lot of experience. Over time, it does become easier, but even with experience you don't have total control. BYO



Water Woes

Proper bottle washing

by Ashton Lewis 

Q I RECENTLY MOVED FROM MONTANA TO SALEM, OREGON. WHEN I BREWED IN MONTANA I USED WELL WATER FOR MY BREWS AND THERE WAS NEVER A PROBLEM — THEY WERE WONDERFUL BEERS. NOW THAT I AM AN "URBAN" BREWER, I SEEM TO HAVE TOO MANY INSTANCES OF BEERS FERMENTING WITH DRY YEAST THAT WILL NOT TAKE OFF — THE FERMENTATIONS JUST SIT THERE, NEVER GOING INTO KRÄUSEN OVERNIGHT (LIKE THEY DID IN MONTANA). COULD IT BE CHLORINE IN MY WATER? IT MAY BE MY IMAGINATION BUT I THINK I EVEN SMELL CHLORINE IN THE SHOWER. I HAVE TRIED ADDING A CAMPDEN TABLET TO MY BREWING WATER TO LITTLE EFFECT. I HAVE THOUGHT OF BREWING WITH BOTTLED WATER AS A TEST TO SEE IF THE LOCAL CITY PROVIDED STUFF IS THE PROBLEM. DO YOU THINK THIS IS A GOOD APPROACH, OR DO YOU SEE SOME OTHER BREWING ASPECT I AM MISSING? HOW CAN I, OTHER THAN GIVING UP MY JOB AND MOVING BACK TO MONTANA, GET BACK TO BREWING WONDERFUL BEERS?

DALE ENGSTROM
SALEM, OREGON

A You are one of those patients who comes in to the doctor's office with a cold and already have your mind made up about the cause! Since you are convinced that you are stunting the activity of your yeast with chlorine from the water, that is really all I have to work with to help you out of your dilemma. To paraphrase your question: you were doing just fine in Montana brewing great beers. The Big Sky State apparently was providing you with a great environment and water supply for your homebrewing hobbies. Then you moved to another beautiful state, one that also has its unfair share of great breweries, and the brewing wheels now seem to roll less evenly.

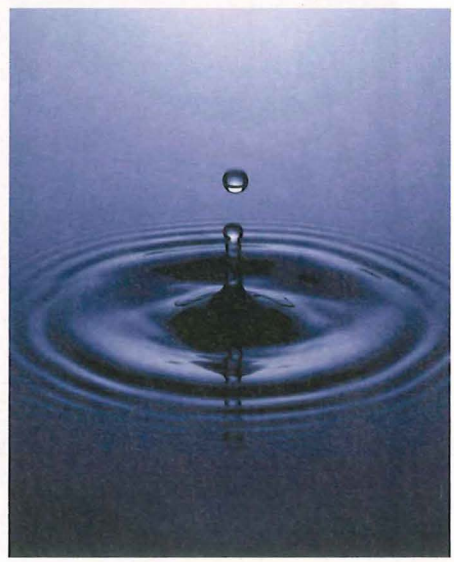
If you do have chlorinated water, and use the chlorinated water to hydrate dry yeast before pitching, this could have an adverse affect on your yeast. Fortunately, that problem is easy to solve, as you suggest, by using bottled water, or water treated like bottled water that is transported in something a bit friendlier than a plastic bottle, to hydrate your yeast. If your water is heavily chlorinated and your shower smells like a swimming pool you might want to check with your local water utility to determine if there is something unusual happening down at the water works.

Most commercial brewers who use city water for brewing use some sort of chlorine removal method before using this type of water for brewing. Some brewers use carbon filters and some use UV lights to remove chlorine from water. At home, carbon filtration is probably your best bet. Campden tablets can also be used to convert chlorine into chloride, but it seems as though that method has not helped you.

I am sure you have changed more than your water when you moved from Montana to Oregon. But before you consider other problems you should satisfy your curiosity about the water. It's pretty obvious you are looking for an excuse to visit your former stomping grounds, so this is your excuse. Go back to Montana for a weekend and when you return to Salem bring enough water with you to brew your next batch of homebrew. If the problem is solved you now know that a road trip is required before each brew.

But what could be in the water in Montana that could actually help

> "Zinc concentrations in wort between 10-20 mg/L is beneficial to yeast because zinc is an enzymatic co-factor."



yeast? My guess is zinc. Zinc concentrations in wort between 10–20 mg/L is beneficial to yeast because zinc is an enzymatic co-factor. A brief survey of publications about water tells me that it is entirely possible that your water in Montana may have been a source of zinc. That may be a far-fetched guess, but it does lead to a brewing suggestion: add some zinc nutrient to your homebrew. The zinc nutrient I use is called Servomyces, but there are other zinc sources you can add to wort, such as zinc chloride.

When you moved you probably made more changes to your homebrewing routine than merely changing the water, however, and my first guess is that you may have changed homebrew supply shops. It could be that the yeast you are now using is somehow different. Packaged yeast, whether liquid or dried, has a shelf life. Perhaps you are using older yeast. Another possible difference in your two brewing locales is temperature.

I hate to be short on ideas. I hope something here helps because it is looking like you may have to return to Big Sky Country if you cannot make your yeast happy!

Q I HAVE HEARD MANY PEOPLE TALK ABOUT SANITIZING BOTTLES AND HAVE HEARD DIFFERENT OPINIONS. THE TWO MOST COMMON OPINIONS ARE: 1. NEVER USE A DISHWASHER, ALWAYS CLEAN WITH SANITIZING SOLUTION IN A SINK. 2. YOU CAN USE A DISHWASHER BUT USE HIGH TEMPERATURE WASH/HEAT DRY CYCLE AND NO CLEANING/SANITIZING SOLUTION. I KNOW THAT THE SANITIZING IN A SINK WORKS, BUT I HAVE NEVER TRIED THE DISHWASHER TECHNIQUE. WHAT DO YOU RECOMMEND?

CHRIS VAUGHN
WEST CHESTER, OHIO

A I have heard the same pearls of bottle-washing wisdom you cite in your question. I have also heard similar suggestions made about all sorts of other bottle sanitizing practices and often find myself wrinkling my forehead thinking, "Well, what do the big boys do?" When it comes to washing and/or rinsing bottles it is indeed helpful to look at what commercial brewers do because they are pretty knowledgeable about washing bottles.

At one time it was common for brewers to wash and reuse bottles. Times have changed, though, and it is nearly unheard of for brewers in certain areas of the world to use returnable bottles. In the US, for example, the use of returnable glass is all but gone. However, returnable glass is



> "New glass does not have to be washed before filling, and that is certainly one of the appeals of using new glass to the brewer."

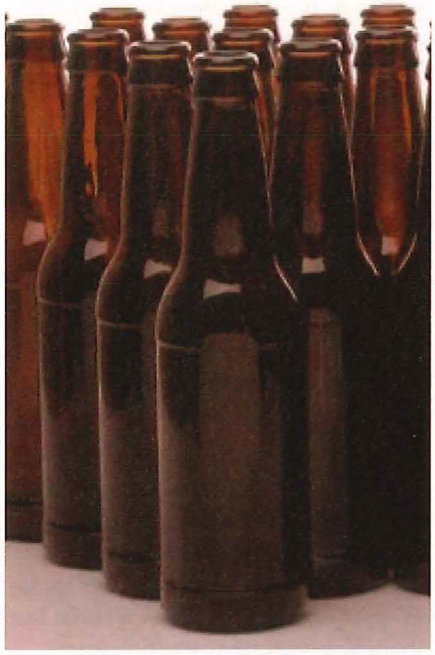


Image courtesy of MonsterBrew.com

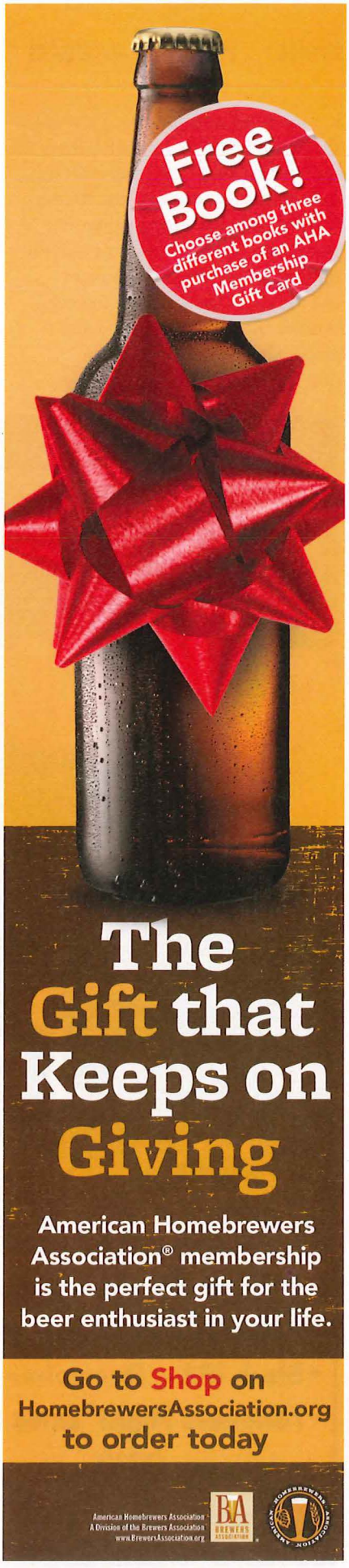
If you reuse bottles, make sure that they are well cleaned and sanitized before filling.

still common in some countries and brewers continue to clean all sorts of things off of bottles (inside and out) before filling. Bottle washers are the industrial equivalent of giant, continuous dishwashers. Several stages of cleaning are present in bottle washers, including hot caustic soak sections, caustic jet sections, hot and cold water rinse sections and a final rinse with fresh water. This kind of machine gets the bottle clean. Following cleaning, returnable glass must be inspected for any defects, such as chips and cracks, and most of this inspection is now performed with in-line imaging equipment.

New glass does not have to be washed before filling, and that is certainly one of the appeals of using new glass for a brewer. Whether using new bottles or returned and cleaned bottles, a bottle-rinsing machine is almost always used before bottle filling. Twist rinsers were once common but have largely been replaced with rotary rinsers that have a much smaller footprint. Some brewers use a liquid sanitizer in the rinser to kill contaminants before filling. The most effective sanitizers in this operation are those with a fast kill time and these are usually oxidizers, such as chlorine, ozone and peroxide. The problem with these sanitizers is that they can oxidize beer, especially ozonated water and peroxide solutions, and, in the case of chlorine, lead to significant off-flavors. The preferred sanitizer these days is steam. Steam has a quick kill time when used as a sanitizer, is relatively inexpensive, is easy to control and, provided that the steam is free of contaminants, leaves no residuals in the bottle that affect beer stability or flavor.

So what does any of this have to do with your question about cleaning bottles at home? For starters, it illustrates that commercial brewers use cleaning machinery. So the one camp that says, "never use a dishwasher" is pretty much out of touch with reality because commercial brewers are running specialized "dishwashers" across the globe. The other camp suggesting that it is OK to use a dishwasher as long as a cleaning solution is not used is also a bit out of touch, however. I think both suggestions have merits, but clarification is required.

One of the practical problems with dishwashers is that a dishwasher is not always the cleanest thing in the kitchen. Television commercials showing a dishwasher full of dishes covered



in food totally disgust me. I am one of those dishwasher users who loads the dishwasher with very well-rinsed utensils, plates, glasses, etc. If your household has a clean dishwasher, using it to clean bottles is not, in my opinion, a terrible idea. You can always clean the inside of the dishwasher by running it empty and inspecting it after cleaning for any residuals.

When it comes to detergent selection for bottle washing, you want to choose a detergent that is designed to attack the target soil and leaves nothing behind. If you choose an unscented, all-purpose dishwashing detergent you should be fine. I like some of the newer detergents on the market that have sodium bicarbonate (baking soda) as the primary ingredient. Baking soda really is a great cleaner for glassware provided that there is not too much heavy soil, which is something that a homebrewer directly controls.

If you rinse your bottles after emptying for consumption there will be little soil to remove and there is no reason to use an excessive amount of detergent or the most aggressive cocktails designed for a bunch of greasy plates. You probably will find that using half the recommended amount will work just fine for cleaning rinsed bottles. Running a second rinse after the cycle is complete may give you a higher level of assurance that there is nothing on the surface of the bottle. The hot dry cycle will leave your bottles in a clean and dry condition for use. However, if you are packaging carbonated beer you will definitely want to fill your beer into a bottle that has been recently rinsed with water so that the surface is wet; this helps prevent foaming caused by rough, dry surfaces.

Dishwashers do have a pretty bad reputation for destroying clear glasses. I have washed my beer and wine glasses by hand since first discovering the odd odor and appearance of glasses washed in dishwashers. It turns out that glass is etched by soft water when the water temperature is over about 140 °F (60 °C). Since most dishwashers heat water to about 160 °F (71 °C), which accelerates the reaction, this type of glass damage is common in areas with soft water or in applications where water is softened. Hard water may leave a film behind, but hard water spots and films can be removed with a mild acid like vinegar.

If this all sounds like a big hassle, you can simply soak your bottles in a mild detergent, rinse and dry.

Whatever you decide to do, though, just make sure you are using clean glass on bottling day. BYO

Ashton Lewis is the Master Brewer at Springfield Brewing Company and Process Engineer for Paul Mueller Company in Springfield, Missouri. Do you have a question for him? Email your request to wiz@byo.com.



Brown Porter

Distinguished English ale

by Jamil Zainasheff



I am a big fan of all British-style beers. I think the great balance of malt and hop character along with tremendous yeast character makes them all eminently drinkable. The British beer style brown porter has traditionally been problematic for many judges and brewers, due to the lack of easy access to fresh commercial examples (especially a decade or more ago).

The problem for judges is that brown porter, like most beers brewed in Britain that are imported, has often traveled long distances under poor conditions and become oxidized by the time it gets served. Oxidation in a caramel-rich beer comes across as a sweet, weird caramel character, not the "paper, wet cardboard" character that new judges are taught to find in light American lager. When I finally developed a recipe and brewed a beer that I felt was on par with the finest commercial examples found in England, few judges were familiar with what a fresh brown porter should taste like. Some scored it high, but it was frustrating to read comments from other judges about a lack of that "special English malt character" when they were mistakenly trying to find oxidation in the beer.

Style-wise, many brewers and judges find brown porter confusing, as they are not sure where it fits among the other dark British beer styles. Brown porter exists in the space between English southern brown ale, mild and robust porter. It is a light brown to dark brown English ale with restrained roast malt characteristics. In comparison, robust porter has a more roast character, while brown porter is often sweeter with more caramel character. While brown porter shares a lot of the same chocolate malt notes as robust porter, it does not have any of the burnt or black malt notes of robust porter; its dark malt character is more chocolate than coffee. The starting gravity on brown porter is often lower than robust porter and higher than mild and brown ales. Brown porter is usually balanced more toward malt sweetness than hop bittering. It should have a caramel and toasty malt character, similar to southern brown ale, but it is bigger and has more roast malt character than southern brown. The hop character is usually low, if any is present at all.

To brew a great all-grain example of this style, start with British pale ale malt as the base. It provides that background rich malt character that is a key component in fine British beers. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuit-toasty flavors. Some brewers use domestic pale ale malt or domestic two-row with the addition of some specialty malts, but this will not produce the same beer as using British pale ale malt. Spend the money, make the effort, and use the proper base malt if you want to make an excellent example of the style.

Similarly, extract brewers should make the effort to source an extract made from British pale ale malt. If you end up using domestic two-row malt extract, you can try to compensate by partial mashing some additional specialty malts such as Munich, biscuit or Victory®. For a 5-gallon (19-L) batch, use about 5 to 10% of the total base malt.

All-grain brewers should use a single infusion mash. A temperature in the range of 150 to 155 °F (66 to 68 °C) works well. Use a lower temperature when using lower attenuating yeasts or higher starting gravities. Use a higher mash temperature when using the higher attenuating yeasts or lower starting gravity beers. If you are unsure, a great starting point is 152 °F (67 °C).

While using the proper base malt

Continued on page 21

BROWN PORTER
by the numbers

OG:	1.040–1.052 (10.0–12.9°P)
FG:	1.008–1.014 (2.1–3.6°P)
SRM:	20–30
IBU:	18–35
ABV:	4.0–5.4%



Photo by Charles A. Parker/Images Plus

Brown Porter
(5 gallons/19 L, all-grain)

OG = 1.052 (12.9 °P)
FG = 1.013 (3.4 °P)
IBU = 28 SRM = 26 ABV = 5.1%

Ingredients

8.6 lb. (3.9 kg) Crisp British pale ale malt (or similar English pale ale malt)
14.1 oz. (400 g) Great Western crystal malt 40 °L (or similar)
14.1 oz. (400 g) Thomas Fawcett & Sons brown malt 70 °L (or similar)
8.8 oz. (250 g) Thomas Fawcett & Sons chocolate malt 350 °L (or similar)
5.5 AAU Fuggle pellet hops, (1.1 oz./30 g at 5% alpha acids (60 min.)
4.8 AAU Kent Goldings pellet hops, (0.4 oz./12 g at 5% alpha acids (10 min.)
White Labs WLP013 London Ale, Wyeast 1028 London Ale or Danstar Nottingham yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 5.9 gallons (22-L) and a gravity of 1.044 (11°P).

The total wort boil time is 60 minutes. Add the first hop addition as soon as the wort reaches a full boil and then start your timer. Add Irish moss or other kettle finings with 15 minutes left in the boil and the second hop addition with 10 minutes left in the boil. Chill the wort to 67 °F (19 °C) and aerate thoroughly.

The proper pitch rate is 9 grams of properly rehydrated dry yeast, two packages of liquid yeast, or one package of liquid yeast in a 1.5-liter starter. Ferment at 67 °F (19 °C) to start, raising the temperature gradually to 70 °F (21 °C) for the last ⅓ of fermentation. When finished, carbonate the beer to approximately 1.5 to 2 volumes.

Brown Porter
(5 gallons/19 L, extract plus grains)

OG = 1.052 (12.9 °P)
FG = 1.013 (3.4 °P)
IBU = 28 SRM = 26 ABV = 5.1%

Ingredients

5.7 lb. (2.6 kg) Muntons English pale liquid malt extract
14.1 oz. (400 g) Great Western crystal malt 40 °L (or similar)
14.1 oz. (400 g) Thomas Fawcett & Sons brown malt 70 °L (or similar)
8.8 oz. (250 g) Thomas Fawcett & Sons chocolate malt 350 °L (or similar)
5.5 AAU Fuggle pellet hops, (1.1 oz./30 g at 5% alpha acids (60 min.)
4.8 AAU Kent Goldings pellet hops, (0.4 oz./12 g at 5% alpha acids (10 min.)
White Labs WLP013 London Ale, Wyeast 1028 London Ale or Danstar Nottingham yeast

Step by Step

I use an English pale liquid malt extract for this recipe. If you can't get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead of liquid malt extract (LME).

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 1.5 gallons (~6 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22 liters) and a gravity of 1.044 (11°P). Stir thoroughly to help dissolve the extract and bring to a boil.

The total wort boil time is 60 minutes. Add the first hop addition as soon as the wort reaches a full boil and then start your timer. Add Irish moss or other kettle finings with 15 minutes left in the boil and the second hop addition with 10 minutes left in the boil. Chill the wort to 67 °F (19 °C) and aerate thoroughly.

The proper pitch rate is 9 grams of properly rehydrated dry yeast, two packages of liquid yeast, or one package of liquid yeast in a 1.5-liter starter. Ferment at 67 °F (19 °C) to start, raising the temperature gradually to 70 °F (21 °C) for the last ⅓ of fermentation. When finished, carbonate the beer to approximately 1.5 to 2 volumes.



Web extra:

Follow Jamil's blog as he opens his own commercial brewery, Heretic Brewing:

www.byo.com/blogs/blogger/Jamil

Brown Porter Commercial Examples

Black Jack Porter
Left Hand Brewing Company
Longmont, Colorado
www.lefthandbrewing.com

Burton Porter
Burton Bridge Brewery
Burton-on-Trent Staffordshire, England
www.burtonbridgebrewery.co.uk

English Malt Porter
Goose Island Beer Co.
Chicago, Illinois
www.gooseisland.com

Geary's London Style Porter
DL Geary Brewing Co.
Portland, Maine
www.gearybrewing.com

London Porter
Fuller Smith & Turner PLC
Chiswick, London, England
www.fullers.co.uk

Old Growler
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www.whitbread.co.uk

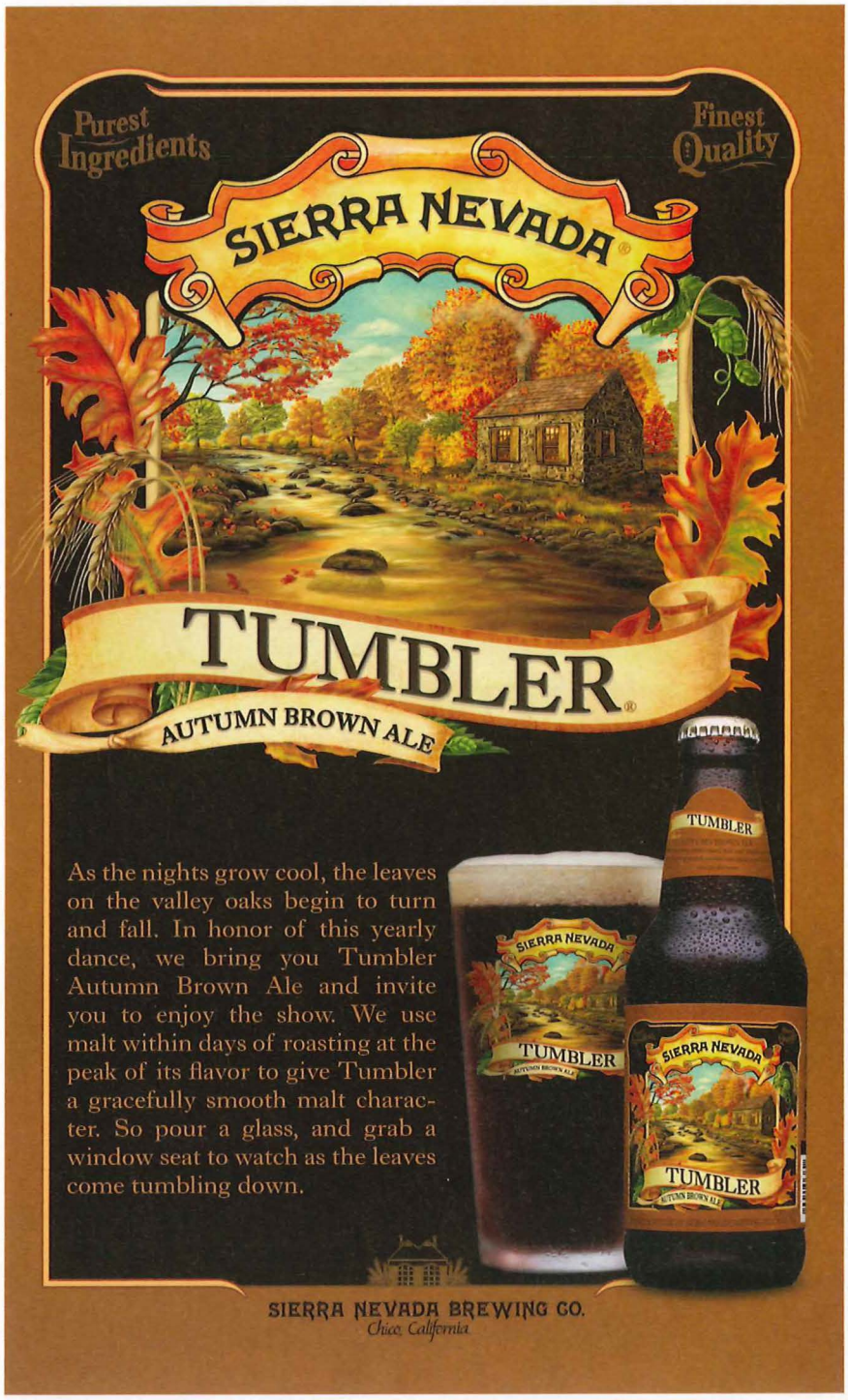
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RCH Brewery
North Somerset, England
www.rchbrewery.com

Polygamy Porter
Wasatch Brew Pub
Salt Lake City, Utah
www.wasatchbeers.com

Taddy Porter
Samuel Smith Old Brewery
Tadcaster, England
www.samuelsmithsbrewery.co.uk/

Tom Paine Original Old Porter
Harvey & Son Ltd.
Lewes, England
www.harveys.org.uk

is important, brown porter also requires a fair amount of specialty malt. For the sweetness and caramel component, consider using 5% to 10% of 40 to 120 °L crystal malt. I prefer to use crystal malts in the 40 to 60 °L range, since they have a more caramel-like flavor. To create the brown color and a chocolate richness, British chocolate malt is an excellent choice, but do not over do it. About 5% is appropriate. Be aware that the chocolate malt from different maltsters can vary substantially in color and flavor. I prefer the lower color chocolate malts, around 350 to 400 °L. The darker malts can be too much like black malt. You want to avoid highly kilned malt (500 to 600 °L), as that gives a character more appropriate to a robust porter or stout. While you can make a really



> "While you can make a really good brown porter with just base, crystal, and chocolate malt, the secret ingredient for an outstanding brown porter is brown malt (5% to 10%)."



good brown porter with just base, crystal, and chocolate malt, the secret ingredient for an outstanding brown porter is brown malt (5% to 10%). Brown malt provides the nutty, slightly roasty, gentle chocolate background note apparent in some commercial examples. Without it, most recipes lean too heavily upon darker roasted malts and will end up with too much roast character. If you are looking for more complexity or increased head retention, you can add other malts as well. Wheat malt, Victory®, biscuit and others are common additions in many recipes, but keep in mind that using too many specialty malts often ends up as a muddled malt character, not a more complex one. Emphasize one or two particular malt characters in your recipe by using two or three grains. Select high quality British specialty malts such as Simpsons or Thomas Fawcett. These malts have a rich malt character, which is complex on its own.

All English-style beer is best brewed with English hops, such as East Kent Goldings, Fuggles, Target, Northdown or Challenger. The bittering level for brown porter has a wide range of 18 to 35 IBU, but you should be shooting for a balance of slightly sweet to slightly bitter. A bitterness to starting gravity ratio (IBU divided by OG) in the range of 0.4 and 0.6 is good. You can skip the late hop additions in this style, but if you want late hop character show some restraint. As a general rule of thumb, add no more late hops than half the amount of bittering hops. This is just a generalization, since using very low or high alpha acid hops makes the equation faulty. One late hop addition, totaling around ½ to ¾ oz (14 to 21 g) for a 5-gallon (19-L) batch at 15 minutes or later, is plenty. Hop flavor and aroma, when present, is a minor player in this style.

Fermentation creates most of the flavor and aroma in many British beers. English-type yeast strains provide a variety of interesting esters and leave some residual sweetness to balance the hop bittering. Many English yeasts attenuate on the lower side

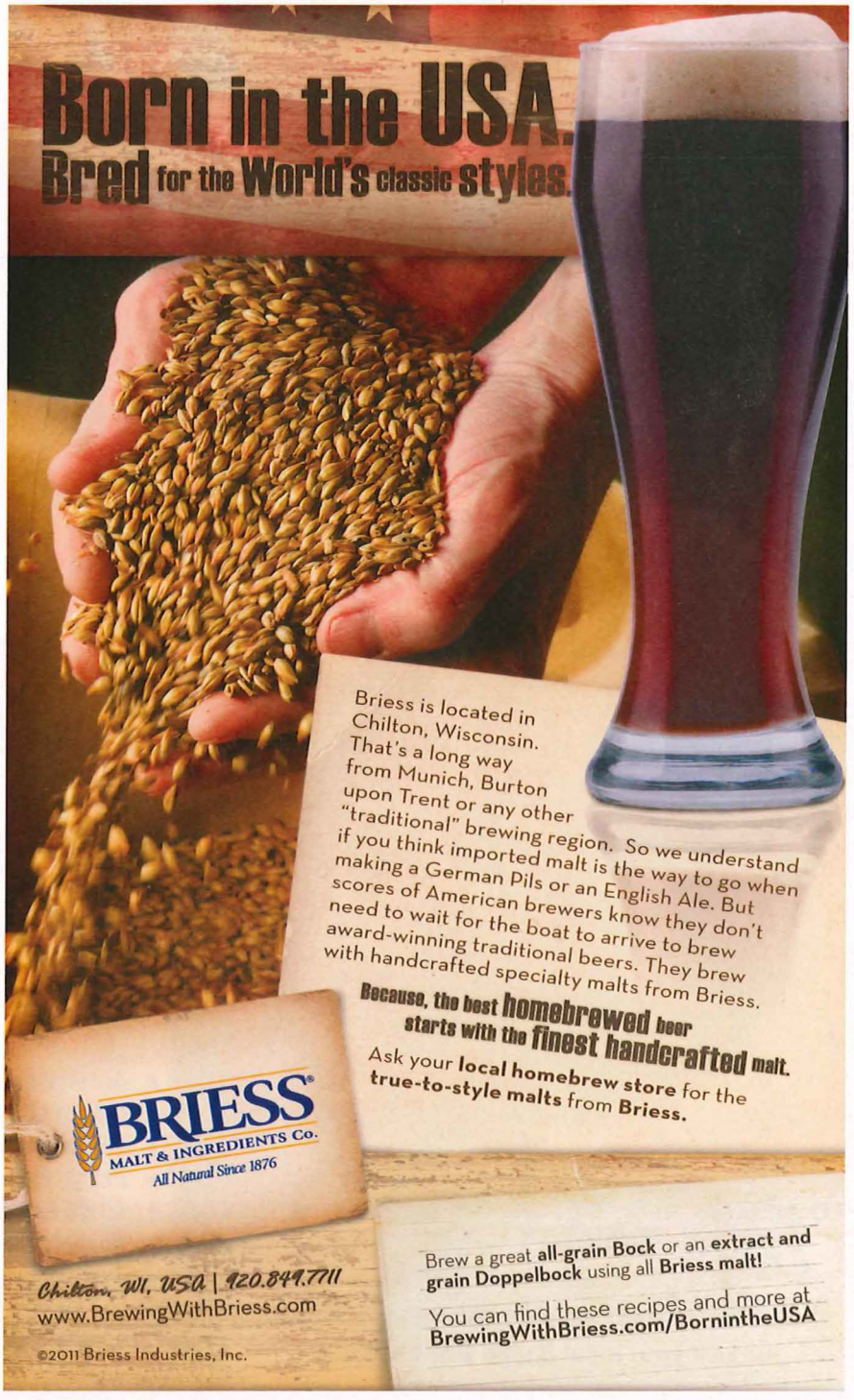
(< 70%), but there are some that attenuate quite well (up to 80%). For many British-style beers you have to think about the final balance of the beer. Most British beer styles are near even or on the bitter side. If the beer has a high starting gravity, or you are using lots of specialty grains that add residual sweetness (such as crystal malts), you need to select a more attenuative strain. If you are brewing a beer with a lower starting gravity and/or limited specialty grains, then you want to go with a less attenuative yeast. This is one of the most important things to know about crafting your own British-style recipes. My favorites for brown porter are White Labs WLP013 London Ale and Wyeast 1028 London Ale. They both provide a wonderful ester profile without being excessively fruity, and they attenuate a little more than most English yeasts. Higher attenuation in this case allows you to use more crystal malts for greater caramel flavor without ending up with too much residual malt sweetness.

> "Fermentation creates most of the flavor and aroma in many British beers. English-type yeast strains provide a variety of interesting esters and leave some residual sweetness to balance the hop bittering."

At lower temperatures (<65 °F/18 °C), these yeasts produce a relatively low level of esters and at high temperatures (>70 °F/21 °C) they produce abundant fruity esters and fusel alcohol notes. I start fermentation in the middle of this range (67 °F/19 °C), letting the temperature rise a few degrees over a couple days. This creates the expected level of esters, helps the yeast attenuate fully, and keeps the amount of diacetyl in the finished beer to a minimum.

Serving British-style beers at cellar temperature, around 52 to 55 °F (11 to 13 °C), allows the character of the beer to come out and can improve drinkability. Colder temperatures prevent the drinker from picking up the interesting fermentation and malt flavors and aromas, so try serving your brown porter above 50 °F (10 °C). Target a carbonation level around 1.5 - 2 volumes of CO_2. BYO

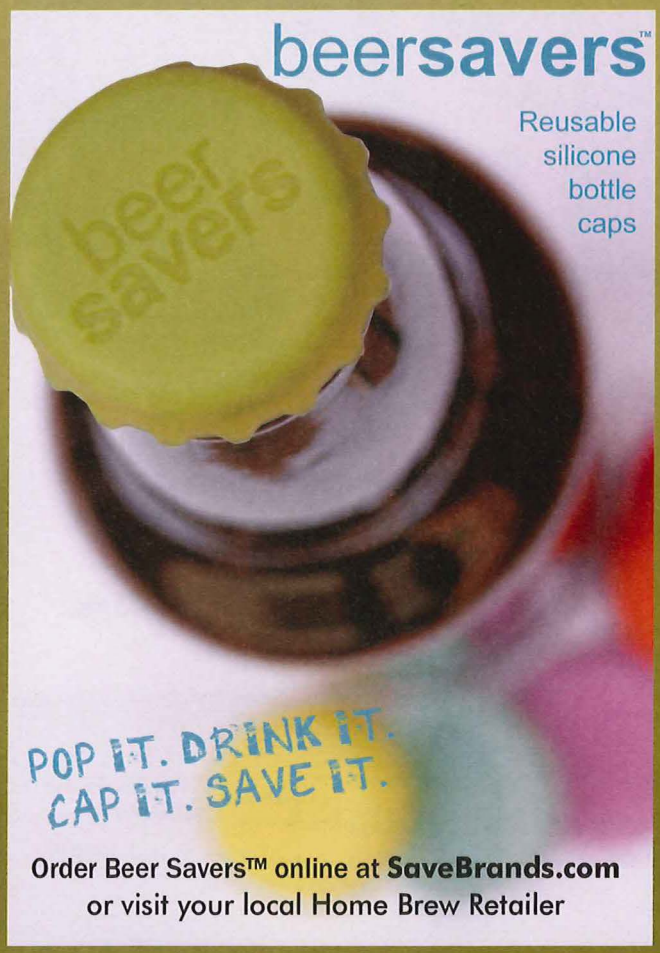
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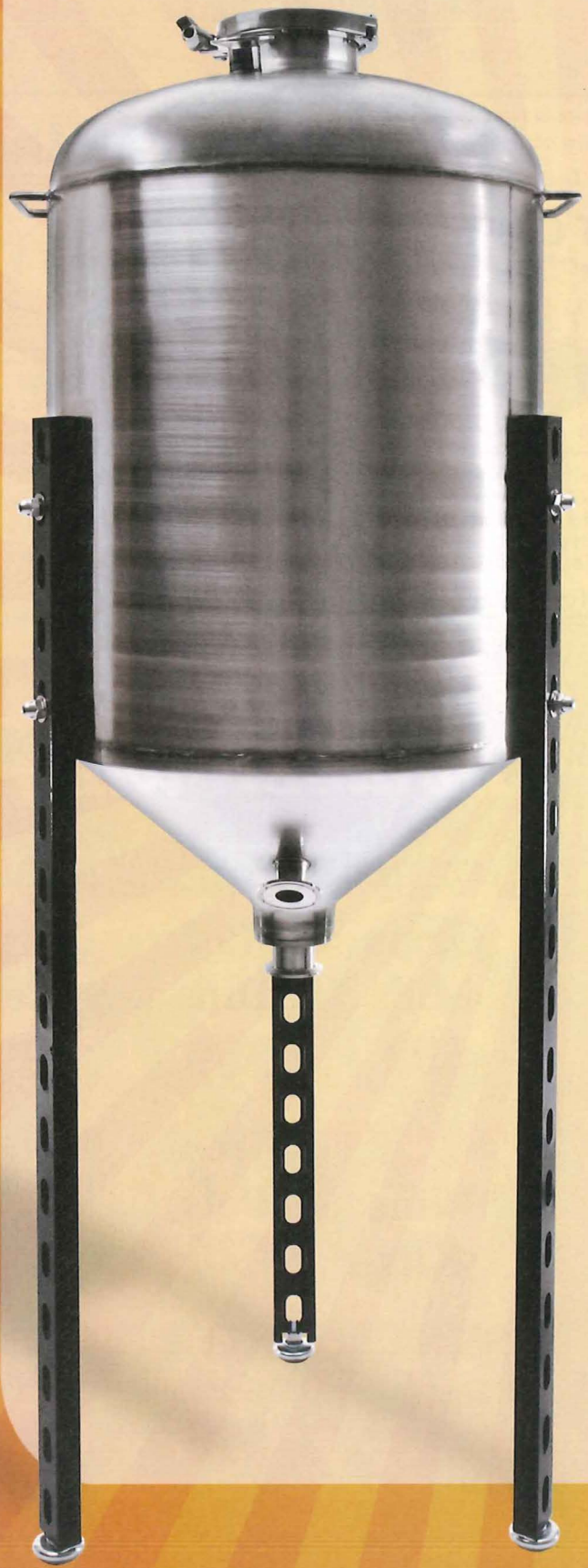
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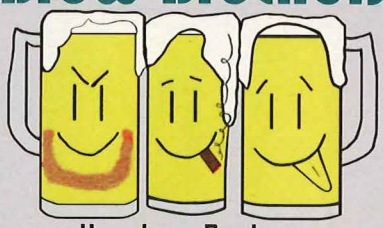
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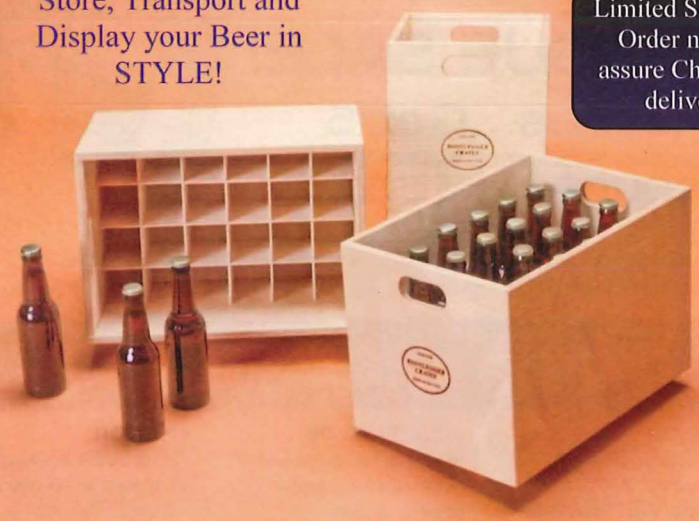


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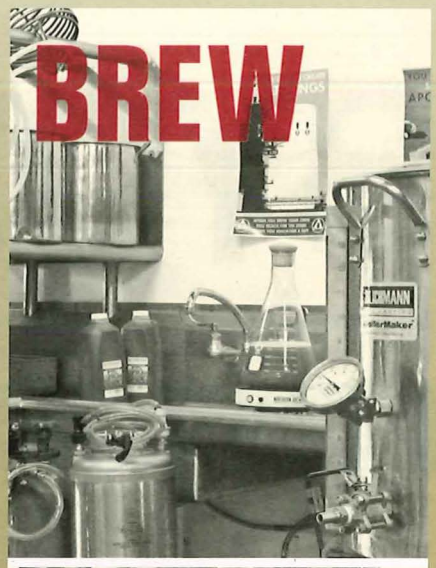
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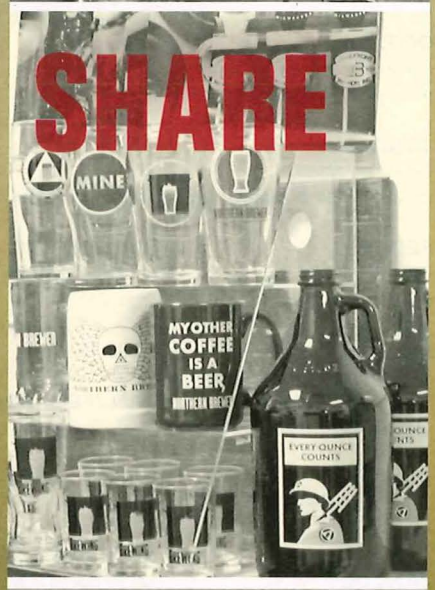
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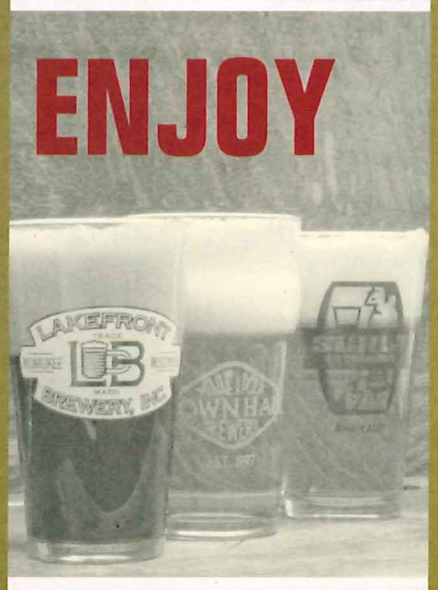
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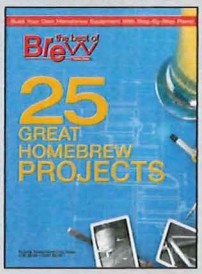
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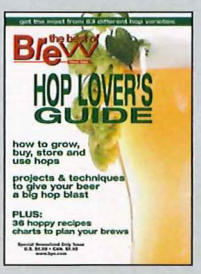
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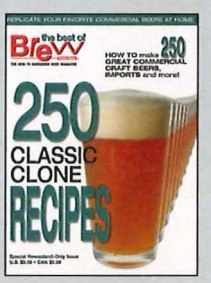
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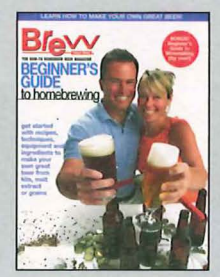
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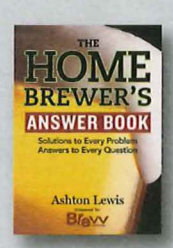
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GOTLANDS DRICKA

An Ancient Nordic Smoky Brew

Story by **Horst Dornbusch & Peter Högström**



Photo courtesy of Gotlandinfo.com

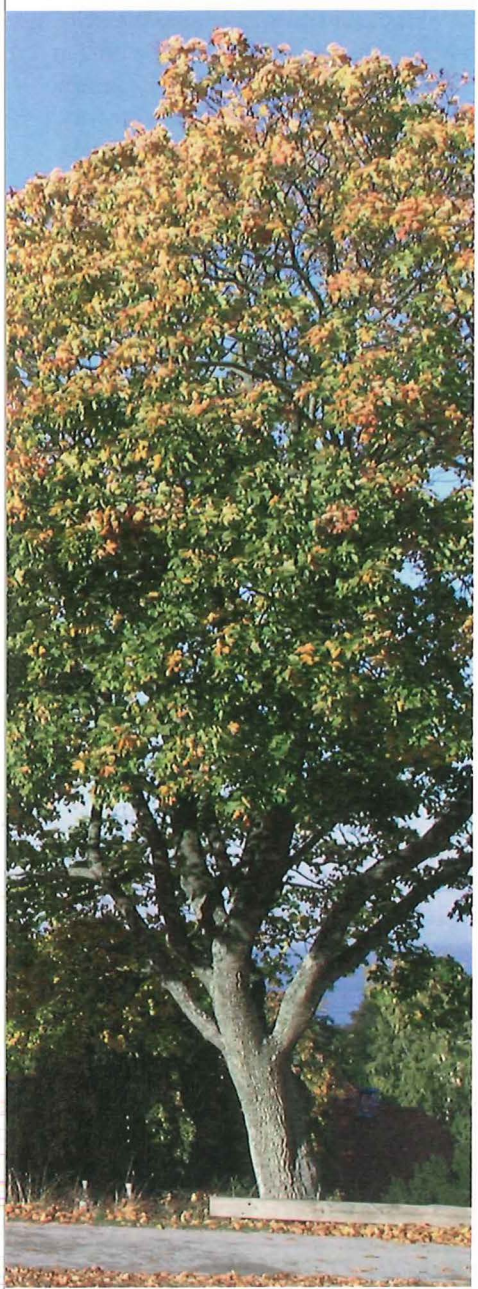
Gotland is home to 94 medieval churches, built in 1150–1400 AD. Most are renovated and in use.



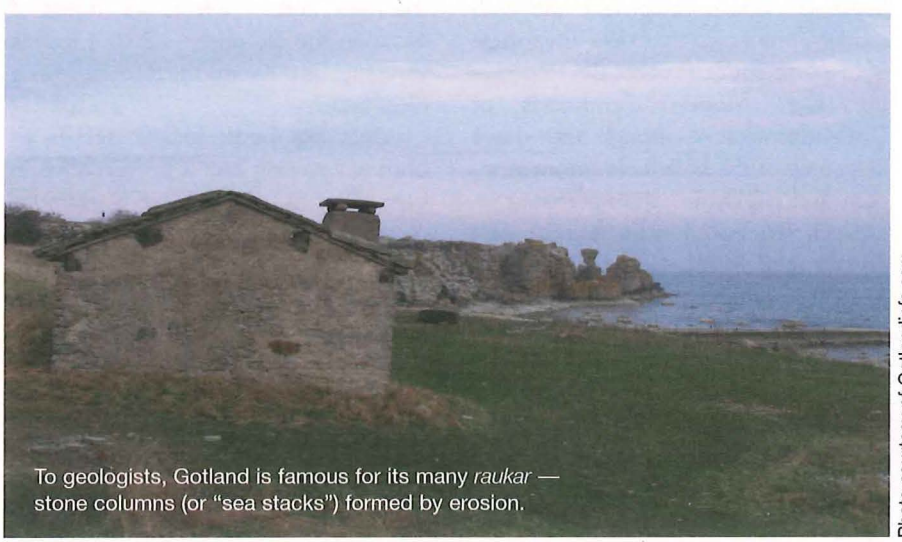
Photo by Istockphoto

Juniper berries grow abundantly in Gotland and are a featured ingredient in Gotlandsdricka.

Gotland, the largest island in the Baltic Sea and an island province of Sweden since 1645, is the ancestral home of an ancient Nordic homebrewed ale, Gotlands-dricka. ("Dricka" is Swedish for "drink.") Its roots date back to the fog of prehistory, when people still communicated in chiseled runic hieroglyphs rather than Roman characters. Originally, this brew was a strong, probably 5 to 15% alcohol by volume (ABV), smoky, murky, all-malt, no-boil beer, flavored just with juniper boughs and berries, fortified with sugar or honey, fermented spontaneously or with baker's yeast, and consumed very young — often while it was still fermenting. Here is an adaptation of this venerable old beer style for modern homebrewers.



The island of Gotland is situated south of Stockholm, roughly 55 miles (90 km) from the Swedish mainland and 100 miles (160 km) from Latvia, which places the island right on the main Baltic navigation routes from the British Isles and Western Europe to such trading centers as Stockholm, Helsinki, St. Petersburg and Tallinn. Gotland's capital, Visby, has always been a convenient port of call for the Nordic trade, and the island a coveted target for foreign occupiers. Not surprisingly, the people of Gotland — called the Gutes and numbering approximately 60,000 today — have always been traders and mariners, as well as farmers. Their frequent contacts with many cultures from Russian, to Estonian, to English, to German, to Danish have given the Gutes a



To geologists, Gotland is famous for its many *raukar* — stone columns (or "sea stacks") formed by erosion.

Photo courtesy of Gotlandinfo.com

highly cosmopolitan outlook. But strangely, their beer, Gotlandsdricka, seems to have remained largely untouched by all those foreign influences. Instead, the brew has remained staunchly indigenous and a manifestation of the Gutes' independent ways.

In the history of beer, Gotlandsdricka is one of three significant indigenous Nordic brews — the others being the juniper-berry-flavored Sahti of Finland, and the Svagdricka of the Swedish mainland, which is a fairly low-alcohol farmhouse malt liquor of perhaps two to three percent ABV. ("Svag" is Swedish for "weak.") Both of these mainland ales may contain rye and oats, but Gotlandsdricka does not.

It is not clear when Gotlandsdricka emerged as a tribal quaff, but apparently it was already well established during the Vikings' heyday in the Ninth and Tenth Centuries. In bygone times, Gotlandsdricka was brewed by just about every household, usually in a wood-heated shack with a grindstone in front. The warm shack served not only as a malt and brew house, but also as a bakery, a smokery for meat, a wash kitchen and perhaps even a sauna. Not surprisingly, the strength, color, smokiness and sweetness of Gotlandsdricka varied from one farm to the next, with the smokiest versions usually brewed — as they still are — in the southern parts of the island.

Since those medieval days, Gotlandsdricka has undergone centuries of transformation and is now also available as a commercial beer made in modern equipment and with modern processes that take advantage of brew-scientific insights developed in our age. Modern renditions of Gotlandsdricka — though they have lost some of the style's old, more innocent and haphazard characteristics — are still fermented with baker's yeast and mashed with a special, floor-malted, smoked malt made on Gotland — a malt that is unfortunately next to impossible to purchase in North America. Commercial Gotlandsdricka is also still made with both juniper boughs and berries, but often also with hops for a mellower taste and as a concession to modern palates.

As a further departure from tradition, it also tends to be boiled conventionally in the kettle for sterility and quality, and packaged in plastic jugs for efficient commercial distribution.

The Gotlandsdricka reconstruction presented here is a practical amalgamation based on the style's ancient traits, the elegance of modern homebrew methods, the uncertain access to fresh, berry-laden juniper boughs in the New World and the ingredient limitations likely to be encountered by North American homebrewers.

Gotlandsdricka Flavorings

As a classic Baltic-Nordic brew, Gotlandsdricka — like many traditional Scandinavian ales — is best flavored with juniper. Brewers of Gotlandsdricka use juniper boughs or twigs that are freshly cut with the berries still on them, and no more than half an inch (approximately 12 millimeters) in diameter. Juniper bushes were the obvious choice as a beer flavoring for Gotlandsdricka, because this evergreen shrub grows in ubiquitous splendor on Gotland.

Gotlandsdricka recipes disseminated in Swedish often specify the amount of boughs by weight. For a 5-gallon (19-L) batch, use roughly 2 to 4.5 pounds (1 to 2 kilograms) divided into two equal portions. Half of them are boiled in the hot brewing liquor for about 30 to 60 minutes prior to brewing, until the brewing liquor turns a dark amber. The other half of the boughs are placed over the bottom of the mash tun — which was made of wood in the old days — 2 to 4 inches (roughly 5 to 10 cm) thick to serve as a filter bed.

Just like hops, juniper serves as both a flavoring and a preservative in beer. The boughs release a resinous tartness, while the berries contribute a pungent and piney flavor that is distantly reminiscent of rosemary with citrus overtones. Because juniper berries are also the flavor source that turns vodka into gin, you can get a quick idea of what a juniper-berry-flavored beer might taste like by adding a jigger of gin to a glass of your favorite smoked ale.

Most North American homebrewers will probably have a hard time finding juniper branches where they live, especially with fresh berries on them. Serviceable substitutes for the juniper boughs are small fir or cedar twigs. But reduce the weight by one half, because these twigs tend to be harsher in flavor than juniper twigs. Then purchase dried juniper berries from the spice rack of your supermarket. You need about 3 ounces (80 grams) for a 5-gallon (19-L) batch, added to the mash. Alternatively, for a less authentic brew, you can skip the boughs altogether and increase the amount of juniper berries by one-half.

Hops, of course, became the ubiquitous beer flavoring in Europe only in the late Middle Ages — first in Central Europe and later in the British Isles and in Scandinavia. A traditional Gotlandsdricka, therefore, does not contain hops. However, hops started to be added to beer in Gotland in more recent times. As such, modern brewers of this ale use hops in small quantities in the mash or the kettle in addition to, but not instead of, juniper. The hop is often a German or Czech aroma variety. After lautering, the collected wort may or may not be boiled.

Modern homebrewers will probably want to boil their wort — as is suggested in the recipe here — to precipitate some large-molecular proteins into the trub and to drive off dimethyl sulfide (DMS) and its precursors, for which humans have a very low taste threshold. DMS can give the finished beer a faint smell and taste of sweet corn and stewed vegetables.

The recipe on page 36 also relies on hops added to the kettle, not the mash. It is formulated for Perle hops at roughly 6.5 percent alpha-acids and a 30-percent hop utilization rate for a 60-minute boil in the kettle. To achieve a bittering value of 14 IBU (not counting any bitterness from the juniper berries and boughs), therefore, requires about 0.5 ounce (14 grams) of hops for a 5-gallon (19-liter) batch. Feel free to select a different hop with different alpha-acid values. Any noble hop or hop without a strong varietal character will work.

Gotlandsdricka Mash

The grist for Gotlandsdricka is generally just floor-malted and smoke-kilned barley and perhaps a small portion of malted wheat. Because the old Gotland kilns were usually fired with local birch, which is plentiful on the island, the original Gotland barley malt was likely very smoky. Because the local wood fuel is also highly resinous, it is likely that some of the smokier versions of the brew from a few centuries ago would not appeal to our contemporary palates and modern flavor sensibilities. For North American brewers, unfortunately, authentically smoked Gotlandsdricka floor malt appears to be commercially unavailable. This means you either have to special-order it from Sweden (for instance, at Humlegårdens Ekolager AB; Fabriksvägen 5; SE-186 32 Vallentuna; Phone: +46-8-514-50120; Fax: +46-8-514-50121; ekolager@humle.se; www.-humle.se), or you must seriously improvise to reconstruct the semblance of an old Gotlandsdricka mash, as is done in the recipe here. The substitute grist bill presented here is an admittedly subjective adaptation of several original Swedish recipes and relies on malt varieties that are readily available in North America. If you can get a hold of real Gotlandsdricka specialty malt, however, simply substitute the quantities of Weyermann smoked malt, Simpsons peated malt, and Weyermann Carafa® I in the recipe with the Swedish malt.

The logic behind the grist substitutions is as follows. The bacony-tasting Bamberg-style smoked malt (from Weyermann) is kilned over aged beech wood logs. It has a color rating of 1.7–2.8 °L (3–6 EBC) and good diastatic power, which means it can be used for any portion of the grist bill. It does provide smokiness, but not of the "right" kind.

To add a bit of more authentic smoky harshness and roastiness — which is part of the brew's flavor from the kilning of malt with birch wood — consider adding perhaps 2 percent of the grist in the form of highly phenolic-tasting peated malt. Simpsons, for instance, makes a malt like this which is available in North America. It has a color rating of roughly 2.5 °L (5.4 EBC). You can also add perhaps 3 percent Weyermann Carafa® Type I (300 to 375 °L; 800 to 1,000 EBC) for additional color and flavor. A relatively large portion of Weyermann Vienna malt provides a good depth of sweet maltiness to balance out the smokiness. Finally, you can enhance the mash with some Weyermann Caraaroma® at 130 to 170 °L (350 to 450 EBC) for a more rounded, biscuit-like beer flavor.

Note that the mash water on Gotland tends to be fairly hard (high in calcium content). If you live in an area with soft water, consider "Burtonizing" your liquor with Burton Salts (usually one teaspoon per 5 gallons or 19 L is plenty).

Fermentation

Ancient Gotlandsdricka was almost certainly fermented spontaneously, but historical versions of the brew relied mostly on bread yeast, which tends to make for a slightly estery finished beer. Use about 1 ounce (roughly 28 grams) of baker's yeast per 5 gallons (19 L) of wort. However, if you wish to experiment — as a heretical departure from authentic Gotland traditions — you could fake it with a relatively fast- and warm-fermenting ale yeast such as Wyeast 1187 (Ringwood Ale) or White Labs WLP005 (British Ale). Conduct the primary fermentation of the brew for about 3 to 5 days. Then, rack it and conduct the secondary fermentation for about 4 to 6 days. The beer is now finished and drinkable!

When we talk about "finished" beer, though, this is a decidedly relative term in the case of traditional Gotlandsdricka. In bygone times, the beer was actually consumed while it was still fermenting — and if fermentation did stop before all the beer was gone, it was often re-started with honey or sugar.

This meant that the brew was very low in effervescence and got drier as it aged. It was also likely to turn progressively sour, like a Belgian lambic, because there was no control over the microbes that settled into the ferment. A fresh Gotlandsdricka, therefore, is milky-turbid, bitter-sweet, smoky-spicy and a bit raw-tasting, with discernable notes of alcohol. As the brew ages, it may lose some of its turbidity, and the flavors may mellow out to acquire a hint of Port or Madeira



Homebrewers in all parts of Sweden are beginning to take an interest in local historical brews.

Photo courtesy of Gotlandinfo.com

Gotlandsdricka Recipes

Gotlandsdricka
(Modern Swedish Homebrewed Version)
(5 gallons/19 L, all-grain with juniper)

OG = 1.072 FG = 1.014
IBU = 14 SRM = 44 ABV = 7.7%

The following is a composite of various recipes used by modern homebrewers in Sweden.

Ingredients

3.3 lbs. (1.5 kg) Weyermann smoked malt
6.8 lbs. (3.1 kg) Weyermann Vienna malt (4 °L)
0.25 lbs. (0.11 kg) Weyermann Caraaroma® malt
1.5 lbs. (0.68 kg) Weyermann pale wheat malt
0.25 lbs. (0.11 kg) Weyermann Carafa® I malt
0.25 lbs. (0.11 kg) Simpsons peated malt
1.9 lbs. (0.86 kg) cane sugar (kettle)
4.0 lbs. (1.8 kg) Juniper boughs with berries
0.19 lbs. (86 g) Juniper berries (dried) (if juniper boughs not available)
13 AAU Perle hops (60 mins) (0.5 oz./14 g of 6.5% alpha acids)
1 oz. (28 g) baker's yeast

Step by Step

Bring about 8 to 9 gallons (roughly 30 to 35 L) of brewing liquor to a boil. Immerse about 2 lbs. (1 kg) of freshly cut, berry-laden juniper boughs into the boiling liquor for about 30 to 60 minutes, until the liquor turns dark amber in color. Then remove and discard the boughs and berries. Let the brewing liquor cool down to about 180 °F (82 °C) at the start of mashing.

In your mash/lauter tun, place the remaining boughs over the false bottom. They should form a layer about 2 to 4 inches (5 to 10 cm). On top of the boughs, mix the dry, milled grist with the amber brewing liquor. Consider a water-to-grist ratio of roughly 1.2 qts. of water per pound of grain (or 2.5 L per kilogram). Make sure the grain is mixed evenly and there are no dry clumps. If juniper boughs are not used, add dried juniper berries into the mash at this point. The target mash temperature for a single-step infusion is about 154 °F (68 °C). Let rest for 120 minutes, while maintaining the hot liquor temperature. Lauter the mash as you normally do, using the rest of the amber liquor as sparge water. During the sparge, the grain bed temperature in the mash tun should rise roughly to the mid-160s Fahrenheit (lower-70s Celsius).

Stop the sparge at a kettle gravity of roughly OG 1.064 (16 °P), assuming a 10% evaporation loss during the boil. Boil for 75 minutes and add the single dose of hops 15 minutes into the boil. Add the table sugar (or other sugar source) 60 minutes into the boil. After shut-down, whirlpool the brew to sediment the hot break. Heat-exchange the wort to approximately 68 to 76 °F (20 to 25 °C), which is an ideal temperature for bread yeast activation. After 3 to 5 days of primary fermentation, rack the brew. After 4 to 6 days of secondary fermentation, transfer it into a dispensing container. In Sweden, Gotlandsdricka is usually dispensed from 5-liter (1.3-gallon) plastic jugs with a screw closure. North American homebrewers might be more likely to dispense the brew in a serving container such as a Cornelius keg. If you store the finished beer in a Cornelius keg, dispense it with just enough pressure to keep the brew flowing. Release the pressure once a day to add one sugar cube or one teaspoon of honey or loose sugar — or more — as a continuous primer to the brew. Close the keg and keep consuming the brew. Keep priming the brew until it is all gone. The brew gets stronger and drier, the longer it receives this treatment. However, because the continuous priming also produces fresh sediment, the brew is likely to have a limited shelf life compared to other beers, especially once dead yeast cells start to autolyze.

Alternatively, you can prime the beer with corn sugar and bottle as you normally would. Use less corn sugar than you normally would, perhaps only ⅓ cup (about 2.2 oz./62 g).

Gotlandsdricka
(Modern Swedish Homebrewed Version)
(5 gallons/19 L, extract with grains and juniper)

OG = 1.072 FG = 1.014
IBU = 14 SRM = 44 ABV = 7.7%

Making an extract version of this beer requires a partial mash to incorporate the smoked malt. We formulated the recipe as a countertop partial mash, using a 2-gallon (~8 L) beverage cooler, lined with a large steeping bag, as the mash/lauter vessel. However, feel free to use any method of partial mashing that works for you. You will also need another large pot to hold hot water (brewing liquor/sparge water) if you boil the juniper boughs. Munich malt extract was substituted for part of the Vienna malt.

Ingredients

3.25 lbs. (1.5 kg) Weyermann smoked malt
0.25 lbs. (0.11 kg) Weyermann Caraaroma® malt
0.25 lbs. (0.11 kg) Weyermann Carafa® I malt
0.25 lbs. (0.11 kg) Simpsons peated malt
1.25 lbs. (0.57 kg) dried wheat malt extract
2 lb. 14 oz. (1.3 kg) liquid Munich malt extract
12 oz. (0.34 kg) dried light malt extract
1.9 lbs. (0.86 kg) cane sugar (kettle)
2.0 lbs. (0.91 kg) Juniper boughs with fresh berries
0.19 lbs. (86 g) Juniper berries (dried) (of boughs not available)
13 AAU Perle hops (60 mins) (0.5 oz./14 g of 6.5% alpha acids)
1 oz. (28 g) baker's yeast

Step by Step

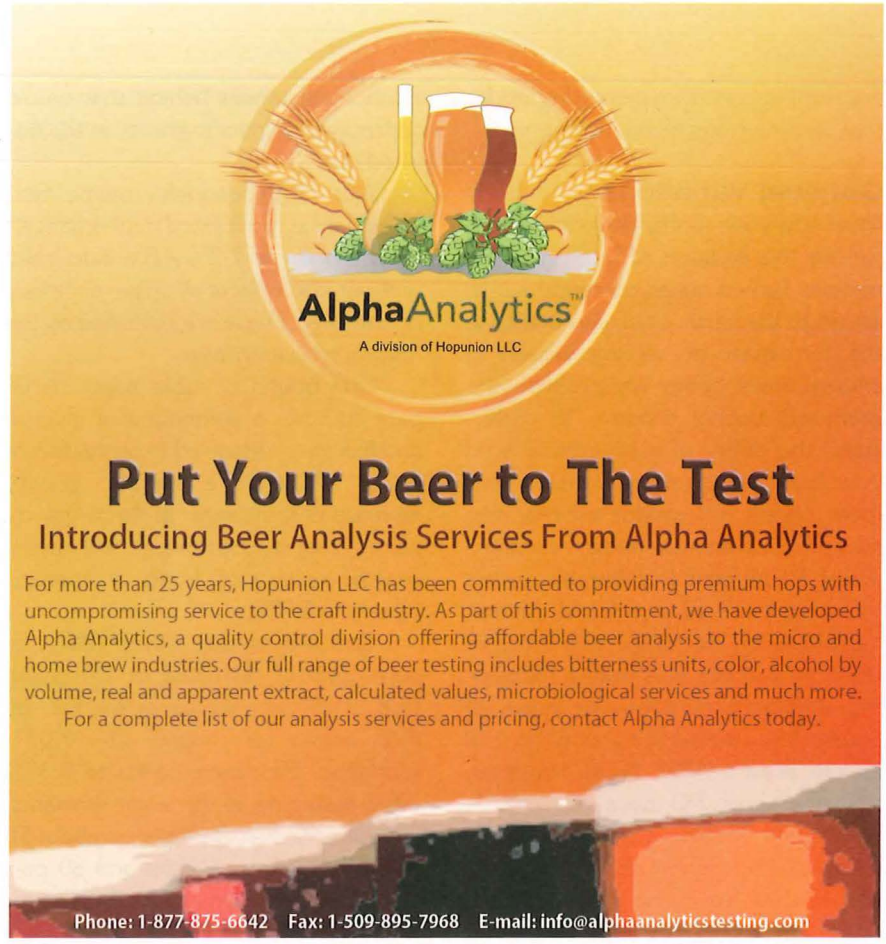
Bring 4 to 5 gallons (15–19 L), or the largest volume you can manage, of brewing liquor to a boil. Immerse about 1.0 lb. (~0.5 kg) of freshly cut, berry-laden juniper boughs (if you have them) into the boiling liquor for about 30 to 60 minutes, until the liquor turns dark amber in color. Then remove and discard the boughs and berries. Let the brewing

liquor cool down to about 183 °F (84 °C) before mashing.

Place the remaining boughs in the bottom of a 2-gallon (~8 L) beverage cooler. On top of the boughs, place a large steeping bag containing the milled grains (4.0 lbs./1.8 kg total). Stir your hot brewing liquor (the water you boiled the juniper boughs in) into the dry, milled grains until the cooler is almost full to the rim. (This will take about 5.5 qts. /5.2 L). If you didn't use juniper boughs, stir the juniper berries into the mash. The initial target mash temperature is about 157 °F (69 °C), which will drop to around 154 °F (68 °C) by the end of the 60-minute mash. Keep remaining brewing liquor heated to 180–185 °F (82–85 °C).

After the mash, draw off approximately a quart (~1 L) of liquid from the cooler and gently pour it on top of the grain bag. Repeat this 3 or 4 times (to recirculate). Collect wort by drawing off approximately a quart (~1 L) at a time, pouring this wort into your brewing kettle then pouring an equal volume of hot sparge water (juniper bough water) gently on top of the grain bag. Once you have drawn off 11 qts. (10 L), quit collecting wort. Add brewing liquor to your brew kettle to make 4.0 gallons (15 L), or as much volume as your brewpot will handle. Stir in dried malt extract and boil wort for 75 minutes. Add the single dose of hops 15 minutes into the boil. Add the table sugar and Munich malt extract 60 minutes into the boil. (Shut off heat and stir thoroughly when adding the liquid malt extract.) If you boiled the juniper boughs and still have "bough water" left, keep the boil topped up with this.

Chill the wort to 68 to 76 °F (20 to 25 °C). Transfer chilled wort to fermenter and top up to 5.0 gallons (19 L) with water at the same temperature. (If you have any remaining "bough water," cool it down and use it for topping up.) Aerate and pitch your baker's yeast. After 3 to 5 days of primary fermentation, rack the brew. After 4 to 6 days of secondary fermentation, transfer it into a dispensing container. (See all-grain recipe for final instructions.)





warmth, in part from increasing oxidation and the rising alcohol content.

Optional Variations

Most authentic Gotlandsdricka recipes call for the addition of table sugar or perhaps brown sugar or candy sugar, added to the kettle or in increments to the fermenter or serving vessel. In ancient times, honey was probably the preferred alcohol booster. To understand the effect of such additions on your brew's parameters, consider that most sugars are almost entirely fermentable, whereas honey contains about 80 percent fermentable sugars by weight — as a rule of thumb, depending on the evaporation rate of the honey in the hive before harvesting. Additions of honey or sugar, of course, alter the wort's gravity, as well as the brew's ABV. Note, however, that the wort FG does not change noticeably, because sugar is fully fermentable into alcohol and carbon dioxide. It thus leaves no residual, non-alcohol substances behind that would contribute to specific gravity in the finished beer.

The Gotlandsdricka recipe featured here is formulated mathematically for a brew of 7.7% ABV, calculated without the effects of sugar or honey on the beer. These are governed by the following relationships:

One pound of table sugar (AKA pure sucrose, a compound of glucose and fructose) dissolved in one gallon of water produces a specific gravity increase in that water of 46.31 gravity points (that is, the mixture will have a specific gravity of 1.046 or approximately 11.5 °P).

This means that 1.0 oz (28 g) of pure sucrose dissolved in 1.0 gallon (3.8 L) of wort increases the OG by 2.88 points (or roughly OG 0.003, rounded). This corresponds to 0.37% ABV, assuming all the sugar ferments. Because the average honey is about 20 percent water by weight and 80 percent sugar, we can use the formula for honey by just multiplying the results by 80% (0.8 or four-fifths) to arrive at the corresponding gravity and alcohol increases from honey instead of sugar.

If you have access to the appropriate smoked malt and juniper, making a more traditional version is as easy as omitting the hops and not boiling the wort. Then, "feed" the dricka with honey as it ages.

If you do choose to try your hand at brewing any version of Gotlandsdricka, you will be stepping into a brewing tradition that extends back many centuries. (BYO)

Horst Dornbusch is the author of several books on beer and the Associate Editor of the "Oxford Companion to Beer" (Oxford University Press, 2011).

Peter Högström lives in Stockholm, Sweden. In 2002, he formed the Swedish chapter of the Beer Judge Certification Program. He is a five-time Swedish Homebrew Champion (2000, 2003, 2004, 2005 and 2009).





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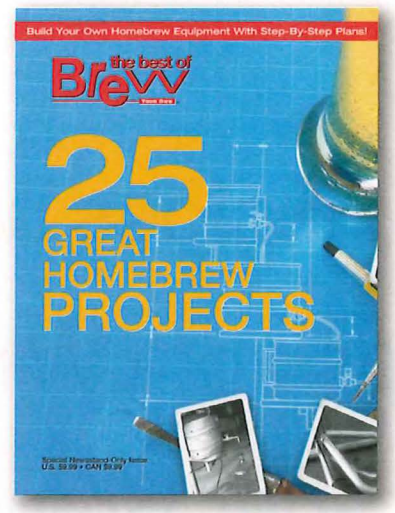
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THE BIG CHILL

Recipes and Tips from Winning Lager Brewers

Story by **Gordon Strong**

For the vast majority of consumers, "lager" is synonymous with "beer" — after all, all the mass-market favorites are lagers.

Advanced consumers might recognize that most beer can be categorized as either an ale or a lager, but not really understand the distinction beyond their favorite brands.

Beginning brewers might know the difference has to do with the yeast, and even mention "top-fermenting" ales and "bottom-fermenting" lagers. But probe further, and they can't define the difference.

Scientists might tell you that the difference between ale yeast and lager yeast is that lager yeast can fully ferment melibiose, an obscure sugar not found in any significant concentration in wort. But, they can't even agree on the name or the history of the type of yeast — it's changed at least three or four times since I've been brewing. Governments often confuse the issue by adding their own definitions, most notably (or notoriously?) Texas who defines "Ale" as a malt beverage con-



Photo by Charles A. Parker/Images Plus

taining 5% alcohol or higher ("Beer" is defined as between 0.5% and 5% ABV). If you've ever seen Paulaner Salvator labeled "Ale," now you know why.

For the practical homebrewer, none of these points really matter except to note that they can generate confusion when discussing lagers. To me, lagers are a class of beer that involve a specific cold-side treatment — they ferment cool with a specific type of yeast, and they are cold-conditioned (or "lagered," which comes from the German word for storage).

Lagers can be of any strength, color or flavor, and can use any type or amount of malt or hops, as long as they are fermented using lager yeast, and then lagered after fermentation is complete. It is the use of lager yeast, not the temperature the beer is fermented at, that makes a beer a lager. Lagers tend to have a smoother, cleaner flavor profile when compared to ales, and may have more sulfur and less fruity esters when fermented at traditional temperatures.

Lagers cover a broad range within the world of beer styles. Most lager styles historically come from central Europe, particularly Germany and the Czech Republic, but the mass-market pale versions are made in nearly every country in the world. Many popular American lager styles are simply adaptations of German and Czech beer styles, made with indigenous ingredients and designed for broader appeal to a wider range of consumers.

Brewing Lager Beer

Since lager beer is such a wide category, I'm going to approach lager brewing by examining brewing practices for specific lager styles and then attempt to generalize from the common elements of each. To get a more diverse set of opinions, I queried the Beer Judge Certification program (BJCP) database for people who won Best of Show (BOS) with lagers at large competitions in 2011, and I've supplemented those with two outstanding lager beers I've had the privilege to personally judge in competition.

My thanks go to BOS winners Paul Sangster of Carlsbad, California; Randy Scorby of Baker City, Oregon; Matt Welz of Middlebury, Vermont; and Dave Helt of Germantown, Wisconsin. I tried both Paul and Randy's beers at the AHA NHC, and both are indeed worthy. To round out

Award-Winning Lager Recipes

We have adjusted the original recipes to meet Brew Your Own's *standard extract efficiency and hop utilization. Details of these adjustments are given at end of each all-grain recipe. Extract conversions by* BYO.

Paul Sangster's Doppelbock/Eisbock

(5 gallons/19 L, all-grain)

OG = 1.100 FG = 1.026
IBU = 28 SRM = 33 ABV = 10%
Best of Show, America's Finest City Homebrew Competition (502 entries)

Ingredients

15 lbs. (6.8 kg) light Munich malt (10 °L)
5.0 lbs. (2.3 kg) German Pilsner malt
3.0 lbs. (1.4 kg) CaraMunich® malt (50 °L)
6 AAU Hallertauer hops (60 mins) (1.5 oz./42 g of 4% alpha acids)
4 AAU Hallertauer hops (30 mins) (1.0 oz./28 g of 4% alpha acids)
White Labs WLP833 (German Bock Lager) yeast

Step by Step

Water profile: half RO water, half filtered San Diego tap water, with 2 grams of calcium carbonate added. Dough in with 7.0 gallons (26 L) of 170 °F (77 °C) water to hit a mash temp of 154 °F (68 °C). Mash for 60 min, then mash out at 168 °F (76 °C). Collect 8.0 gallons (30 L) sweet wort. Boil 90 minutes. Chill rapidly. Oxygenate. Ferment at 50 °F (10 °C) for 3–4 weeks, raising to 55 °F (13 °C) during last 3 days. Lager for a year.

To turn into an eisbock, reduce slightly (remove a quart or two of ice), then lager another year. This is a strong doppelbock, but is not overly intense on the malts; reduction increases the intensity. Eis by freezing until slushy, then transferring it to another keg via a sure-screen to filter out the larger chunks. Concentrate to taste, but watch over-concentrating. Additional lagering greatly helps the flavors smooth out. [Original extract efficiency = 55%. Two base malts adjusted proportionally. 10 AAU bittering hops (60-min addition).]

Paul Sangster's Doppelbock/Eisbock

(5 gallons/19 L, partial mash)

OG = 1.100 FG = 1.026
IBU = 28 SRM = 33 ABV = 10%

Ingredients

5.5 lbs. (2.5 kg) liquid Munich malt extract
5.0 lbs. (2.3 kg) dried German Pilsner malt extract
0.75 lbs. (0.34 kg) German Pilsner malt
0.25 lbs. (0.11 kg) Munich malt (10 °L)
3.0 lbs. (1.4 kg) CaraMunich® malt (50 °L)
6 AAU Hallertauer hops (60 mins) (1.5 oz./42 g of 4% alpha acids)
4 AAU Hallertauer hops (30 mins) (1.0 oz./28 g of 4% alpha acids)
White Labs WLP833 (German Bock Lager) yeast

Step by Step

Place crushed grains in a large steeping bag and place in a 2.0-gallon (7.6-L) beverage cooler. Mix 5.5 qts. (5.2 L) of hot (~168 °F/76 °C) water into the grains and let rest, insulated, for 45 minutes. (The temperature should end up around 154 °F/68 °C.) Draw off a couple cups of wort and pour them back into cooler. Repeat 3 or 4 times to complete recirculation. Draw off between 0.5-1.0 qt. (~0.5–1.0 L) of wort and pour in brewpot. Add the same amount of hot (~185 °F/85 °C) water to top of cooler. You'll need about 6 qts. (~6 L) of hot water (sparge water) total. If grain bed temperature approaches 170 °F (77 °C), cool sparge water to 170 °F (77 °C). Keep collecting wort (and adding sparge water) until you have collected 11 qts. (10 L) of wort. Add water to make 4 gallons (15 L) of wort, stir in dried malt extract and bring to a boil. Boil for 60 minutes, adding hops at times indicated. Stir in liquid malt extract during final 15 minutes of boil. Cool wort, transfer to fermenter and top up to 5 gallons (19 L) with cold water. Ferment at 50 °F (10 °C) for 3–4 weeks, raising the temperature to 55 °F (13 °C) during last 3 days. Lager for a year. See all-grain recipe for eisbock option.

Randy Scorby's Classic Rauchbier

(5 gallons/19 L, all-grain)

OG = 1.053 FG = 1.014
IBU = 28 SRM = 13 ABV = 5.0%
Best of Show, AHA NHC (840 entries)

Ingredients

7 lb. 13 oz. (3.5 kg) Weyermann rauchmalz (smoked malt)
1 lb. 5 oz. (0.59 kg) Weyermann Pilsner malt
1 lb. 3 oz. (0.53 kg) Weyermann Munich Type II malt
12 oz. (0.34 kg) Weyermann Caravienne® malt
1.6 oz. (45 g) Weyermann dehusked Carafa® II malt
8 AAU Tettnanger hops (60 mins) (2.0 oz./57 g of 4% alpha acids)
1.2 AAU Tettnanger hops (5 mins) (0.3 oz./8.5 g of 4% alpha acids)
Wyeast yeast nutrient (15 mins)
Wyeast 2633 (Oktoberfest Blend) yeast (2 qt./2L yeast starter)

Step by Step

Single decoction mash schedule: Mash in at 132 °F (56 °C) and hold for ten minutes. Pull a thick decoction and boil it for 10 minutes. Return to main mash and hold at 154 °F (68 °C) for 40 minutes or until conversion is achieved. Recirculate until clear, fly sparge with 168 °F (76 °C) water and boil for 90 minutes. Chill wort and pitch yeast starter. Wort temperature should be no higher than 50 °F (10 °C) when pitched. A higher pitch rate is needed to compensate for low wort temperature. Ferment at 48 °F (8.9 °C) for 14 days or until desired FG is achieved. [Original extract efficiency = 70%. Three base malts adjusted proportionally.]

Bill Ballinger's Munich Helles

(5 gallons/19 L, all-grain)

OG = 1.055 FG = 1.015
IBU = 14 SRM = 5.4 ABV = 5.2%
Scored a 46 at the Indiana Brewers Cup (1,071 entries)

Ingredients

8 lb. 12 oz. (4.0 kg) Weyermann Pilsner malt
2 lb. 7 oz. (1.1 kg) Munich malt
1.8 oz. (51 g) melanoidin malt
4.1 AAU Hallertauer Hersbrucker hops (75 mins) (1.2 oz./34 g of 3.4% alpha acids)
White Labs WLP833 (German Bock Lager) yeast

Step by Step

Used 3.5 gallons (13 L) RO water treated with 3.0 g gypsum, 9.0 g calcium chloride, and 9.0 g chalk in the mash. Sparge water is RO water with no salts, but treated with phosphoric acid to be pH 5.3. Mash at 154 °F (68 °C) for 60 minutes. Sparge with 168 °F (76 °C) water for 45 minutes, collecting 6.7 gallons (25 L) wort. Boil for 75 minutes, yielding 5.0 gallons (19 L). Ferment at 54 °F (12 °C) for 2–3 weeks, rack to keg. Lager for 14 weeks. [Original recipe for 6 gallons (23 L) at 80% efficiency. All ingredients scaled down then two base malts adjusted proportionally.]

Bill Ballinger's Munich Helles

(5 gallons/19 L, extract with grains)

OG = 1.055 FG = 1.015
IBU = 14 SRM = 5.4 ABV = 5.2%

Ingredients
4.0 lbs. (1.8 kg) Pilsner dried malt extract
1.0 lb. (0.45 kg) Munich liquid malt extract
1 lb. 14 oz. (0.85 kg) Munich malt
2.0 oz. (57 g) melanoidin malt
4.1 AAU Hallertauer Hersbrucker hops (75 mins)
(1.2 oz./34 g of 3.4% alpha acids)
White Labs WLP833 (German Bock Lager) yeast

Step by Step
Steep crushed grains in 2.7 qts. (2.6 L) of water at 154 °F (68 °C) for 60 minutes. Add water to make at least 3.5 gallons (13 L), stir in dried malt extract and bring to a boil. Boil for 75 minutes, adding hops at start of boil and liquid malt extract with 15 minutes left in boil. Ferment at 54 °F (12 °C) for 2–3 weeks. Lager for 14 weeks.

Dave Helt's Schwarzbier
(5 gallons/19 L, all-grain)
OG = 1.050 FG = 1.019
IBU = 30 SRM = 32 ABV = 4.1%
Best of Show, Drunk Monk Challenge (735 entries)

Ingredients
4.5 lbs. (2.0 kg) Maris Otter malt
2.0 lbs. (0.91 kg) Vienna malt
1.5 lbs. (0.68 kg) Munich malt
1.0 lb. (0.45 kg) flaked barley
1.0 lb. (0.45 kg) dehusked Carafa® II malt
0.50 lb. (0.23 kg) CaraPils® malt
0.50 lb. (0.23 kg) pale chocolate malt
8 AAU US Goldings hops (30 mins)
(1.7 oz./48 g of 4.5% alpha acids)
Wyeast 1056 (American Ale) yeast

Step by Step
Mash at 154 °F (68 °C). Pitch ⅔ cup yeast slurry of 1056 from a previous batch. Boil for 90 minutes. Ferment at about 66–68 °F (19–20 °C), bottle, then lager at 38 °F (3.3 °C) for 4 months. [11 AAU hops in original recipe.]

Matt Welz's German Pilsner
(5 gallons/19 L, all-grain)
OG = 1.050 FG = 1.009
IBU = 30 SRM = 2.2 ABV = 5.4%
Best of Show, Greg Noonan Memorial Homebrew Competition (281 entries)

Ingredients
10 lbs. (4.5 kg) Bestmalz German Pilsner malt
6.4 oz. (0.18 kg) Weyermann Carafoam® malt
6 AAU Hallertauer Mittelfrüh hops (60 mins)
(1.4 oz./40 g of 4.2% alpha acids)
4.2 AAU Hallertauer Mittelfrüh hops (15 mins)
(1.0 oz./28 g of 4.2% alpha acids)
2.1 AAU Hallertauer Mittelfrüh hops (0 mins)
(0.5 oz./14 g of 4.2% alpha acids)
Wyeast 2278 (Czech Pils) yeast
(1 gallon/4 L starter)

Step by Step
Use soft water with "just a little gypsum and calcium chloride added." Mash at 149 °F (65 °C) for 90 minutes. Boil 90 minutes. Ferment at 50 °F (10 °C), ramping up to 60 °F (16 °C) towards the end of fermentation for a diacetyl rest. Lager for about 6 weeks. [Original recipe contained 7.4 AAU bittering hops and 0.75 lbs. (0.34 kg) less Pilsner malt.]

Extract with grains option:
Decrease amount of Pilsner malt to 1 lb. 10 oz. (0.74 kg). Add 1.5 lbs. (0.68 kg) of Pilsner dried malt extract and 4.0 lbs. (1.8 kg) Pilsner liquid malt extract. Steep grains at 149 °F (65 °C) for 60 minutes. Boil 60 minutes. Ferment at 50 °F (10 °C), ramping up to 60 °F (16 °C) towards the end of fermentation for a diacetyl rest. Lager for about 6 weeks.

Michael Pearson's Standard American Lager
(5 gallons/19 L, all-grain)
OG = 1.050 FG = 1.010
IBU = 18 SRM = 3 ABV = 5.3%
Scored a 47 at the Indiana Brewers Cup (1,071 entries)

Ingredients
4.5 lbs. (2.0 kg) Rahr 6-row pale malt
4.5 lbs. (2.0 kg) Rahr 2-row pale malt
12 oz. (0.34 kg) flaked maize
12 oz. (0.34 kg) flaked rice
5 AAU Magnum hops (60 mins)
(0.42 oz./12 g of 12% alpha acids)
Wyeast 2112 (California Lager) yeast
(2 qt./2 L starter)

Step by Step
Single Infusion mash at 150 °F (66 °C) for 60 minutes. Boil for 90 minutes. Cool. Oxygenate wort for 90 seconds. Pitch at 52 °F (11 °C) and let free rise to 55 °F (13 °C). Maintain at 55 °F (13 °C) for 14 days. Raise temperature to 62 °F (17 °C) for 7 day maturation rest. Wyeast 2112 doesn't throw much diacetyl, so this step is to knock the subtle acetaldehyde down and expedite sulfur scrubbing by CO_2. If filtering, transfer to Corny keg and crash cool for 2–4 days and filter using your normal method. If not, crash cool and lager for 10–14 days until desired clarity is reached and sulfur aroma/flavor from yeast in suspension is not detectable. [Original recipe was 7 gallons at 70% extract efficiency.]

the panel, I selected beers from Michael Pearson of Indianapolis, Indiana and Bill Ballinger of Shelbyville, Indiana. In one of the more memorable panels of my judging career, I gave them scores of 47 and 46 (out of 50, on the BJCP scoresheet) in the Light Lager BJCP category. Two of the best beers I've ever tasted, and both in the same flight.

Each of these brewers not only gave me their award-winning recipes, but also discussed their favorite tips for brewing winning lager beers. I'll talk about the common tips first, then discuss style-specific recommendations, followed by their recipes.

Common Tips
The brewers gave me tips that tended to fall into three major categories: ingredients, brewing procedures (hot-side process) and fermentation (cold-side process).

Ingredients: The Basis for Great Lagers
All the brewers emphasized the need for fresh, authentic ingredients in their lagers, especially in German beers where the malty richness needs to shine. German malts and noble hops provide the most authentic and best-tasting German-style lagers. Randy said, "Use ingredients indigenous to the style being brewed as much as possible; this helps create and enhance the nuances intended of the style." Bill said, "Use the freshest ingredients you can get your hands on; it really makes a difference." Matt prefers to keep the malt bill simple, even to the point of just using Pilsner or Munich malt. Bill agrees, warning that you should avoid "kitchen sink recipes."

Paul emphasizes the correct type of malty sweetness produced from German base and specialty malts, and not candy-like sugary crystal malts. He says that it is "Important that even if the terminal gravity is high, that the sweetness isn't candy-like." I will add that all brewers should understand the difference between maltiness (the flavor of malted grain) and sweetness (the residual sugar in the beer). Many German lagers are malty but dry; your

brain might tell you that it's sweet, but it's not.

All of the brewers recommended using soft water to make superior lagers. Michael said that some calcium chloride and baking soda will "keep the beer soft, but add enough salt, chloride, and calcium to round out the flavor and mouthfeel." (Adding baking soda (sodium bicarbonate) is usually reserved for dark beers, to counteract the acidity of dark grains.)

Paul limits sulfate levels to less than 65 ppm and calcium and magnesium to less than 100 ppm total. He builds his water using soft water (reverse osmosis (RO) and local water) with mineral additions, especially sodium and chloride to accentuate sweetness in malty-rich styles. He increases the bicarbonate levels only when using darker malts to keep the mash pH from dropping too low.

The brewers were divided on their yeast recommendations, although all basically agree with Matt who prefers to keep the yeast impact minimal to "showcase the malt and spicy, flowery noble hops." Randy suggested experimenting with yeast, including splitting batches into two or three fermenters to determine which "yeast strains produce the most stylistic character."

Bill and Michael prefer to stick with one lager yeast, learning how to use it and how it responds to different fermentation conditions. Bill puts it best when he said, "switching lager yeast is not like switching ale yeast. Ale yeast add much more character to the final beer, but all lager yeast are inherently very clean fermenters by nature. Learn your chosen yeast inside and out. Find out what temperatures it likes best for each of your recipes and how long it takes in primary and if you need to do a diacetyl rest."

Bill recommends White Labs WLP833 (German Bock Lager) for lagers, but Michael makes the unusual choice of Wyeast 2112 (California Lager) at a cooler (52 °F/11 °C) temperature. Michael says that "2112 will produce a maltier flavored beer than most other lager yeasts, so bump the IBUs up 5–10% in styles where that is not desirable."

Hot Side Process: The Same as Most Beers

The brewers had a few recommendations for brewing processes, but most would be applicable to all beers.

Several of them stressed the need to bring your "A-game" when brewing lagers – take extra care with cleaning and sanitation, follow your normal hot side brewing processes carefully and avoid typical mistakes. Matt says he "is probably even more anal when it comes to keeping trub and 'schmutz' out of the fermenter via whirlpooling, hopsacks, etc."

Bill and Matt both recommend a longer boil (90 minutes, typically) when using Pilsner malts to reduce DMS in the end product; that's something I normally do as well.

Randy mentions the use of a decoction mash schedule to "develop and emphasize malt character and richness" and to keep bittering hop additions to 60 minutes or less to "create a more rounded hop bitterness." None of the other brewers mentioned these steps, but they are ones that I typically follow, however.

Fermentation: The Key to Lager Character

What most people recognize as a great lager character is a result of a clean fermentation with proper attenuation and reduction of fermentation by-products. All brewers advocated pitching sufficient yeast. Pitching rate calculators can help, but Bill's rule of thumb is to use at least twice as much yeast as used when making ales (more if making a strong lager). Making a starter is recommended unless you have access to sufficient yeast. Creating a proper fermentation environment with oxygen and nutrients makes a difference; if making a starter, introduce nutrients at that time.

Most of the brewers advocated chilling the wort below the fermentation temperature to account for the heat of fermentation to raise the temperature to the desired range. Randy recommends "chilling the wort to below 50 °F (10 °C) prior to pitching yeast. Although yeast reproduction will be faster at higher temps, it is critical to reduce undesired flavors and aromas. Use a high pitch rate of healthy yeast due to low temperature."

Bill agrees with this and further states that he builds his starters "at the same temperature that the beer will ferment." I agree, and will often chill my starters to slightly below the pitching temperature to ensure the yeast isn't shocked by entering a cooler fermentation environment. Matt isn't worried about the slower pace of a cooler fermentation, noting that he is "not trying to rush fermentation at all — it's done when it's done." Michael uses Wyeast 2112 at 52 °F (11 °C), which he finds, "Produces a more refined and almost German-like sulfur profile. It adds days to the overall fermentation, but the lack of diacetyl production makes 2112 a great yeast choice for newer lager brewers."

The need for a diacetyl rest is strain-dependent. Some brewers recommend it, but others don't. My advice is to taste your beer and use it if you think you detect diacetyl. Raising the temperature towards the end of fermentation will often help ensure full attenuation and encourage yeast to clean up fermentation by-products. With cooler temperatures, primary fermentation can take awhile. Bill says, "Patience Grasshopper! Let the beer ferment for two to three weeks in the primary fermenter. Yeast move a little slower at the colder temperatures."

After fermentation is complete, brewers recommend racking the beer into a keg or other container for cold storage. The actual lagering phase is where the beer will mature and sulfur flavors produced during fermentation are cleaned up. Bill says, "The cold storage step could take 4 to 12 weeks depending on your original gravity (OG). A good rule of thumb is 1 week per degree Plato from the day you brew your beer, it will be ready." As always, let your palate be the final judge as to when your beer is ready to be served. Immature (green) flavors are the sign of a rush job.

Specific Recommendations

Aside from the tips that apply to all lagers, I thought the brewers gave me

good advice that applies to four special cases: brewing strong lagers, making lager-like ales, using specialty flavors in lagers and making multiple styles from the same beer. I agree with all their recommendations, and have applied them to my beers as well.

Paul Sangster: Brewing Strong Lagers

Some of my highest scoring beers have been doppelbocks and eisbocks; I find Paul Sangster's experiences and recipes are very similar to my own. I think his recommendations apply to all lagers, but are especially important for higher-gravity beers. Brewing successfully is often a series of calculated risks, and big beers give you less margin of error; it's best to focus on those aspects that can easily go wrong when dealing with extreme beers.

Paul begins by emphasizing the basics: sanitation. Big lagers need to have a soft, malty complexity without a distracting acidic character. The need to age big beers longer gives bugs more of a chance to ruin your beer. Don't let them do it! Be sure to brew and handle the beer cleanly so that your big beer will be stable over the long haul. I would add packaging and handling so that your transfers and storage don't let oxygen into the beer, since this can also spoil a great beer by dulling its character or making it go vinegary.

Selecting the proper strain of lager yeast is critical for high gravity fermentation. Paul recommends choosing a yeast with the desired flavor profile (he likes to accentuate the malt flavor), higher attenuation so that the beer dries out even with a high-gravity wort, and the ability to handle fermentation in a high-alcohol environment without flocculating or stalling. He recommends White Labs WLP833 (German Bock Lager) yeast for malty high-gravity beers; I concur, it's one of my favorite strains — the Ayinger yeast. (The Wyeast equivalent of this strain is their seasonal release, Wyeast 2487 (Hella Bock).)

High gravity lagers need a lot of yeast. Starters are critical, and it's better to over-pitch than under-pitch. Paul recommends using on-line pitching rate





calculators to make sure that you don't under-pitch. In big, flavorful lagers, Paul pitches at high kräusen to make sure the yeast gets busy in the wort as fast as possible. The increased mass of yeast cells mean that more oxygen and nutrients are needed in the wort — consider oxygenation rather than aeration, and add yeast nutrients for insurance. The goal is to reduce stress on the yeast so that they don't produce off-flavors or become restricted in their growth.

Paul recommends adding a second dose of oxygen 24 hours after the initial pitch to help with the growth phase of the yeast, and he often repitches his big (over SG 1.085) lagers to ensure they finish fermenting. Planning ahead with a second starter (one vial or smack pack at high kräusen is sufficient); repitch after the most active portion of fermentation has finished. Paul recommends patience, as it often takes 3-5 weeks for a big lager to finish. He raises the temperature into the low 60s at the end to help it finish and as insurance against diacetyl.

To avoid brothy autolysed flavors, Paul recommends racking to a secondary vessel if fermentation takes longer than 4 weeks, and when lagering. Big lagers may have more haze-producing proteins in solution, so lagering as close to 32 °F (0 °C) is recommended to help them settle out. Using finings can help, but lagering is a slow process, so give it time. Big malty lagers with complex flavors frequently improve over 6–18 months, so be patient and sample occasionally.

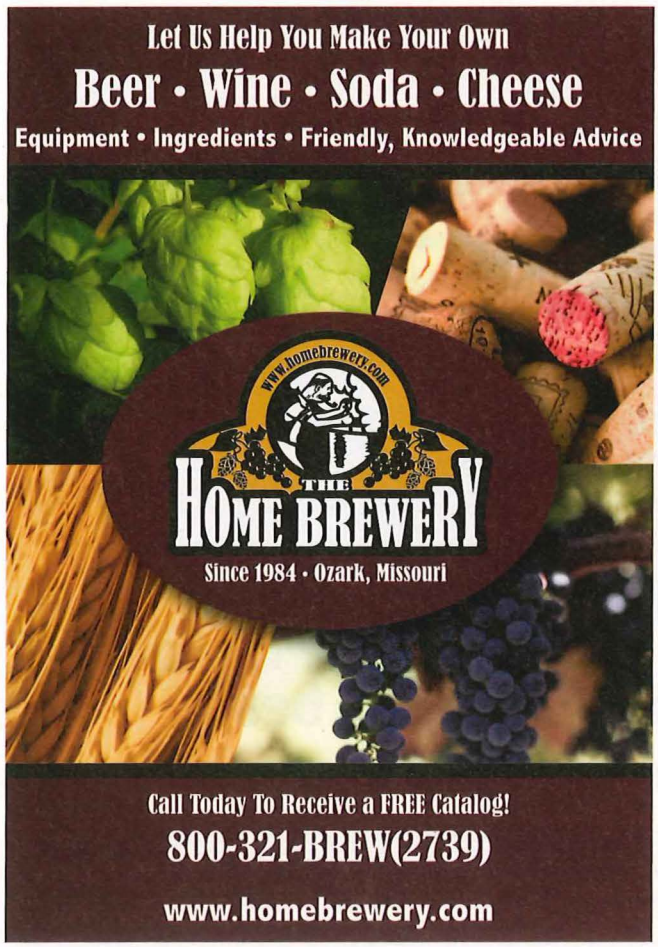
Randy Scorby: Specialty Flavors in Lagers

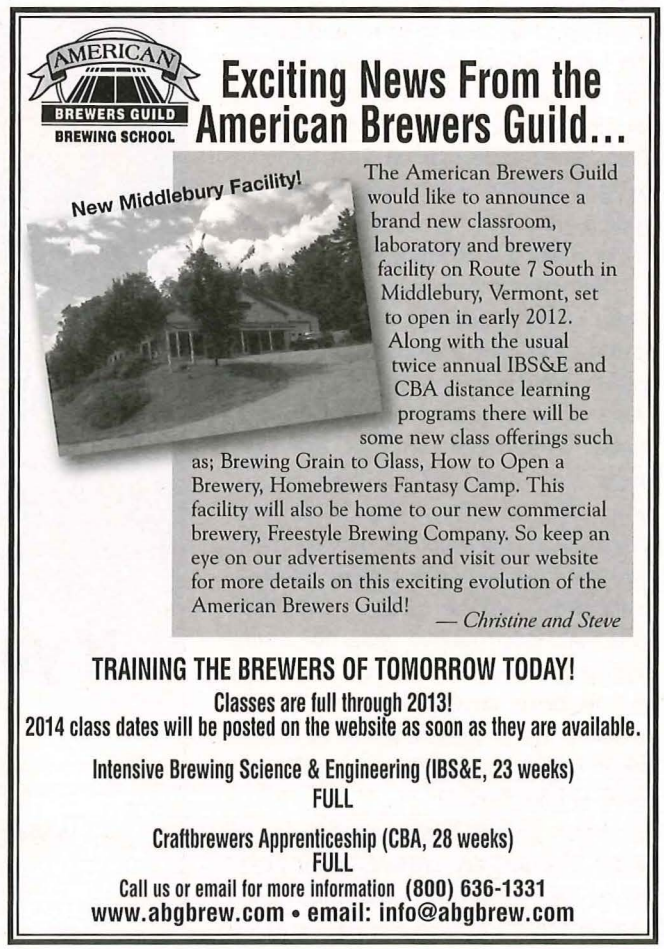
Randy Scorby has won multiple medals in lager categories at the National Homebrew Competition (NHC) over the years. His most recent success is winning Best of Show with a rauchbier. He says that before trying to make a beer that has a special flavor (like smoke), that the brewer first get the base recipe down cold. (OK, that pun was mine.) In the case of rauchbier, first dial in your Oktoberfest recipe. Randy used his basic Oktoberfest recipe as a base, replacing a majority of the base malts with rauchmalz, and then tweaked the color by adding a small amount of dehusked Carafa® II.

Randy was attempting to approximate the color of Schlenkerla Rauchbier, but judged that earlier versions had too much specialty grain flavor. The color was right, but the Carafa® and smoked malt masked the underlying Oktoberfest maltiness. His winning recipe reflects his adjustment based on his opinion as a BJCP National judge; the color is on the low end for the style, but the malty richness shines through. Based on his medal, I'd say he made the right call.

Michael Pearson: Multiple Styles from the Same Beer

I judged Michael Pearson's standard American lager twice in one competi-





tion, first in the initial judging and then again in a mini-BOS round. I initially scored the beer lower, feeling it was more like a premium American lager (a bigger beer), but the second bottle was spot-on for the style. Michael suggested that the second bottle probably had a higher CO_2 level, which made it seem like a lighter beer.

Michael believes that the carbonation level is a critical part of American lagers, and can easily affect the overall impression of the beer. He also points out that different regions of the country have different preferences, and he'll adjust the carbonation accordingly for the audience.

He does tweak his recipe slightly when entering as a premium American lager, boosting the OG to 1.055 by adding more 2-row and raising the IBUs to 22. This beer has medaled in the NHC. My personal opinion is that his standard American lager is a fine premium when presented with lower carbonation. Michael suggests that an even lower carbonation level (to the point where there is no carbonic bite in the finish) would make the beer a fine American blonde ale.

Dave Helt: Making Lager-Like Ales

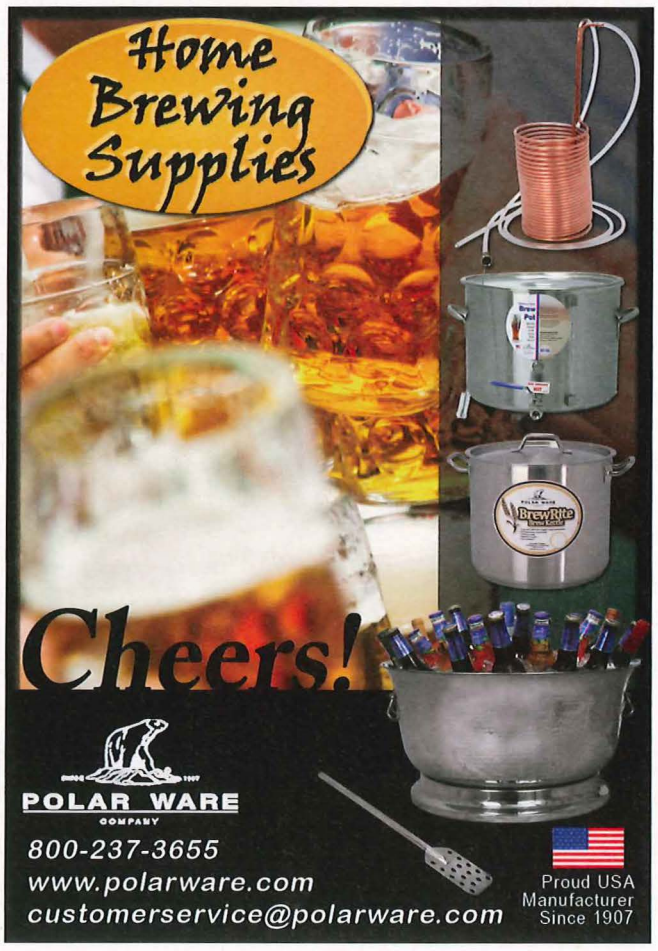
When I contacted Dave Helt about his winning recipe, he sheepishly confessed that it wasn't a real lager, but that it used California Ale yeast. He doesn't have a temperature-controlled fermentation fridge (yet) but adapted to his conditions by using a clean-fermenting ale yeast and keeping it cold in his basement over the winter. He suggests pitching plenty of yeast (even for an ale), fermenting cool and tasting it while lagering until you notice a change in character.

After the beer was fermented, Dave tasted it and felt that it was clean, but not really crisp enough to pass for a lager. After he kept it cold for an extended period of time, he noticed that the ale qualities had diminished enough to make it indistinguishable from a genuine lager. He feels that about four months of lagering in a fridge are about right to get this character. On a personal note, I think this is very similar to the process used in Kölsch and Altbier, the German ales that are cold-conditioned to get their smooth character.

He has entered this beer several times in competition and has repeatedly gotten back scoresheets that praised its "clean lager character" and noting that the "fermentation was clean." He did say that versions that hadn't been kept lagered in a fridge were called out by judges for negative yeast issues, so the extended lagering does appear to be critical to the character even when using a neutral yeast. (BYO)

Three-time Ninkasi Award winner Gordon Strong is the President of the BJCP and the author of "Brewing Better Beer: Master Lessons for Advanced Homebrewers."

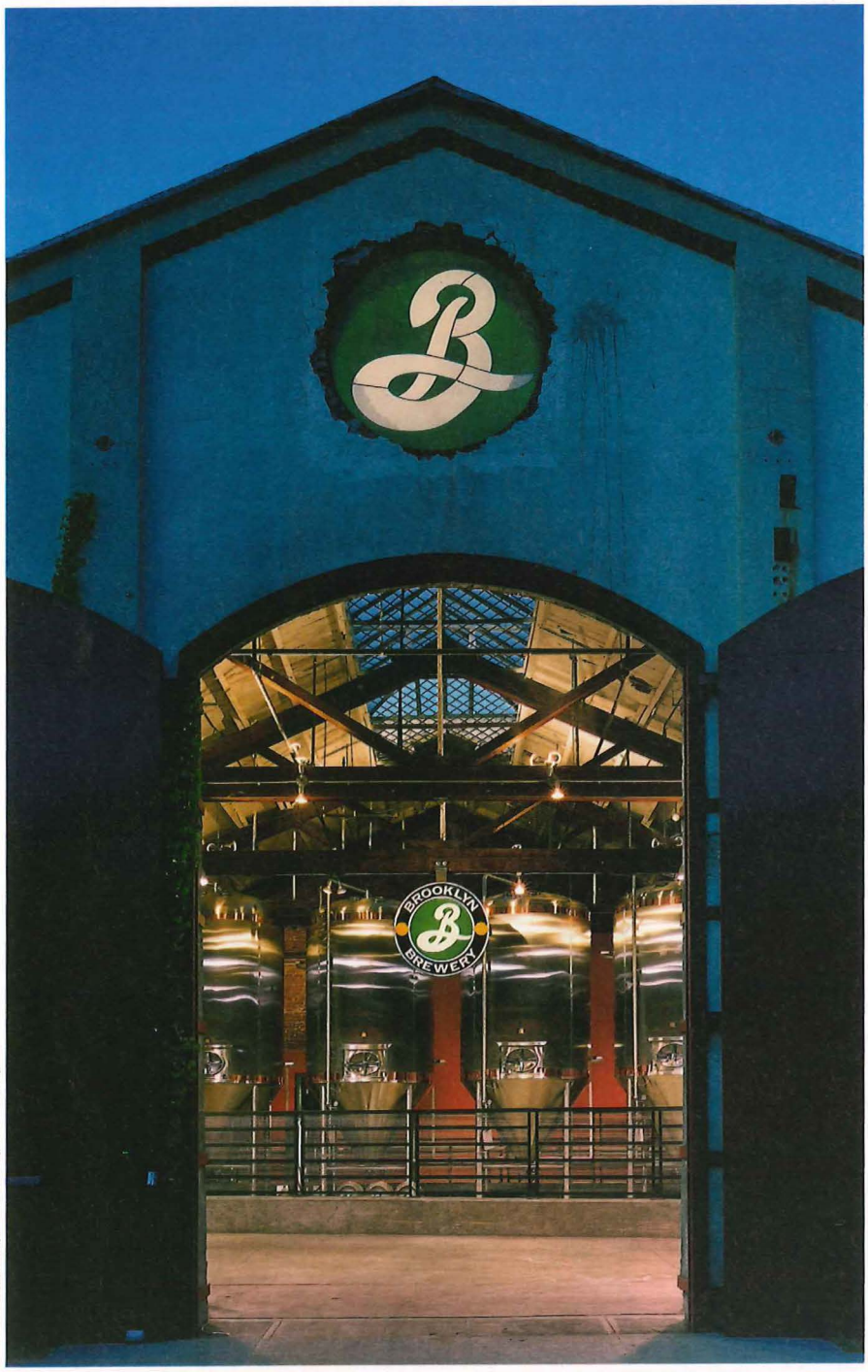




Story by **Betsy Parks**

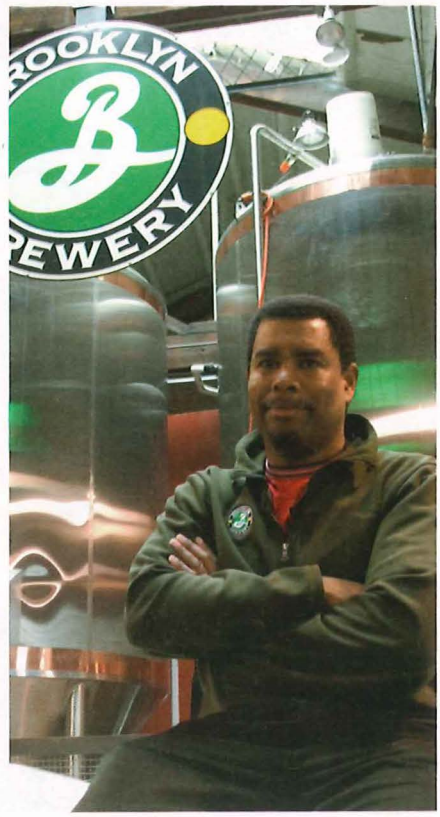
BREWING THE BROOKLYN WAY

A New York brewery balances tradition and innovation.



Photos courtesy of Brooklyn Brewery

Brooklyn has long been known as an incubator for tastemakers. From fashion and visual arts to music and theater, creative-types have flocked to this New York City borough for decades to be close to, and to create, the arts. Brooklyn is also a hub for the "slow food" movement and a magnet for urban homesteaders and anyone into all things DIY (it's not unusual to come across an urban chicken coop or beehive in Brooklyn these days).





Brooklyn began by contract brewing through FX Matt in Utica. But then, in 1996, they built their own brewhouse in Brooklyn's Williamsburg neighborhood. In 2011, they unveiled their new expansion — costing $8 million and increasing their capacity to 120,000 barrels per year.

This is a place where *Urban Farm* magazine sells well, underground supper clubs serve four-star dinners from artist lofts, and indie rock bands spring up seemingly overnight. And if that weren't enough, Brooklyn has also always been home to all sorts of entrepreneurs. Before Prohibition, the borough boasted nearly 50 breweries. Between history, ingenuity and artistic inspiration, Brooklyn has it all (and does it while looking good, thank you very much). So it's no coincidence that Brooklyn is the home of the decidedly dressed up, thoughtfully experimental, yet utterly urban Brooklyn Brewery.

In the Beginning

Located in what is now considered the über-hip neighborhood of Williamsburg, just over the Williamsburg bridge from Manhattan's Lower East Side, the Brooklyn Brewery has seen a lot happen in the realm of craft brewing since the first bottle of Brooklyn Lager came down the bottling line back in 1988.

Co-founder Steve Hindy picked up a homebrewing habit while working as a Middle East correspondent for the Associated Press in the late 70s and early 80s. Assigned to Islamic Middle Eastern countries, including Saudi Arabia and Kuwait, which forbid alcoholic beverages, Steve learned to brew from foreign diplomats who crafted contraband beers behind closed doors. When he returned to the US in 1984 and settled in Brooklyn, he befriended his downstairs neighbor, Tom Potter, a former lending officer at Chemical Bank, and the two decided to try opening a commercial brewery.

In the brewery's early days, when the concept of craft beer was basically unknown, Brooklyn Lager — Brooklyn's first beer — was a tough sell. During the first few years Hindy and Potter started out self marketing and self distributing the beer to an uninterested and competitive New York market using only a van and a small beverage truck.

"In the beginning, there was just Brooklyn Lager," said Hindy. "At the time, people were kind of turned off by the beer," he said, explaining that consumers and bar owners thought the full-flavored lager was too dark or too bitter compared to the mass market styles.

Today, however, Brooklyn Brewery is among the top 40 breweries in the United States, their beers are distributed in 26 states and they export beer to Hong Kong, Japan, Britain, Denmark, Sweden, Finland, Canada, Turkey,

PHOTOS on page 48
Left: The newly-expanded Brookyln Brewery, home of Brooklyn Lager and many newer, innovative beers.
Right: Garrett Oliver, Brewmaster since 1994, has steered the Brooklyn Brewery towards experimentation.

Norway and Switzerland. In the city of New York itself, Brooklyn Brewery has become the most successful brewery since Schaefer and Rheingold closed in 1976. And as for those unconvinced bar owners from back in the day? Well, these days Brooklyn Lager is the city's #4 draft beer.

Growth and Development

At first, Brooklyn contract brewed their beers upstate at the Matt Brewing Company in Utica, New York (which also brews the Saranac line of beers). In 1996, however, long before the streets of Williamsburg filled up with hipsters, Hindy and Potter converted an old matzo factory in an industrial area of the neighborhood into a working brewery, which is the home of Brooklyn Brewery to this day.

Brooklyn Brewery is first and foremost an urban brewery, however, and unsurprisingly it's been a challenge for the company to expand with space at such a premium in New York City. Although the NYC-based brewery produces 12,000 barrels of beer each year on site, in 2010 they sold 108,000 barrels — much of it produced under contract at Matt's. After several years of searching for space to expand their home base in a sellers' real estate market, a building directly adjacent to the existing brewery opened up not so long ago, and in 2011 the brewery unveiled an $8 million dollar expansion, which increases their production capacity to 120,000 barrels each year.

The Brewmaster

If Brooklyn is where taste is made, then there is no better example of a Brooklyn tastemaker than Brooklyn Brewery's Brewmaster, Garrett Oliver. An accomplished brewer, author, beer judge and multi-media beer ambassador, Oliver started his career much like the rest of us — as a homebrewer.

"I started making beer at home just to have some real beer, and I fell in love with it," said Oliver. "It is half art, half science."

Oliver brewed his first beers based on those he tasted while traveling for a year in England, and it wasn't long after his first homebrew that he rose to prominence among NYC-area home-

Brooklyn Brewery Clones

All-grain homebrew recipes by Garrett Oliver. Extract versions by BYO.

Brooklyn Lager clone
(5 gallons/19 L, all-grain)

OG = 1.052 FG = 1.012
IBU = 30 SRM = 13 ABV= 5.2%

Brooklyn Lager is our flagship beer. It is loosely based on the old Vienna lager style, derivations of which were popular in parts of the United States in the late 1800s. Bitterness is snappy, with a firm malt core and the beer is dry-hopped.

Ingredients

9 lb. 6 oz (4.25 kg) American 2-row malt
14 oz. (0.40 kg) Munich malt (10 °L)
11 oz. (0.31 kg) Caramel malt (60 °L)
4.6 AAU Willamette hops (75 mins) (1.0 oz./28 g of 4.6% alpha acids)
2.5 AAU Cascade hops (35 mins) (0.33 oz./9.3 g of 7.5% alpha acids)
2.5 AAU Vanguard hops (35 mins) (0.45 oz./13 g of 5.6% alpha acids)
0.50 oz. (14 g) Hallertau Mittelfrueh hops (2 mins)
0.50 oz. (14 g) Saphir hops (2 min)
0.50 oz. (14 g) Cascade hops (2 min)
0.75 oz. (21 g) Cascade hops (dry hops)
1.5 oz. (42 g) Hallertauer Mittelfrueh hops (dry hops)
White Labs WLP833 (German Bock Lager) yeast

Step by Step

Mash in at 118 °F (47 °C) and hold for 20 minutes. Ramp up to 135 °F (57 °C), hold for 5 minutes. To reach the saccharification temperature of 156 °F (69 °C), there are two methods, depending on your equipment. If your heat source can raise the temperature of the mash rapidly (in 5 to 10 mins), then do so. If not, add 200 °F (93 °C) water to the mash, stirring vigorously to avoid hot spots, until you reach the target temperature. (American 2-row malt is diastatically powerful, and if the mash isn't heated quickly enough, the resulting wort will be too fermentable.) Hold 35 minutes at 156 °F, (69 °C) then ramp up to mash off at 170 °F (77 °C). Transfer to lauter. Run off to achieve original gravity of 13 °P. Boil ends at 75 minutes. (Our boil is 15 mins longer, but you're probably working with a direct flame, which would result in too much color development). Adjust volume, if necessary, to 5.0 gallons (19 L). Cool in at 55 °F (13 °C), and pitch yeast. Once activity has clearly started (approximately 24 hours for lagers), attemperate, if possible, to 52 °F (11 °C). As activity subsides towards the end of fermentation, allow a free rise to 60 °F (16 °C) for 48 hours. Once the fermentation is finished, bring the temperature to 36 °F (2.2 °C) for lagering. After one week at 36 °F (2.2 °C), add dry hops. Hold for 10 days before bottling.

Brooklyn Lager clone
(5 gallons/19 L, extract with grains)

OG = 1.052 FG = 1.012
IBU = 30 SRM = 13 ABV= 5.2%

Ingredients

7.0 oz. (0.20 kg) American 2-row malt
14 oz. (0.40 kg) Munich malt (10 °L)
11 oz. (0.31 kg) Caramel malt (60 °L)
2.0 lbs. (0.91 kg) light dried malt extract (such as Briess or Coopers)
4.0 lbs. (1.8 kg) light liquid malt extract (such as Alexander's or Briess)
4.6 AAU Willamette hops (75 mins) (1.0 oz./28 g of 4.6% alpha acids)
2.5 AAU Cascade hops (35 mins) (0.33 oz./9.3 g of 7.5% alpha acids)
2.5 AAU Vanguard hops (35 mins) (0.45 oz./13 g of 5.6% alpha acids)
0.50 oz. (14 g) Hallertau Mittelfrueh hops (2 mins)
0.50 oz. (14 g) Saphir hops (2 min)
0.50 oz. (14 g) Cascade hops (2 min)
0.75 oz. (21 g) Cascade hops (dry hops)
1.5 oz. (42 g) Hallertauer Mittelfrueh hops (dry hops)
White Labs WLP833 (German Bock Lager) yeast

Step by Step

Place crushed grains in a steeping bag and steep in 3.0 qts. (2/8 L) of water in your brewpot at 154 °F (68 °C) for 60 minutes. Lift grain bag and place in a colander suspended over brewpot. Rinse grains with 1.5 qts. (1.4 L) of 170 °F (77 °C) water. Add water to "grain tea" to make at least 3.5 gallons (13 L), dissolve dried malt extract and bring to a boil. Boil for 75 minutes, adding hops at times indicated. Stir in liquid malt extract during final 15 minutes of the boil. Cool wort and transfer to fermenter. Top up to 5.0 gallons (19 L) with cool water, aerate wort and pitch yeast. Pitch yeast at 55 °F (13 °C) and cool to 52 °F (11 °C) when fermentation starts. Perform a two-day diacetyl rest at end of fermentation. Lager for 17 days, adding dry hops after one week.

Brooklyn Monster Ale clone
(5 gallons/19 L, all-grain)

OG = 1.100 (25 °Plato)
FG = 1.020 (5 °Plato)
IBU = 55 SRM = 25 ABV= 10.2%

Brooklyn Monster Ale was first brewed in 1997. It is midway between the old British barleywine style and more modern variants. Much of this beer's essential character comes from the use of Maris Otter floor malts, but the residual sugar is relatively low.

Ingredients

13 lb. 4 oz. (6.0 kg) GlenEagles Maris Otter malt

3 lb. 12 oz. (1.7 kg) Crisp Pale Ale malt
8.0 oz. (0.23 kg) caramel malt (60 °L)
3.0 oz. (85 g) chocolate malt
14 oz. (0.40 kg) cane sugar
9.2 AAU Willamette hops (120 mins) (2.0 oz./56 g of 4.6% alpha acids)
6.25 AAU Cascade hops (60 mins) (0.90 oz./26 g of 7.0% alpha acids)
1 tsp. Irish moss (10 mins)
3.5 oz. (99 g) English Fuggle hops (3 mins)
White Labs WLP001 (California Ale) yeast

Step by Step
Mash in at 154 °F (68 °C) and hold for 90 minutes. Bring mash to 168 °F (76 °C) to mash off. Sparge slowly and carefully. Collect 5.0 gallons (19 L) wort at 23 °P (1.092). Heat to 205 °F (96 °C), stir in cane sugar, to reach OG of 25 °P (1.100). Boil ends at 120 minutes. Adjust volume, if necessary, to 5.0 gallons (19 L). Cool to 58 °F (14 °C), aerate well, and pitch yeast at twice the rate that you would for pale ale. Ferment at 67 °F (19 °C). After fermentation is complete, cool if possible. If beer must wait [for bottling] more than one week after active fermentation has ceased, transfer to secondary until bottling. Prime with ⅝ cup of corn sugar. Age in bottle for not less than three months before serving.

Brooklyn Monster Ale clone

(5 gallons/19 L, partial mash)
OG = 1.100 FG = 1.020
IBU = 55 SRM = 25 ABV= 10.2%

Ingredients
2.5 lbs. (1.1 kg) GlenEagles Maris Otter malt
13 oz. (0.37 kg) Crisp Pale Ale malt
8.0 oz. (0.23 kg) caramel malt (60 °L)
3.0 oz. (85 g) chocolate malt
14 oz. (0.40 kg) cane sugar
3.0 lbs. (1.4 kg) Muntons Light dried malt extract
7.0 lbs. (3.2 kg) Muntons Light liquid malt extract
9.2 AAU Willamette hops (120 mins) (2.0 oz./56 g of 4.6% alpha acids)
6.25 AAU Cascade hops (60 mins) (0.90 oz./26 g of 7.0% alpha acids)
1 tsp. Irish moss (10 mins)
3.5 oz. (99 g) English Fuggle hops (3 mins)
White Labs WLP001 (California Ale) yeast

Step by Step
Place the crushed grains in a large steeping bag. Place bag inside a 2-gallon (~8 L) beverage cooler. Stir 5.5 qts. (5.2 L) of water at 167 °F (75 °C) into the grains. Let rest for 60 minutes. The temperature should drop to 154 °F (68 °C) at the end of the rest. After the mash, draw off approximately a quart (~1 L) of liquid from the cooler and gently pour it on top of the grain bag. Repeat this 3 or 4 times to recirculate. Collect wort by drawing off about a quart (~1 L) at a time, pouring this wort into your brewing kettle then pouring an equal volume of hot sparge water gently on top of the grain bag. [You will need a total of about 6.0 qts. (5.6 L) of sparge water at 170 °F (77 °C).] Once you have drawn off 11 qts. (10 L), quit collecting wort. Add brewing liquor to your brew kettle to make 4.0 gallons (15 L), or as much volume as your brewpot will handle. Stir in dried malt extract and boil wort for 120 minutes. Add the hops at times indicated in the recipe. Add the table sugar and liquid malt extract in last 15 minutes of the boil. [If boil volume dips below 3.5 gallons (13 L), bring volume back up with boiling water.] Cool wort and transfer to fermenter. Top up to 5.0 gallons (19 L) with cool water, aerate wort and pitch yeast. Ferment at 67 °F (19 °C).

Brooklyn Local 2 clone

(5 gallons/19 L, all-grain)
OG = 1.074 (18.5 °Plato)
FG = 1.008 (2.0 °Plato)
IBU = 24 SRM = 20 ABV= 9%

Brooklyn Local 2 is based on the dark abbey ale style, but the inclusion of wildflower honey and sweet orange peel adds subtle elements to a complex, but restrained palate. A low saccharification temperature promotes attenuation and the beer is quite dry.

Ingredients
12.5 lbs. (5.7 kg) Pilsner malt
1.3 lbs. (0.59 kg) Belgian dark candi sugar syrup
9.0 oz. (0.26 kg) wildflower honey
5 AAU of German Perle hops (75 mins) (0.65 oz./18 g of 7.8% alpha acids)
5 AAU of German Perle hops (40 mins) (0.65 oz./18 g of 7.8% alpha acids)
0.75 oz. (21 g) sweet orange peel (5 mins)
1.0 oz. (28 g) of East Kent Golding hops (2 mins)
2.0 oz. (57 g) Styrian Golding hops (2 mins)
Wyeast 1214 (Belgian Ale) or White Labs WLP500 (Trappist Ale) yeast

Step by Step
Mash in at 122 °F (50 °C) and hold for 10 minutes. Raise temperature to 146 °F (63 °C) and hold 60 minutes. Raise mash temperature to 154 °F (68 °C) and hold 15 minutes, then mash off at 168 °F (76 °C). When 5.0 gallons of wort is obtained, you should be at 15 °P (1.060). Heat the wort to 200 °F (93 °C), turn off heat, and stir in candy sugar syrup and honey, then bring to a boil. The boil ends at 75 minutes. Adjust volume, according to gravity. Cool to 64 °F (18 °C), aerate well and pitch yeast. Ferment at 72 °F (22 °C). Prime with ¾ cup sugar per liter at bottling.

Extract with grains option:
Reduce Pilnser malt to 2.0 lbs (0.91 kg); add 2.0 lbs. (0.91 kg) light dried malt extract and 4.5 lbs. (2.0 kg) light liquid malt extract. (Use Pilsner malt extract, such as Weyermann.) Place crushed grains in a steeping bag and steep in 3.0 qts. (2.8 L) of water in your brewpot at 150 °F (66 °C) for 45 minutes. Lift grain bag and place in a colander suspended over brewpot. Rinse grains with 1.5 qts. (1.4 L) of 170 °F (77 °C) water. Add water to make at least 3.5 gallons (13 L), dissolve dried malt extract, sugar and honey and bring to a boil. Boil for 75 minutes, adding hops at times indicated. Stir in liquid malt extract in final 15 minutes of the boil. Cool wort and transfer to fermenter. Top up to 5.0 gallons (19 L) with cool water, aerate wort and pitch yeast. Ferment at 72 °F (22 °C).

Brooklyn Sorachi Ace clone

(5 gallons/19 L, all-grain)
OG = 1.062 FG = 1.008
IBU = 36 SRM = 3 ABV = 7.5%

Brooklyn Sorachi Ace marries the overall structure of the modern saison style with the unique lemony/herbal qualities of the Sorachi Ace hop. Sorachi Ace is used throughout, and very complete attenuation gives refreshing, flinty dryness. This is a unique beer, and the latest beer to join our permanent line-up.

Ingredients
11 lbs. (5.0 kg) Pilsner malt
1.0 lb. (0.45 kg) corn sugar
6 AAU Sorachi Ace hops (60 mins) (0.5 oz/14 g of 12% alpha acids)
6 AAU Sorachi Ace hops (30 mins) (0.5 oz/14 g of 12% alpha acids)
5.0 oz. (140 g) Sorachi Ace (0 mins)
2.0 oz. (57 g) Sorachi Ace (dry hop)
Wyeast 1214 (Belgian Ale) or White Labs WLP500 (Trappist Ale) yeast

Step by Step
Mash in at 122 °F (50 °C), hold 10 minutes. Raise mash temperature to 146 °F (63 °C) and hold 60 minutes. Raise mash temperature to 152 °F (67 °C) and hold 15 minutes, then mash off at 168 °F (75 °C). To 5 gallons (19 L) of wort at 13.5 °P (1.054), add corn sugar. Boil ends at 60 minutes. Add hops at times indicated in ingredient list. Turn off heat and add 5 oz. (142 g) Sorachi Ace to the wort. After two minutes, begin cooling to 64 °F (18 °C), aerate well, and pitch yeast. Ferment at 71 °F (22 °C). After fermentation ends and yeast settles, dry hop with Sorachi Ace for 5–7 days. Prime with ¾ cup sugar at bottling.

Extract with grains option:
Reduce Pilsner malt to 2.0 lbs. (0.91 kg). Add 2.0 lbs. (0.91 kg) Pilsner dried malt extract and 4.0 lbs. (1.8 kg) Pilsner liquid malt extract. Steep grains at 148 °F (64 °C) for 60 minutes. Boil for 60 minutes, adding hops at times indicated. Add liquid malt extract and sugar late in the boil. Ferment at 72 °F (22 °C).

Garrett Oliver, Author

Garrett Oliver is not only a well-respected brewer, he is also an accomplished author and beer expert. He has hosted more than 700 beer tastings, dinners and cooking demonstrations and regularly writes for beer and food-related media. He's the kind of guy who, if he can't find the information he wants or needs, he creates it, which he admits is the reason why he chose to accept the challenge of editing the recently-released, 900-plus-page "Oxford Companion to Beer" (Oxford Press, 2011). When the Oxford Press approached him to be the editor of the broad-spectrum beer reference, he turned the job down at first, leery of taking on the huge project while also running his brewery and juggling media appearances and beer-related events. Friends and colleagues, however, pointed out that someone else might not edit the book to his liking, and he'd probably come to regret his failure to step up to the challenge.

"They said, 'someone else will do it and you'll say, 'It should have been done this way,'" Oliver said — and he had to admit they had a point, and so he agreed to do it.

Covering everything you've ever wanted to know about beer — from the rise of craft brewing, to beer politics, to technical brewing terms and styles to, of course, homebrewing, "The Oxford Companion to Beer" is a 920 page reference for anything you've ever wanted to know about beer, written by the experts on each of the more than 1,100 A-Z entries.

Prior to the "Oxford Companion," Oliver authored "The Brewmaster's Table" in 2003 (published by HarperCollins), which explores his passion for enjoying beer with food. And he certainly has the expertise — he was a founding board member of Slow Food USA and recently retired from the Board of Counselors of Slow Food International. He was also a 2009 and 2010 finalist for the James Beard Award as "Outstanding Wine or Spirits Professional." "The Brewmaster's Table" provides readers of all interest levels the principles of matching beer and food, as well as brewing traditions, and also provides practical advice for serving and storing beer. It was the winner of a 2004 International Association of Culinary Professionals (IACP) Book Award and was a finalist for the 2004 James Beard Foundation Book Awards.

Oliver's first book, "The Good Beer Book" (1997, Berkley Trade), co-written with Timothy Harper, is an early guide to beer and beer making.

brewers, and helped establish the New York Homebrewers Guild. He started brewing professionally at the Manhattan Brewing Company in 1989 as an apprentice and became Manhattan's Brewmaster in 1993. During his time there, he began to establish his reputation for his refreshing interpretations of traditional beer styles and for writing and lecturing about beer and brewing.

Oliver joined the Brooklyn Brewery team as the Brewmaster and a partner in 1994, and since then he has gone on to international fame as a brewer, author and lecturer. Oliver has served as a judge for the Professional Panel Blind Tasting of the Great American Beer Festival for twenty years, and has been a perennial judge for the Great British Beer Festival competition and The Brewing Industry International Awards. He is the recipient of the 1998 Russell Schehrer Award for Innovation and Excellence in Brewing, granted by the Institute for Brewing Studies, and also the recipient of the 2003 Semper Ardens Award for Beer Culture (Denmark) and Cheers Beverage Media's "Beverage Innovator of the Year" Award for 2006. And in 2007, Forbes named him one of the top ten tastemakers in the country for wine, beer and spirits.

So what exactly is it about Oliver's taste and brewing philosophy that puts him (and his beers) so much in demand? Call it a combination of intellectual curiosity, a thorough understanding of classic beer styles and an ability to take calculated risks. To Oliver, renewed interest in craft brewing isn't a new trend — it's a return to the way things once were.

"Craft brewing and homebrewing represents a return to normality," said Oliver. "It seems new because we've forgotten how, but things like baking bread, making cheese, making stock for cooking — and brewing, are not new. The slow food movement is not a new movement. Try explaining what a 'foodie' is to an Italian."

The Brooklyn-Style Brew

If the West Coast brewing style is the hoppy Wild, Wild West, consider the East Coast the voice of restraint — and Brooklyn Brewery's beers the epitome of city sophistication and balance. In a city with a market of more than 8 million people (around 2.6 million in Brooklyn alone), Brooklyn could brew any style they wanted and it would probably sell well. But Oliver says regardless of what they brew, they vow to brew it with a signature style.

"I'm looking for a certain kind of elegance," Oliver said of his beers. "Rather than ask ourselves, 'what would be louder,' we ask, 'what would be beautiful?'"

Brewing Garrett Oliver-style requires getting the classic styles and solid brewing procedures down before you start to experiment.

"It's great to have a guitar melody in your head," says Oliver, as an analogy, "but if you can't play the guitar, you can't play the melody."

While some of Brooklyn's modern beers may not adhere to the Reinheitsgebot, there has always been a healthy appreciation for the European style of brewing at Brooklyn, and their beers express more than just a nod to tradition. When the brewery first opened, their first brewmaster was fourth-generation German-American William Moeller, who developed the first recipe for Brooklyn Lager. Moeller's grandfather had brewed beer in Brooklyn and willed his notebooks and brewing records to his sons. That first recipe, Hindy said, was based on the German-style beers that were brewed in Brooklyn back in the heyday of American brewing, when breweries like Trommer's, Rheingold, Piels and Schaefer were still around — when Brooklyn was one of the nation's largest beer producers (from 1870 until the 1950s).

"I do believe in the idea of style. Style does mean something." Oliver said, comparing brewing to style to following the guidelines of French cuisine. "There are very strict rules — Champagne is Champagne. There's no such thing as red Champagne, and there isn't going to be. People respect that, and I think they ought to respect beer too. And here in Brooklyn, weissbier is weissbier. If we want to make

something else, we give it a different name. For instance we don't call Local 1 a tripel — because it's not quite like a tripel."

Oliver feels similarly when it comes to craft beer trends and experimenting with new styles. He's a fan of forward-thinking brewing, but believes in keeping style definitions intact.

"There's a huge mistake in taking an existing style and changing it, like 'black IPA,'" he said. "IPA was one of the most rigid beer styles in its heyday. Changing the name is only shorthand for beer geeks, which is only good if you know the longhand. Otherwise, the novice's definition of that style is destroyed. It's not that I don't like the beer, I just don't like the name," he said.

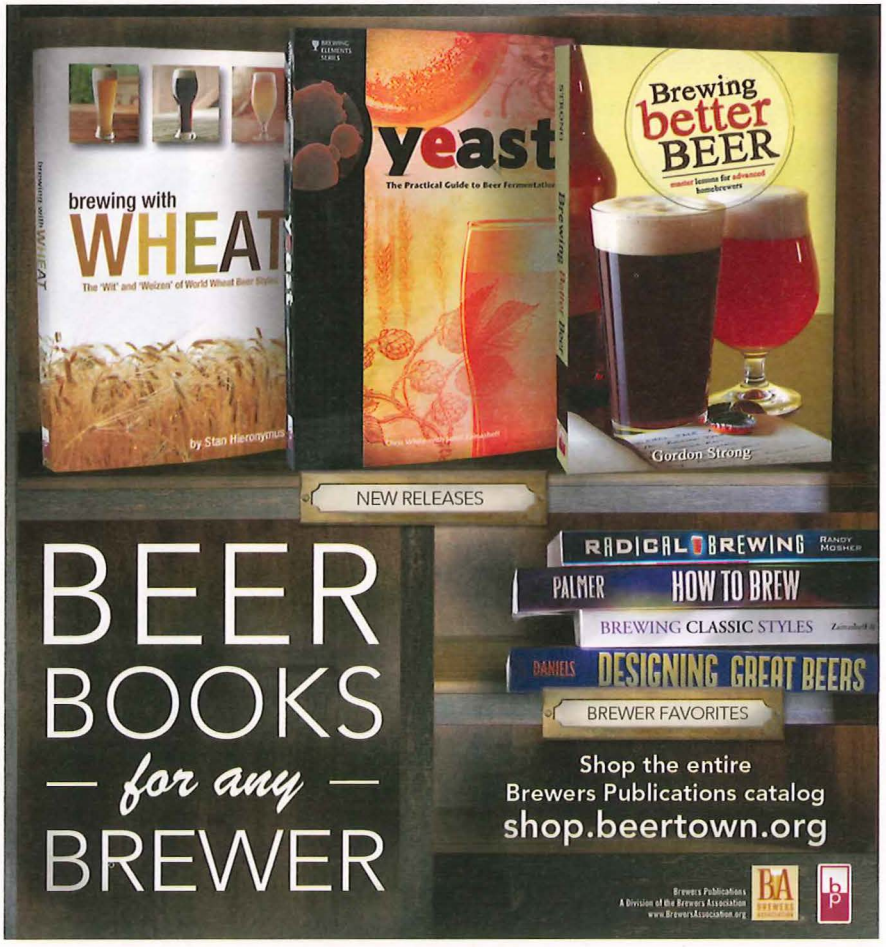
"In 200 years are people going to be talking about 'double IPA' and understanding what that was supposed to mean? We should stake our own claims and make our own brewing history rather than trying to change the past. When we went to make a strong, hoppy IPA, we didn't call it "Weisse IPA" ; I made up my own name, and we called it Hopfen-Weisse. Brewers are creative people – surely they can think of creative names for their new beer styles!," says Oliver.

Hindy echoes that philosophy, pointing out that a solid base of brewing knowledge gives brewers stronger abilities to create something new.

"I think we have great respect for the European brewing traditions as well as the American brewing traditions," said Hindy. "But I think we've been able to go beyond that and create some very original beers. You have to be true to the fundamentals of brewing. If you are true, there is a whole new world of flavor to be explored."

And while that is great advice for amateurs, seasoned brewers can take something away from it as well. As you expand your brewing experience, your abilities to try new things will increase. The best example of this is Brooklyn Lager, which has gone on to become a star — the flagship of Brooklyn's lineup of nearly 20 regular, seasonal and limited-edition beers. Building on the base of solidly built, popular beers, Oliver has been able to transition Brooklyn





into more of an experimental brewery while satisfying his curiosity.

"I've been brewing for 22 years, and I'm making use of things I have learned," he said. "It's like being a musician. Every successful musician has an album that sells, and everyone loves it. For me, that's Brooklyn Lager. And I'm very happy to sing that song for you. But the question is, how do you get bigger and become more interesting versus less interesting? You keep evolving. We are a much more artisanal brewery than we were five or six years ago, and that is a big part, to me, about what I'm here to do."

This means developing an appreciation for more than just the beers you like to brew — it requires an understanding of all kinds of beers and their brewing methods.

"You can't say that Kenny G can't play the saxophone — he just plays music that you don't want to hear," says Oliver, on appreciating the technical skills of mass-market brewers.

Homebrewing, Brooklyn Style

If you want to homebrew like a Brooklyn Brewery brewer, it all starts with the yeast. Oliver explains that lots of homebrewers don't begin with nearly enough of a healthy population of yeast to properly start fermentation. And when the yeast is struggling, it gives off a lot of estery profiles, which is a common flaw in homebrews.

"I would say that the number one fault in homebrews is poor fermentation," said Oliver, who has tasted and judged many, many homebrews. "If you pitch your yeast and don't see any signs of fermentation until 24 hours later, you haven't pitched enough yeast, or it's not as healthy as it should be. In a brewery, warm fermentations are very clearly active within 12 hours. If you pitch yeast in the evening and don't see anything happening when you get up in the morning, your lag phase is too long." He advocates making a yeast starter the day before brewing, which can easily provide double the yeast's population, or harvesting yeast from a batch of homebrew.

He also suggests experimenting with yeast to see the difference in the finished beers. Try brewing the same batch (or splitting a batch) of beer — one with the yeast from your smack-pack or package of rehydrated dried yeast, and the other with double the amount of yeast. The batch with more yeast may well taste cleaner.

Oliver also believes that brewing isn't just about the process — it's ingredient-driven as well. Choose your ingredients carefully, however.

"Choose your ingredients to do a particular job," he said. "You should always have a reason why you're choosing ingredients." For example, Oliver is a believer in using base malts that are suitable to that beer — such as Canadian 2-row that has more diastatic power for making witbier, where British pale ale malt would not perform properly and would give the wrong fla-

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vor. Brooklyn Brewery doesn't use one type of base malt for every beer.

This is because, he says, basic grains are not all alike. "Generic ingredients are almost never generic," he said, explaining that if you test brew with ten different ingredients, you will see a difference. "I definitely don't believe that you can have just one or two base malts."

But most importantly, Oliver thinks every homebrewer should decide on their goals before setting foot in the brewery. Do you want to brew just to play around with ingredients, or do you want to be a serious brewer? There is no right answer, but if you want to become a better brewer, you need to take a methodical approach to brewing.

"Ask yourself, 'Am I here just to have fun, or is there a target that I want to hit?'" he said, explaining that learning to brew is like learning to cook. "As a cook, I'm really good, but I'm not a chef. If you want to learn to cook like a chef, you have to do it over and over again to perfect it." And the same is true for brewing. Brew the same beer over and over until you get it right, he suggests, and change only one thing at a time when you make adjustments. A truly accomplished brewer should be able to dream up a beer, and then brew that beer and have it turn out pretty much as expected.

The Future

So what's next for the Brooklyn Brewery? Expect more experimental styles to pop up throughout the year, including collaborations. Brooklyn Brewery was the first brewery in the country to do collaborations, starting in the late 90s. One of Brooklyn's most well-known collaborations is Brooklyner-Schneider Hopfen-Weisse, which was a joint effort between Oliver and Hans-Peter Drexler, the brewmaster at Germany's G. Schneider & Sohn brewery. Oliver says he is also interested in more collaborations with chefs, winemakers and coffee roasters (to name a few). For example, their Cuvee de Cardoz, an Indian-spiced wheat beer collaboration with Floyd Cardoz, the Executive Chef of the Indian-inflected New York City restaurant Tabla.

But traditionalists can always count on Brooklyn's lineup of year-round beers as well — even though tastes have evolved since Hindy and Potter first opened the brewery.

"These days Brooklyn Lager is considered something of an entry level craft beer," said Hindy. "Palates have changed, though, and we're making a pretty incredible array of year-round and specialty beers now."

It's all a part of Brooklyn's way of bringing brewing tradition and innovation together.

"We already had the most interesting beer culture here in the United States in 1900, and then we lost it," Oliver said. Thankfully, Brooklyn Brewery is around to be a part of bringing those traditions back. BYO

Betsy Parks is Associate Editor of Brew Your Own *magazine. She lives near Stratton Mountain, Vermont.*

Beer and Food

If you would like something to go with your beer, Brooklyn beers are also excellent companions with meals — and even make great recipe components. Check out their website at www.brooklynbrewery.com/index.php/recipes/ for some more of their favorite beer and food recipes. (Recipes by Garrett Oliver.)

Pasta with Lobster, Chorizo and Peas (pair with Brooklyn Local 1)

Time: About 30 minutes
Yield: 2 large or 4 small servings

Ingredients

- salt
- ½ cup coarsely chopped chorizo sausage
- 6 tbs. extra virgin olive oil
- 1 cup chunked, cooked lobster meat
- 1 cup peas (defrosted if frozen)
- ½ lb. fettuccine or other long pasta
- crushed red pepper flakes to taste

Step by Step

1. Bring a large pot of salted water to a boil for pasta. Combine chorizo and 2 tablespoons oil in a large skillet; when it begins to brown, add lobster and peas. Cook, stirring occasionally, until hot, then keep warm while you cook the pasta.
2. Cook pasta until tender but not mushy, then drain. Toss with chorizo-lobster mixture, remaining olive oil, red pepper flakes and salt. Serve immediately, with Brooklyn Local 1.

Carbonade Australien (pair with Brooklyn Winter Ale)

Carbonade Flamande, a beer and beef stew, is pretty much the national dish of Belgium. There are as many recipes for this dish as there are Belgians, but this version is perfect when made with Australia's world-famous lamb.

Ingredients

- 1 kg boneless leg of Australian lamb, cut into 1-inch cubes
- 3 large yellow onions, sliced
- 24 oz. Brooklyn Winter Ale or Brooklyn Brown Ale
- 1 oz. butter
- 1 oz. peanut oil
- 3 cups beef, veal or lamb stock or canned low-salt beef broth
- 2 tbs. sugar
- 3 tbs. all-purpose flour
- 1 tbs. tomato puree
- 1 tbs. nutmeg
- ½ cup golden raisins
- 1 large Granny Smith apple, peeled and sliced into a dozen pieces
- Salt and pepper to taste

Step by Step

1. Heat the oil and butter in a large, heavy skillet over high heat. When the skillet is very hot, add the meat with some salt and pepper, stirring frequently until well browned on all sides. Using a slotted spoon, lift the meat from the skillet and set it aside.
2. To a heavy pot, add the lamb, then the onions. Add the stock or broth, herbs, nutmeg and sugar. Add beer until the meat is entirely covered. Bring to a boil, then add tomato puree. Cover and simmer gently for 1 hour.
3. Remove the lamb with a slotted spoon and set aside. Using a chinoise or other strainer, strain the sauce into another pot.
4. Place the meat in the pot with the strained sauce. Add the rough and the raisins, continue cooking for 1 hour. Add the apple slices and cook for a further 10 minutes. Taste and adjust the seasoning.
5. Serve with mashed potatoes or frites, and Brooklyn Winter Ale.

Story by **James Spencer** and **Chris Colby**

SHOULD YOU REHYDRATE DRIED YEAST?

A BYO-BBR Collaborative Experiment

In the old days, when homebrewing beer was a way to dodge Prohibition, dried yeast meant bread yeast. The flavor characteristics that came from bread yeast were dodgy, but the yeast did the job of converting the sugars from malt extract into alcohol. That seemed to satisfy the needs of the hobby at the time. Nowadays, homebrewers have access to a great selection of high quality ingredients, including yeast strains from beer styles and breweries around the world. Dried yeast has caught up with the times. A growing number of varieties of yeast are available in handy little packets.

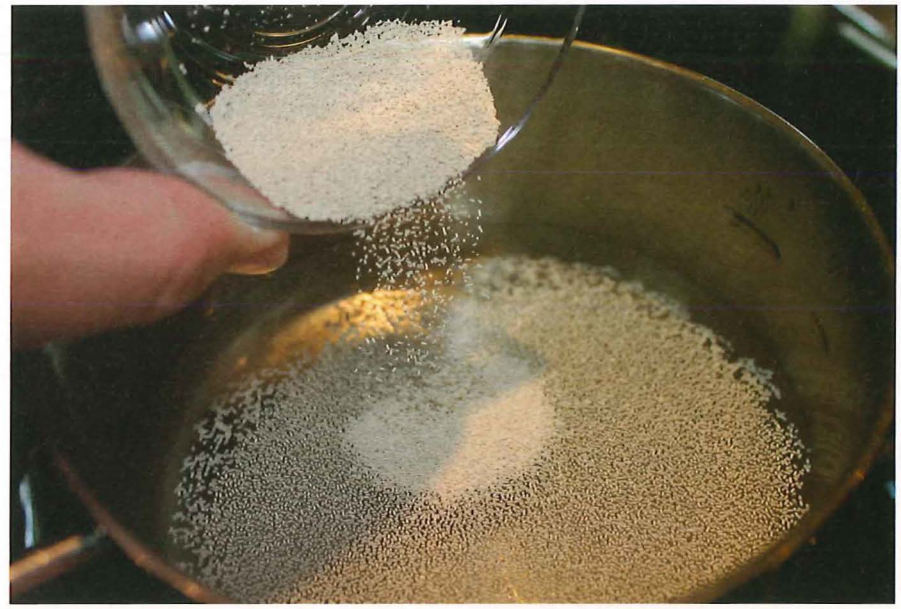


Brew Your Own and *Basic Brewing* team up regularly in our ongoing series of collaborative experiments having readers and listeners test elements of common homebrewing wisdom. Check out our methods and results – and consider participating in our next experiment.

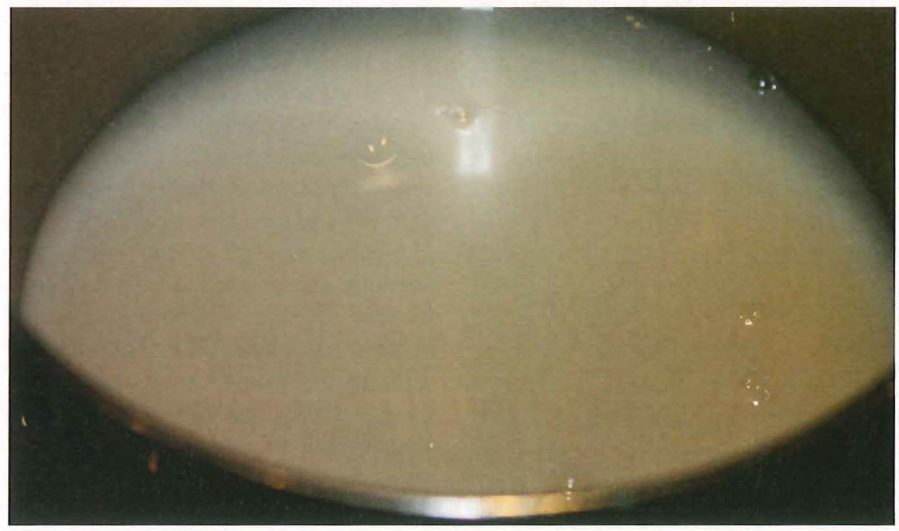
Dried yeast offers at least a couple of advantages over liquid yeast. Dried yeast is less expensive — with no need for a yeast starter to raise the proper amount of cells for a 5-gallon (19-L) batch — brewers can simply pull a packet from the fridge on brew day and be ready to pitch with little or no preparation time. (On the other hand, there is a much broader variety of strains available as liquid yeast.) But, what are the steps necessary for preparing those little dried cells for work in fresh wort? Do you need to rehydrate the yeast, or can you just sprinkle them on the wort?

Even dried yeast manufacturers can send mixed signals over the need for rehydration. In fact, Fermentis seems to have a split opinion between product lines. The instructions on the packet of Safale S-04 and Safale US-05 are simple — "Sprinkle into wort." However, the packet of Red Star Champagne yeast, also produced by Fermentis, recommends more, "For best results, dissolve yeast by adding about ¼ cup (50 mL) of water at about 38–41 °C (100–105 °F)." Is this a difference between beer and wine yeast, or would our beers also benefit from yeast rehydration?

Rehydrating dried yeast adds another step to an already-busy brew day. It's something else to remember along with cleaning, measuring, boiling, cooling and sanitizing. Also, introducing the yeast to water adds another opportunity for infection to creep in. (This risk is small, though, unless your







Photos by James Spencer

TOP: Rehydrating dried yeast starts with heating the water to around 100 °F (38 °C). The exact temperature depends on the yeast strain; the dried yeast is then poured into the water.

MIDDLE: Upon contact, the cells absorb water quickly via osmosis. Until the cell starts functioning, water (and anything else) moves across the yeast's cellular membrane via simple diffusion.

BOTTOM: Once hydrated, the yeast takes on a creamy appearance. The temperature of the yeast slurry must be decreased before pitching to avoid stunning the yeast.

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water is contaminated with fecal coliform bacteria.) To be properly cautious, brewers should boil and cool the water for rehydration to the proper temperature before adding the yeast. So, why bother?

In theory, dried yeast cells perform better than those rehydrated in wort. When dried yeast cells first encounter water (whether from pure water or wort), the water enters the cell via osmosis. Cellular functions that would normally determine what other molecules get taken into or be excluded from the cell don't begin to function until the cell is fully rehydrated. For yeast cells that are rehydrated in wort, or pitched directly into the fermenter, harmful molecules can enter the cell by simple diffusion. They are more likely to ingest compounds that are toxic to them (or that they regulate the amount of carefully) and die. For cells that are rehydrated in water, the only molecule crossing the cell membrane is H_2O.

In addition, the osmotic pressure on yeast cells rehydrated is higher than cells rehydrated in wort. This causes the yeast to take on water, and spring into shape faster, than cells rehydrated in wort. And this is theorized to be beneficial as well.

An experiment by Sean Terrill, head brewer of Silverton Brewing Company in Silverton, Colorado, seems to support that idea. Sean rehydrated four samples of Safale US-05 for half an hour. Two were hydrated in water, one at around 80 °F (27 °C) and around 64 °F (18 °C). Two more were rehydrated in wort samples of 11.5 °P (1.045 specific gravity) at the same temperatures.

To measure viability, Sean added samples of the rehydrated yeast to a methylene blue solution. Living yeast cells will not absorb the solution. Dead cells will and turn blue as a result.

Taking the age of the yeast into account, Sean predicted a viability level of 75–80%. The samples soaked in water measured within that range — 75% for the warmer sample and 79% for the cooler one. The wort-soaked samples didn't fare as well. Sean measured the viability of each to be 43%. The complete details of Sean's experiment are found at seanterrill.com. (Unfortun-ately, the results of methylene blue staining become progressively less reliable below 85% viability. So the exact numbers may not be meaningful, even if the general difference is.)

To see how these lab results translated into results in the real world, we asked listeners of the *Basic Brewing Radio* (BBR) podcast and readers of *Brew Your Own* (BYO) to participate in the eighth BYO/BBR Collaborative Experiment — will rehydrating your yeast yield a better beer than simply sprinkling the yeast into the wort?

The Experiment

We asked brewers to brew up a batch of beer, splitting the wort into two halves. One half would be pitched with yeast rehydrated with water, and the other half would simply get sprinkled with dry yeast. We asked participants to keep the variables to a minimum. The two halves were to be the same volume, fermented in similar vessels at the same temperature. Brewers were to observe any similarities or differences in fermentation performance and, more importantly, in the character of the final beer.

One of the first responses we received was from Jacques Bertens, a Dutch homebrewer for more than 30 years and founder of the Hobbybrouwen.nl website. Coincidentally, through interaction with members of the forum on his site and experiments on his own, Jacques had been conducting research into the question of the benefits of dried yeast rehydration.

Through polling members of the Hobbybrouwen.nl forum, Jacques gathered data on 274 batches of beer. The data indicated that of those samples, sprinkled batches achieved higher average degrees of attenuation than their rehydrated counterparts — 77.2% vs. 75.3%. When this information was broken down by yeast strain, nine out of twelve yeast varieties achieved lower final gravities when rehydrated. This is the opposite of what would be predicted.

In a side-by-side taste comparison of three dried yeasts, rehydrated and

> "For cells that are rehydrated in water, the only molecule crossing the cell membrane is H_2O."

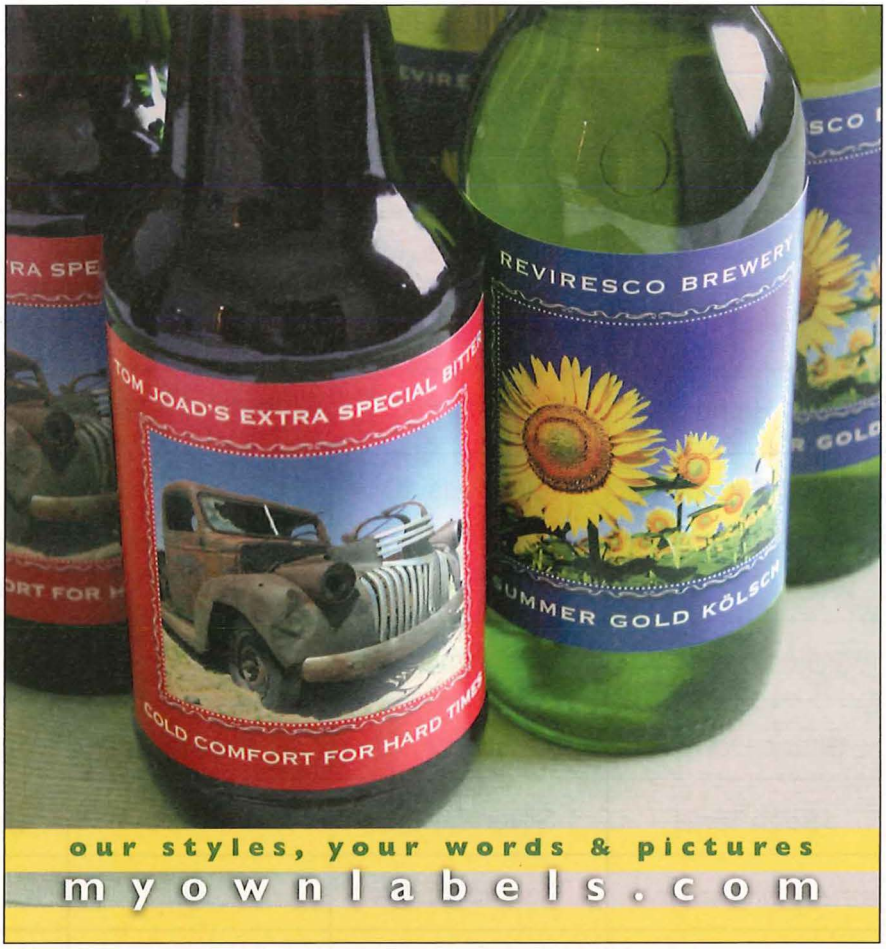
sprinkled — Brewferm Top, Danstar Nottingham, and Fermentis Safale US-05, dried yeast was preferred 19 times, while rehydrated yeast was preferred 18 times.

"Based on the historic data, desktop research and the experiments that were performed using different yeasts, I conclude that hydration of yeast is not needed to make a good beer," says Jacques. "Based on the described data, it is recommended not to hydrate dry yeast, since this may cause risks when not carried out in the proper way. Even when hydrating the yeast, one might wonder what the benefit will be over the extra effort and risk."

For our part in the experiment, James brewed two hoppy pale ales. One weighed in at 1.049 original gravity, while the other measured 1.079 to start. James pitched with Safale US-05. On the lower gravity beers, the fermentation appeared to start and finish at about the same time, while the sprinkled yeast began visible activity a couple of hours before its rehydrated counterpart in the higher gravity batches and actually finished fermentation a day sooner. These are surprising results, if we are to assume the effective viable pitching rate of the sprinkled yeast treatment was less than that of the rehydrated treatment.

In both worts, the final gravities were the same in the pairs — 1.010 for the lower gravity beers, and 1.014 in both the bigger beers.

As for the taste, four out of five who sampled the lower gravity beers found little to no noticeable differences. Three out of four found extreme similarities in the bigger beers. The lone dissenter was Sean Terrill, who





EXPERIMENT PARTICIPANTS

Name	City	Beer	Yeast	Preference
Matt Weide	Minneapolis, MN	Braggot	Lalvin D-47	Rehydrated
Kevin Pratt	Ontario, Can.	Pale Ale	Safale US-05	Rehydrated
Travis Hammond	San Diego, CA	Scottish 90 Shilling	Safale US-05	Rehydrated
Mike Duppong	Twin Falls, ID	Porter	Muntons Ale Yeast	Dry
Brian Davis	Lyle, MN	Fat Tire Clone	Salfale US-05	Rehydrated
Vinnie Sempronio	Jacksonville, NC	Pale Ale	Nottingham	Dry
Shane Dowling	Santa Cruz, CA	Pale Ale	Safale US-05	Dry
Sean Terrill	Silverton, CO	Pale Ale	Safale US-05	Rehydrated
Zot O'Connor	Redmond, WA	Cider	Various	Rehydrated
James Spencer	Prairie Grove, AR	Pale Ales	Safale US-05	Dry

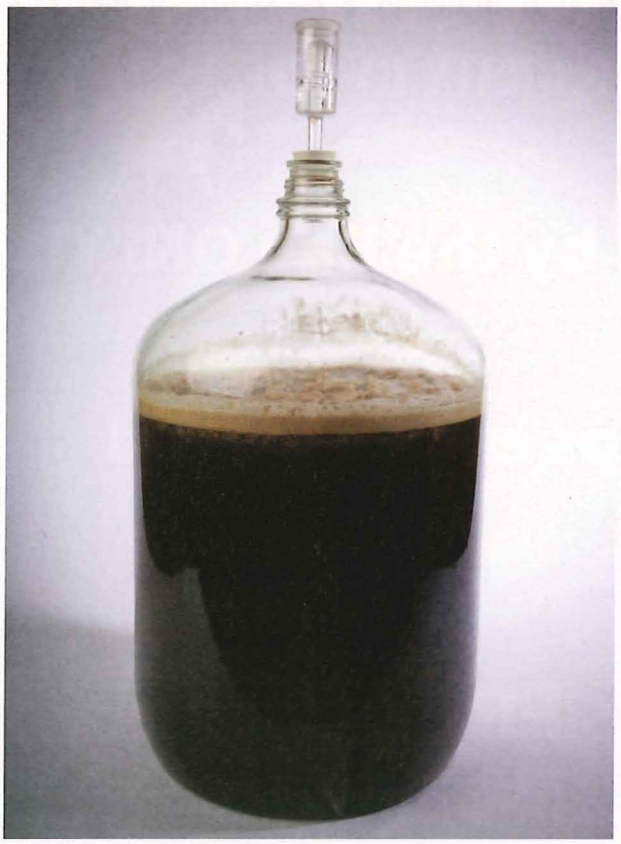


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expressed a preference for the hydrated samples in both of these cases.

For Sean's contribution, he fermented three batches of the same pale ale wort. In two, Sean pitched the recommended amount of dry yeast – one rehydrated and one not. In the third, he pitched twice the amount of yeast unhydrated. In a tasting on *Basic Brewing Radio*'s episode discussing the experiment results (July 28, 2011), Chris Colby and I tasted very little differences between the beers, with the double-pitched beer having a slight yeasty note. Sean indicated the differences might have been more dramatic when the beers were fresher, adding that he again preferred the sample made with rehydrated yeast.

When Steve Wilkes and I attended the National Homebrewers Conference in San Diego this past June, we were approached by homebrewer Travis Hammond, who had his experiment samples on tap on Club Night. We enlisted the help of Kim Sparrow and Robert Masterson to help us judge the results.

Travis had brewed a Scottish ale, and the differences in this malty style between the dry and rehydrated samples were much more dramatic. Four out of five of the tasters preferred the hydrated sample, with Steve being the lone dissenter in preferring the beer made with sprinkled yeast.

Vinnie Sempronio of Jacksonville, North Carolina split his pale ale wort into three fermenters and added a twist. In

addition to the dry sprinkle and water rehydrated, Vinnie pitched a third batch with yeast that had been rehydrated in water and then proofed with wort to bring the temperature down to pitching levels.

In a time-lapse video, the sprinkled wort can be seen taking off first, followed by the yeast proofed with wort and finally the yeast hydrated with water alone. The original gravity of the wort measured 1.046. At the end of fermentation, the sprinkled batch hit 1.013, while the water-only rehydration reached 1.012, and the wort-proofed batch got down to 1.011.

In tasting, Vinnie found subtle differences between the batches. "These are all miniscule differences, and I really had to try and find a huge difference between them," he says. In the end, Vinnie preferred the sprinkled batch.

Brian Davis of Lyle, Minnesota, brewed a Fat Tire clone and noticed virtually no difference between dry and rehydrated Safale US-05. However, he attributes the lack of difference to overpitching in each half of the batch. "I don't use a lot of dry yeast, but I will continue to rehydrate – with the correct amount," Brian says.

Mike Duppong of Twin Falls, Idaho, brewed 2 gallons (7.6 L) of porter with Muntons ale yeast, splitting into two 1-gallon (3.8-L) batches. Three grams of yeast was used in each half. "The dried yeast took off much faster and finished a little earlier," Mike says. "There were no color or taste differences between the bottled results."

Mike also counted the bubbles in his fermentation locks. Both treatments peaked at the same bubble rate, but the sprinkled yeast batch reached the peak of fermentation a day earlier. It also finished a day earlier.

Matt Weide of Minneapolis, Minnesota, brewed a braggot and pitched with Lalvin D-47 yeast (a wine yeast). For the rehydrated half, he used John Palmer's technique from "How to Brew," which involves rehydrating the dried yeast in hot water, then "proofing" it by adding a spoonful of sugar. Matt prefers the rehydrated half, noting that it was lighter in color and a bit clearer than the sprinkled half. "If I

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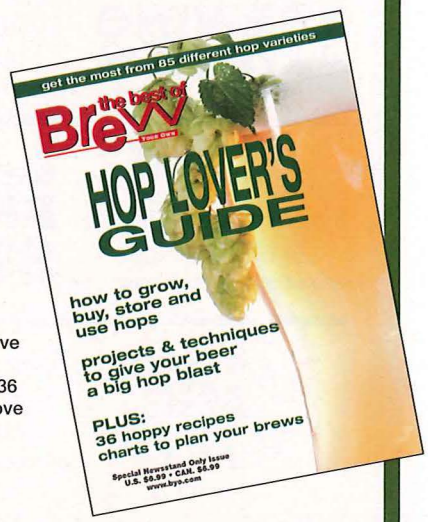
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were entering this in a competition (which I will do), I would use the Palmer method when using dried yeast," Matt says. "The only drawbacks of the Palmer method were the extra time it took to pitch the yeast and the increased possibility for contamination."

His mead with rehydrated yeast finished at 1.024, compared with a 1.026 final gravity for the batch with sprinkled yeast.

Shane Dowling of Santa Cruz, California, brewed a hoppy extract pale ale with Safale US-05. "I didn't notice a difference, except for the extra step, so I think it's safe to follow the instructions," Shane says. "Besides, it says to 'sprinkle on wort,' so why bother with hydrating?"

Kevin Pratt from Ontario, Canada, used Safale US-05 with his single malt and single hop (SMASH) pale ale. Kevin reports that he and his wife prefer the rehydrated batch, although that half experienced a blowoff, while the sprinkled half did not. This may account for a difference in flavor or aroma, as harsh hop-derived compounds cling to kräusen.

Zot O'Connor of Redmond, Washington, has been inspired by the experiment to embark on a test comparing how five different dried yeast strains perform in cider when hydrated and sprinkled. Results are still pending.

Conclusions

The potential strength of a collaborative experiment is that, if multiple experimenters get the same result, this is a clear indication that the experimental variable had an effect that was large enough to be easily detected. The potential downfall of a collaborative experiment comes when the results are mixed — are they "real" (the experimental variable doesn't matter) or is something about the experiment suspect? Is the effect of the experimental variable too small to be measured with the experimental design?

In this experiment, we tentatively believe that our results are "signal," not noise. Our results suggest that rehydrating dried beer yeast does not make beer that is markedly better than beer made by simply sprinkling the dried yeast on top.

The participants in the experiment were split in their preference for sprinkled vs. rehydrated yeast, with the numbers leaning 6 to 4 in the direction of rehydrating. It may be that a larger experiment would uncover more evidence of an effect, however small, of rehydrating yeast. But, no one reported getting "bad" beer from sprinkling yeast. So, if your brew day gets busy, and you don't have time to rehydrate, sprinkling will still get the job done. BYO

James Spencer is the host of Basic Brewing Radio and Video. *Chris Colby is Editor of* BYO. *See James' podcasts (at basicbrewing.com) or Chris' blog (at byo.com) for information on how to participate in future experiments.*

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Home Laboratory

Assemble your own testing tools

by Terry Foster



On my first day in a new job as Section Leader for Organic Chemistry Research, I walked into a brand new laboratory. It had worktop benches with utilities, fume hoods and a secure storeroom, but no chemicals or equipment with which to work. And it was my job to set up the whole thing from scratch and make it into a functioning laboratory. Some things were very different back then, such as the calculator — it weighed around 20 lbs. (9 kg), had only a 30-step program and cost the equivalent of $4,000 in today's money. But other needs were very much the same then as if I were setting up a new lab today, either in a research facility, or in my own home, and they are all considerations any homebrewer should keep in mind when setting up their own home lab.

If you want to be able to brew with accuracy, you should seriously consider setting up some sort of lab in your homebrewery. To do that, you will need some basics:

- Thermometer
- Hydrometer
- Calculator
- Refractometer (optional)
- Scales
- Measuring cylinders

And if you are an all-grain brewer, you will also need:

- pH strips, or preferably a pH meter (plus standards)
- Iodine solution
- Pipettes or eye-droppers
- A piece of white tile

Thermometer

The two instruments that are most important to a homebrew lab are the thermometer and the hydrometer.

A good mercury-in-glass thermometer is about as accurate as you can get (that is properly calibrated and expensive). But apart from cost, mercury-in-glass thermometers are a hazard since the glass bulb is very fragile, and mercury is quite toxic and definitely something we do not want in our beer. So a cheaper, readily-available instrument is an alcohol-in-glass thermometer. Unfortunately, these types of thermometers are often somewhat inaccurate, and are also slow to reach the temperature of the liquid in which they are immersed. A more practical option, which is only a little more expensive, is a digital thermometer, of which there are several types sold by homebrew suppliers. They are all based on a bimetal thermocouple enclosed in a stainless steel sheath, so they are very sturdy and will not break and contaminate your wort or beer. They also generally react rapidly when immersed in a liquid.

But do not assume that all thermometers are accurate! All thermometers should be calibrated. Do this by first immersing your thermometer in an ice-water mixture (which holds steady at 32 °F, 0 °C). Next, immerse the thermometer in boiling water and read that point. When you perform this check, you will have to allow for the fact that the boiling point of water decreases with increasing elevation. If your readings are off on this value you may be able to adjust the settings on a digital thermometer. Otherwise, note the difference between your reading and the true value and make allowance for this in subsequent readings, which can make a significant difference when checking mash temperatures. Thermometer error will cause an error in your hydrometer readings, as well.

Hydrometer

A good hydrometer provides a lot of information: extract efficiency, fermentation efficiency and even a good approximation to alcohol content. Hydrometers are readily available from most homebrew suppliers, and not particularly expensive. However, I find that most common versions aren't too accurate since they can only be

> "A home lab is not necessary, but it certainly makes it easier to brew with consistency and accuracy, especially if you are getting serious about brewing."

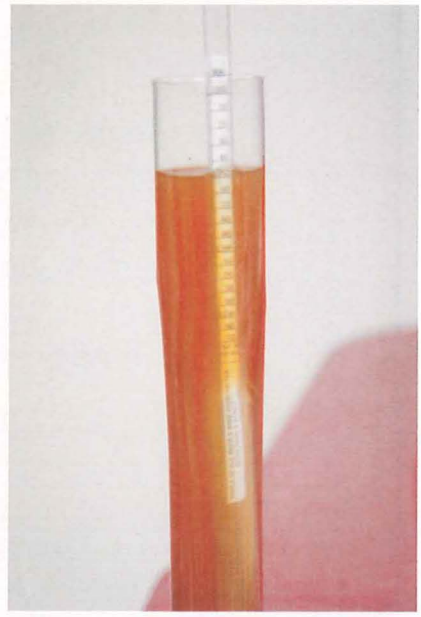


Photo by Les Jörgensen

read to 1 division in 1.000, which is difficult when you have to also contend with the meniscus formed by the liquid on the instrument. The reading is made more difficult by the fact that cheaper hydrometers are made on the basis of "one size fits all" and cover a range of as much as 1.000 to 1.130 (or higher), making the gradations quite small and hard to read. To remedy this, I use one that reads from 1.000 to 1.070 and is accurate to 0.5 of a gravity point and serves for most purposes and for bigger beers I'll use a second one covering a range 1.060 to 1.130.

Many commercial craft brewers use the Plato system, which is also favored by European brewers. Some brewers use Plato because they think it measures the percentage of sucrose in wort by weight, and is therefore a more accurate representation of fermentable sugars in wort than is specific gravity. However, both types of hydrometers measure the same thing: dissolved solids (whether they are fermentable or not). The two scales are different, but for most purposes you can assume that 1 °P = 1.004 S.G. At 12 °P (= 1.048 S.G.) this is exact but the relationship is not linear. For a more accurate conversion, especially at higher gravities, see the tables in *Laboratory Methods for Craft Brewers* (published by the American Society of Brewing Chemists), or *New Brewing Lager Beer* (Greg Noonan, Brewers Publications). In his book, Noonan gives the following equation:

$$°P = 135.997(SG)^3 - 630.272(SG)^2 + 1111.14(SG) - 616.868$$

Since one graduation on the Plato scale is about four times that on an SG scale, these instruments usually cover a narrow range, and you will usually have to purchase a set of three to cover the span 0 to 24 °P, which will cost around $40.

You should check your hydrometer before using it to brew, even though they are supposed to be already calibrated. Do this by simply floating it in water at the calibration temperature (which should be on the stem or the paper inside it), and check whether it reads zero. If it is more than two divisions off, you might want to consider getting a new one. Otherwise, add or subtract the difference from zero on any subsequent readings. Ideally you should check it at a higher gravity (for details see the "Techniques" column in the March/April 2006 issue of *BYO*).

Also do note that all hydrometers are calibrated for a specific temperature, usually 15 °C (59 °F) for specific gravity, 20 °C (68 °F) for Plato instruments. Try to measure the gravity at that temperature. If you cannot do this you will have to make an adjustment, which can be done easily using the calculator at www.brewersfriend.com/hydrometer-temp/. At BruRm@BAR, where I brew, we use a Plato instrument with a built-in thermometer, which

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gives the correction opposite the temperature scale.

Refractometer

An alternative to a hydrometer is a refractometer, which reads in degrees Brix (Plato), and only requires a few drops of wort or beer for a gravity determination. These are available with a range of 0 to 32 °Brix, with an accuracy of +/- 0.2 °Brix, usually with automatic temperature compensation. These cost around $60 for a dual-scale instrument, which reads in SG as well as Brix. Because of the small amount of liquid required for a reading, refractometers are very good for quickly checking at various points during the wort preparation process. The drawbacks with refractometers, however, are that they do not work with aqueous ethanol solutions, or when there are suspended solids present in the liquid, so they are not useful for checking beer or fermenting wort.

Scales

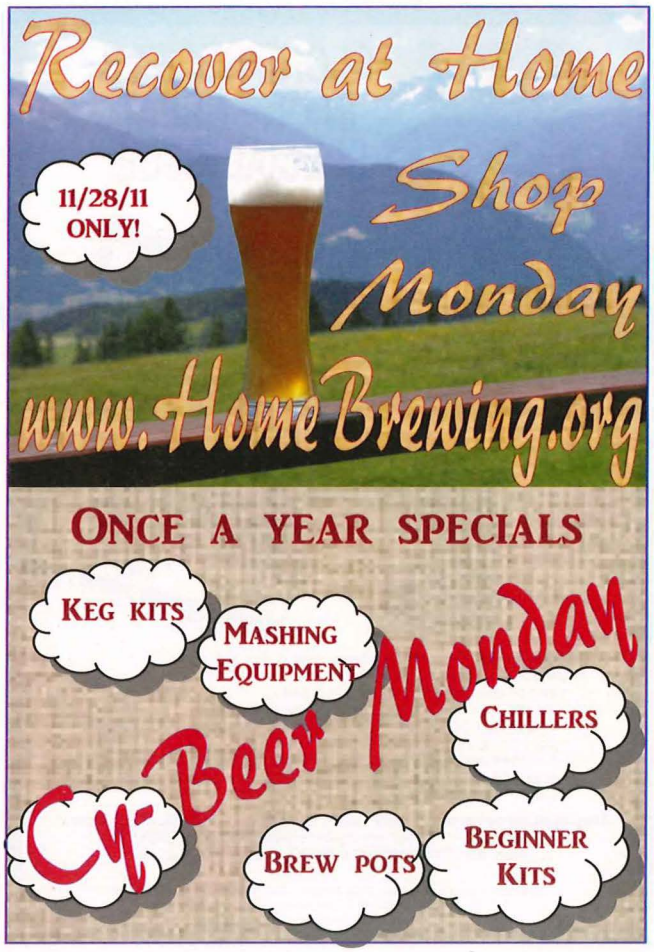
Of course you need a scale for weighing out malts and hops when brewing, but you should really have two separate scales. You can't properly weigh out 1 ounce (28 g) of hops on a scale designed to handle 30 pounds (14 kg). If you must use only one scale, find a digital model where the maximum is 11 pounds, reading to +/- 0.1 oz, such as those that are offered by homebrew suppliers. I have two digital scales, one reading 0–200 g (0–7 oz.) for hops and water treating chemicals, and one reading 0-5000 g (0-11 lb.).

Calculator

You will definitely need a calculator in your lab for all of the various calculations involved in determining extract yields, adjusting final gravities and so on. These days most of you will probably use the calculator on your mobile phone, but a good scientific calculator is worth owning, not only for difficult equations (such as the conversion of SG to Plato referenced earlier), and for immediate weight and temperature scale conversions, not to mention the practicality of keeping your mobile phone away from bubbling brewpots and sticky extracts. A basic scientific calculator with a huge range is available for only $20–30.

Measuring cylinders

Owning at least one measuring cylinder (also known as a graduated cylinder) is a must, because you need to calibrate your brewing vessels. Pre-made marks on brewing and other buckets are not often accurate. If you can't rely on your volume measurements you won't be able to calculate important measurements like OG accurately, and therefore can't make any calculations based on this, such as extract yields. I have a range of cylinders: 100 mL, 250 mL, and 500 mL. But you don't need this kind of collection —





either of the last two sizes will work fine (and can also double as a hydrometer jar). You can calibrate a small jug with water to 1 L using one of those sizes, then use the jug to fill a larger one to 3.0 L. Then take the cylinder and measure 0.78 L, and you have 1 US gallon (3.78 L), which you should mark with tape or marker pen on the vessel, and the latter can be used to calibrate all other vessels (especially the fermenter).

pH measurement

If you want to check the pH of your mash you can use pH test strips, which are very cheap, but they claim to measure only to 0.5 pH unit. Many people find it difficult to use these strips because of color matching for results, even at that level. So I recommend investing in a pH meter, which can cost as little as $30. These instruments generally measure to +/- 0.1 pH units, but must be calibrated against a standard buffer solution, which can also be bought from the same source. You'll also need storage solution to keep the electrode from drying out. The rule about pH meters is that the cheaper the meter the shorter the life of the electrode. My last meter lasted about 10 years, but the electrode could be stored dry, and it cost about $120 from Cole-Parmer.

Iodine solution

You should test your mash with iodine often, but particularly if you are using any unmalted grains, such as wheat or oats. If you are lucky you may be able to buy tincture of iodine from a pharmacist. If not, you can make a solution by dissolving 1.27 g of iodine and 2.5 g of potassium iodide in 500 mL of distilled water. If you do it this way, you will have to purchase the chemicals from a suitable supplier. Checking for starch conversion in the mash is simple, and takes just a drop (from a pipette or eye dropper) of wort mixed with a drop of the iodine solution on a white tile or plate. If this turns blue starch conversion is incomplete; intermediate colors such as purple and red indicate significant amounts of higher dextrins, while a yellow-brown color means the mash is done. Further details are given in the ASBC book mentioned earlier.

Going further

I focused on testing materials and didn't discuss chemicals for cleaning, acid washing of yeast and antifoams. And of course there's a yeast starter kit (now sold by many homebrew suppliers), and you might even want to consider buying your own microscope for yeast examinations.

Test work may seem like lot of extra effort and cost, but if you're serious about brewing, invest in some testing equipment — you will thank yourself for the accuracy! BYO

Terry Foster is a frequent contributor to Brew Your Own *and writes the "Techniques" column in every issue.*

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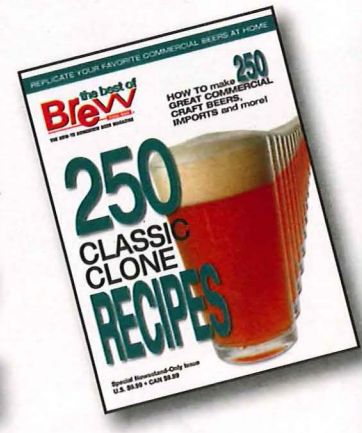
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Chiller Performance

Go with the (counter) flow

by Chris Bible



Wort cooling is a critical step in the homebrewing process. The primary reason for cooling the wort is to bring the wort temperature down to an optimal fermentation temperature as quickly as possible in order to minimize the time during which the wort is susceptible to contamination by bacteria or wild yeast. An additional benefit of rapidly cooling the wort is that the chance of forming compounds that could later form dimethyl sulfide (DMS) is reduced.

There are several ways that a homebrewer can rapidly cool boiling wort. The use of a counter-flow wort chiller is one common method. A counter-flow wort chiller is typically configured as a "pipe-in-a-pipe" (or "tube-in-a-tube") arrangement consisting of several feet (20–50-foot) of coiled, ⅜–½-inch copper tubing contained within either a garden hose or a larger rigid pipe. The whole arrangement is generally bent into a coil.

Appropriate fittings on either end of the pipe-in-a-pipe coil allow garden-hose or sink-supplied cooling water to flow into and out of the coil. The heat from the wort is removed by the action of the cooling water flowing through the outer pipe in a direction that is opposite the direction of the flow of the wort within the inner pipe. The heat in the wort is transferred through the wall of the inner pipe and into the cooling water. The relative directions of the fluid flows within the system are important; counter-current flow (opposite direction) transfers heat more efficiently than co-current (same direction) flow. Typical counter-flow chillers can remove heat from the wort at a rate such that the wort is brought down from boiling temperature (approximately 212 °F/100 °C) to yeast-pitching temperature (65–70 °F/18–21 °C) within a matter of 5–15 minutes.

A counter-flow wort chiller is a very simple counter-current type heat exchanger. The rate at which a counter-current type heat exchanger removes heat from the wort is dependent upon several things, including 1.) the surface area of the heat transfer surface of the inner pipe, 2.) the temperature of the cooling water, 3.) the temperature of the wort, 4.) the relative temperature differences between the wort and cooling water along the length of the heat-exchange surface area, 5.) the rate at which cooling water flows through the chiller. 6.) the degree of agitation (turbulence) on each side of the heat transfer surface of the inner pipe and 7.) the "overall heat transfer coefficient" of the chiller.

Increasing the surface area (i.e. using a longer pipe) increases wort cooling rates. Having more cold surface area cools the wort more quickly by allowing more hot wort to contact cold surface area per unit time.

The temperature of the wort and the temperature of the cooling water affect the overall cooling rate in that the larger the difference between the cooling water temperature and the wort temperature, the faster the wort will be cooled. The rate at which cooling water flows through the outer pipe is related to this in that the faster the cooling water flows through the pipe, the lower the average temperature of the cooling water within the pipe will be. At higher cooling water flow rates, the water has less time to heat up as it travels trough the pipe, so it doesn't get as hot as if it were allowed to move more slowly through the pipe.

The amount of turbulence of the fluids around the inner-pipe heat-transfer surfaces is also very important to the observed heat transfer rate. If there is too little turbulence, it will take much longer to cool the wort. The reason for this is that the fluids nearest the heat-transfer surface will exchange heat very quickly but will only be moved away from the heat-transfer surface by convective or diffusional forces within the system.

> "The rate at which a counter-current type heat exchanger removes heat from the wort is dependent upon several things [. . .]"



Photo by Les Jörgensen

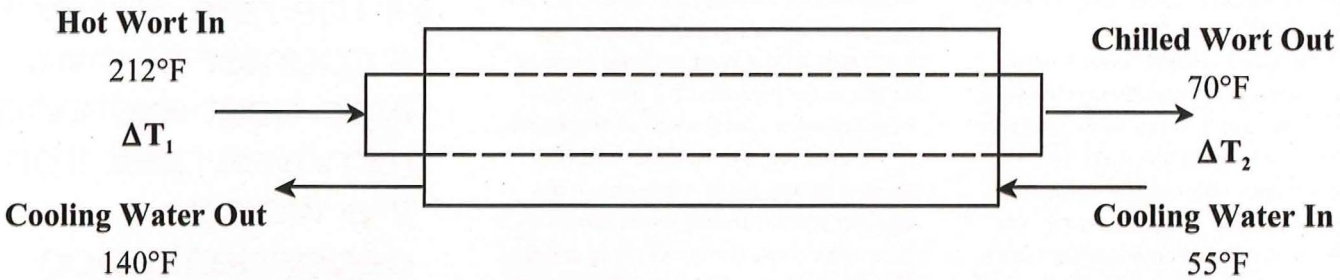
Convective or diffusional movement is a relatively slow process. This means that, without good turbulence, fluids in very close proximity to the heat-transfer surface will quickly have a temperature that is relatively close to the temperature of the heat-transfer surface itself. If the temperature of the fluids nearest to the heat-transfer surface are relatively close to the temperature of the heat-transfer surface, very little heat transfer will occur. In a counter-flow type heat exchange system, good turbulence is obtained by having adequate flowrates of both the wort and the cooling water within both pipes. Some designs also include surface irregularities on the surfaces of the inner tube that are designed to cause turbulent flow of the fluids.

The "overall heat transfer coefficient" of the heat-exchange system is a number that quantifies the rate at which heat will be transferred from the wort and into the cooling water for a specified chiller geometry, wort temperature and cooling water temperature. This number is an empirically determined number that varies from system to system. Perry's Chemical Engineering Handbook states that for a counter-current heat-exchange system with adequate turbulence and with hot-side/cold-side medium consisting of water/water respectively, the overall heat transfer coefficient of the system will be between 200 – 250 BTU/hr-ft^2-°F.

A schematic of a pipe-in-a-pipe heat-exchanger used for wort cooling, with typical inlet and outlet temperatures, is shown in Figure 1 (below).

All of the earlier discussion can be summed up with a couple of relatively simple equations. This equation

Figure 1: Typical Pipe-In-A-Pipe Heat Exchanger For Wort Cooling







describes the rate at which heat is removed from the wort by a counter-current heat-exchange system:

$Q_1=UA\Delta T_{lm}$

Where:
Q_1 = heat removal rate (BTU/hr)
U = Overall heat transfer coefficient (BTU/hr-ft^2-°F)
A = Surface area of heat-exchange surface (ft^2)
ΔT_{lm} = Log mean temperature difference between wort and cooling water during heat transfer process.

Referencing Figure 1 for the temperature differences at each end of the pipes, ΔT_{lm} is defined as:

$$\Delta T_{lm} = \frac{\Delta T_2 - \Delta T_1}{\ln\left(\Delta T_2 / \Delta T_1\right)}$$

The equation that describes the total amount of heat that must be removed from the wort in order to bring its temperature down to optimal fermentation temperatures is given as:

$Q_2=mC_p\Delta T$

Where:
Q_2 = total heat removal (BTU)
m = mass of wort (lbs.)
C_p = Heat capacity (or specific heat) of wort, usually close to 1.0 BTU/lb-°F
ΔT = Temperature change of wort (°F)

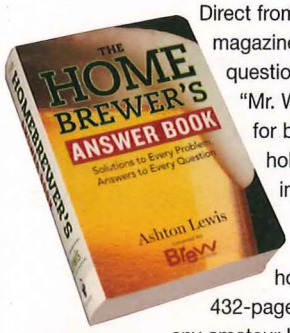
Here is an example to illustrate how these equations can be used to predict the amount of time it will take to chill your wort using a counter-current wort chiller.

Assumptions:
Amount of wort to be cooled: 5.0 gallons
Specific Gravity of Wort: 1.050
Initial Temperature of Wort: 212 °F
Outlet Temperature of Wort: 70 °F
Inlet Temperature of Cooling Water: 55 °F
Outlet Temperature of Cooling Water: 140 °F
Using a 50' counter-flow wort chiller with an inner pipe with a 3/8" outside diameter (OD).
U = 225 BTU/lb-ft^2-°F (the midpoint of the range)
To determine how much total heat must be removed, use $Q_2=mC_p\Delta T$:

Q_2 = (5.0 gallons)(8.34 lb./gallon of water) (1.050 S.G. of wort)(1.0 BTU/lb-°F)(212 °F-70 °F)

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Q_2 = 6,217 BTU

To determine how long it will take to cool this wort down to 70 °F use $Q_1=UA\Delta T_{lm}$

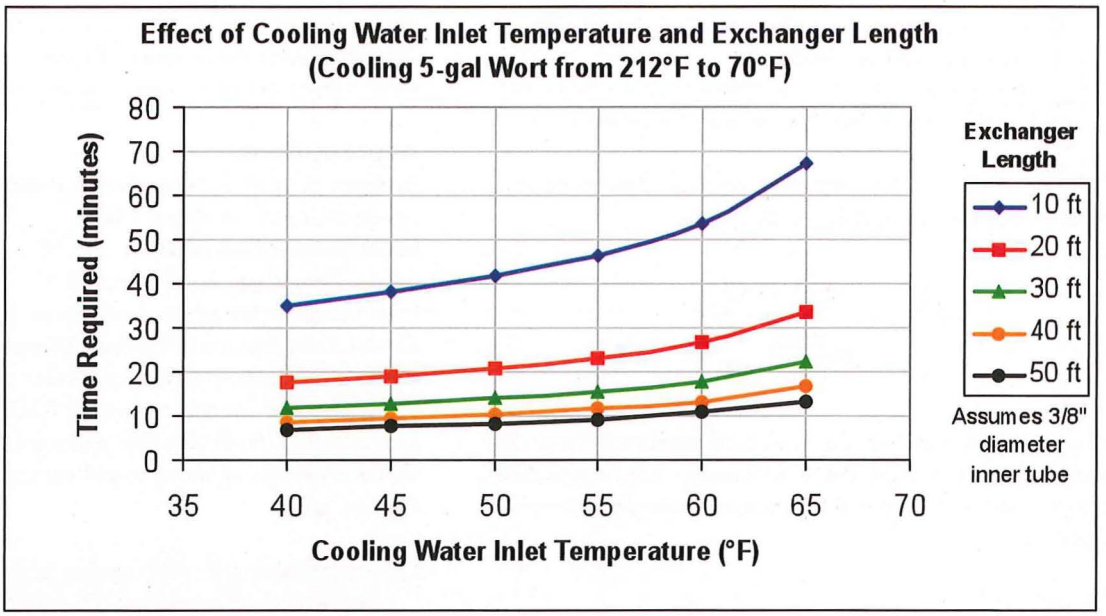
Q_1 = (225 BTU/lb-ft^2-°F)(4.91 ft^2)(36.3 °F)
Q_1 = 40,102 BTU/hr

Then divide Q_2 by Q_1 to get:

Q_2/Q_1 = 6,217 BTU heat removal required/40,102 BTU/hr heat removal rate = 0.155 hours or 9.3 minutes.

A graph showing the importance of the effects of cooling water temperature and heat-exchange surface area on total time required to cool the wort is shown in Figure 2 (below). If you know the length of your counter-flow chiller and the temperature of your cooling water, you can estimate how quickly to drain or pump the wort from your kettle — through the chiller — to your fermenter. BYO

Chris Bible is BYO*'s "Advanced Brewing" columnist.*



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Build a Hop Spider

Keep your hops under control

by John Brooke



Picture this scenario: You're brewing an imperial IPA, and it utilizes a pretty aggressive hop bill. You've meticulously selected your ingredients, spent hours tweaking the recipe and have sourced all of the ingredients from your favorite homebrew suppliers. Brew day finally arrives and everything is going perfectly; you're hitting your mash rests with ease, your efficiency is through the roof and you've perfectly timed your hop additions. You find yourself daydreaming about cracking open a bottle or pulling a pint of this heavenly brew a few months from now once it's ready to drink, and it's as close to brewing nirvana as you've been.

Then, the unthinkable happens; your ball valve, pump and plate chiller start to clog with hop matter, and even after trying to rectify the situation, you can't seem to keep your system from clogging. Of course, you have a backup immersion chiller in case of this very scenario, but to your horror you remember that you sold that immersion chiller a while back since your beloved plate chiller has been working so well! The ice-in-the-bathtub method isn't really reasonable if you are brewing a large batch (like I do, which are 15-gallon/57-L batches), so that's another idea out the window. Without a way to efficiently cool your wort, your batch has to sit out for hours to cool, and in the end becomes hazy and infected.

After running into this problem on more than one occasion, I decided to try and find a solution. Some people have had success combating excess hop matter by adding a screen to the end of their dip tube; but that seemed to me like it would also be destined to clog at some point. Others just dump their entire wort, hop matter included, into the fermenter and let it all drop out during fermentation; but that means that you lose quite a bit of your final beer to trub/hop matter at bottling time. I decided that the best way to contain the hop matter would be to utilize some sort of hop bag. Some may argue that this method can affect hop utilization, but I haven't noticed a difference in my recipes thus far.

At first, I attempted to add the hops to the bag, tie a knot in it and pull the bag out when I needed to add more hops. This didn't work well since pulling out the bag, untying it, adding hops, and retying it — all while the bag was soaked in boiling wort — was a hassle. I decided then that I needed some way of holding the bag open during the boil so I could add hops at any point. I searched my local hardware store for some way of accomplishing my goal, and this is the design that I came up with. There are many other brewers out there with similar designs, so I used some of them for inspiration. I tweaked my design to make the unit sturdier and easier to clean. The thing I love most about this project is how simple it is to build. The only tool I needed was a drill with the proper drill bit.

> "If you use anything more than a few ounces of whole leaf hops, the amount of vegetation left at the end of the boil can be a little overwhelming."

Parts and Supplies List

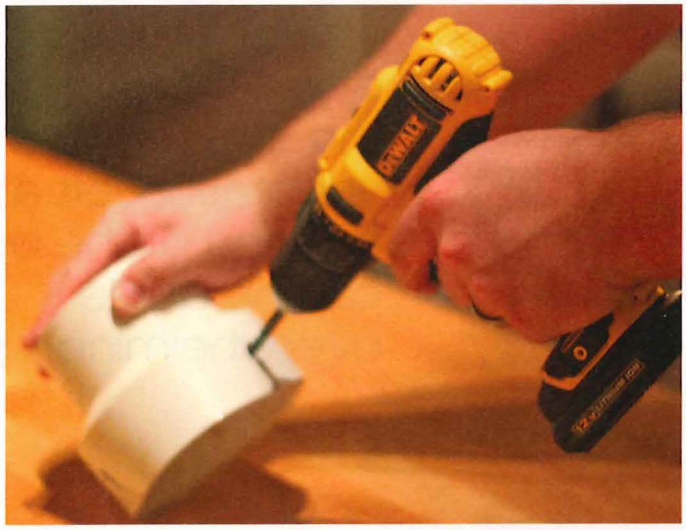
- 4-inch to 3-inch reducing PVC coupling
- 1 nylon paint straining bag (1- or 5-gallon/3.8- or 19-L size, depending on your batch size)
- 3 carriage bolts with 6 nuts and washers of corresponding size
- 1 turn-key clamp (that will fit the 3-inch end of the coupling)
- Power drill with drill bit that corresponds to the size of the carriage bolts
- eye protection (safety goggles)





1. GATHER YOUR MATERIALS

The main piece of the spider is a PVC reducing coupling. You can choose whatever size fits your budget and is available in your area, but I went with a 4-inch to 3-inch reducing coupling for a few reasons. First, the naturally conical shape of the coupling allowed more space to pour the hops into the spider easily. Second, the larger area of the opening made it easier to fill. Finally, the small opening at the bottom of the spider made it easier to find a clamp to fit the spider. Another integral part of the hop spider is the nylon mesh bags, which are meant for paint straining, but work well for our purposes since nylon retains its structural integrity even at higher temperatures. The bags are available in 1- or 5-gallon (3.8- or 19-L) varieties, and are extremely inexpensive.



2. DRILL HOLES IN PVC COUPLING

This is the most technically challenging part of the project, but it should be fairly simple as long as you have a good drill bit. Find a drill bit that corresponds with the size of your carriage bolts and drill three holes equidistant apart. You will be threading the carriage bolts through the holes you're drilling, and the carriage bolts will support the hop spider. If the holes aren't exactly equidistant apart, the hop spider will still support itself without an issue. Make sure to wear some sort of eye protection during this part of the project as hot PVC shavings will be ejected from the coupling. It's also a good idea to do this in a garage, outside, etc. where you can easily sweep up the shavings. Once you're done drilling, clean up the holes by pulling off any hanging pieces of PVC, as they could loosen over time and fall in your wort.

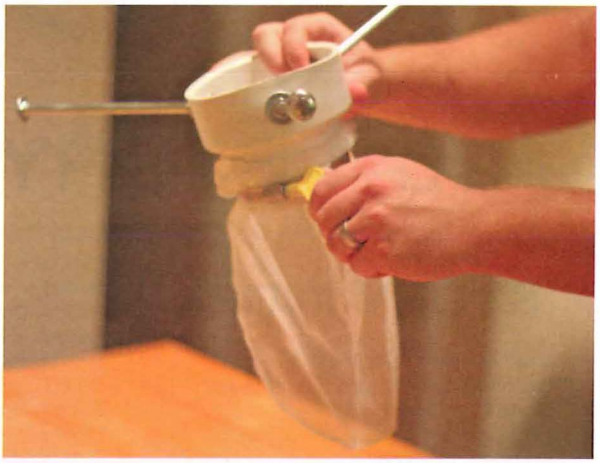


3. ATTACH BOLTS, WASHERS AND NUTS

The next step is threading the carriage bolts through the holes you've drilled. You want a nut and washer on each side of the hole, which will help secure the bolts. In order, it should be nut-washer-coupling-washer-nut. If you are so inclined, you can use a crescent wrench to tighten the nuts, but hand tightening is more than enough to keep the hop spider secure and it allows for easy cleaning after a brew session.

4. ATTACH CLAMP AND MESH BAG

In this step, you have an option of using either regular worm clamps, which are tightened using a flat head screwdriver, or turn-key clamps, which allow you to hand-tighten the clamp. I found the turn-key clamps to be much more efficient, as it makes for one less tool to have on hand on brew day. The first step is to attach the mesh bag to the smaller end of the coupling by stretching the elastic around the lip of the coupling. After the bag is attached, pull the bag through the center of the clamp and slide the clamp onto the coupling, making sure to keep the bag under the clamp. Tighten the clamp as securely as possible. If the bag falls off the coupling, all of this work would be for naught, so make sure to tighten the clamp well. Test the security of the bag by giving it a tug. If it passes this test, you're good to go.



5. TEST THE FIT ON YOUR BREW POT

The final step is to double check that the hop spider fits your brew pot. I have two different brew pots that I alternate using, depending on batch size, so I made the hop spider large enough to accommodate both sizes. If the carriage bolts fit securely over the lip of your brew pot, you're good to go. If they're a little short, pick up three longer carriage bolts and you'll be all set

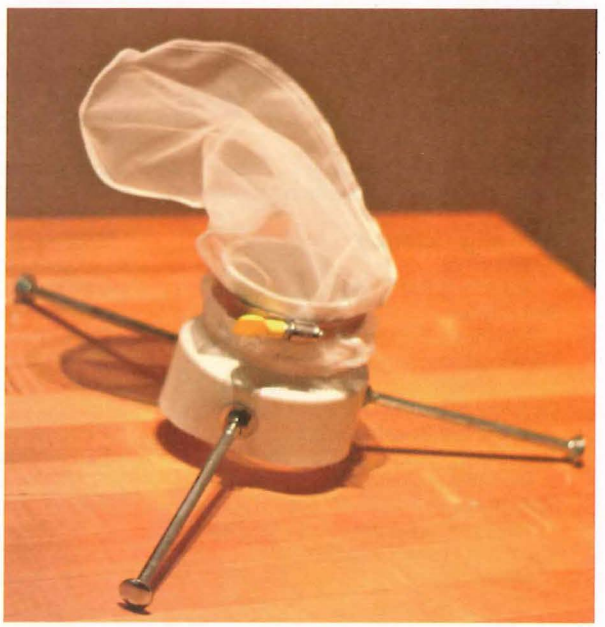


6. USE AND MAINTENANCE

The hop spider will have wort splashed on it at some point, so be sure to wash it off after each brew session to keep it from becoming a sticky mess. I do not reuse the mesh bags as they can be a pain to clean, but you can clean those out if you so choose.

Since the cost of making a hop spider is so low, I suggest making a few at a time to give to your brewing friends. I'm sure they'll appreciate the thought and will probably get a lot of use out of the spider. Even if you don't use a ball valve or pump setup, this will help deal with hop matter in your fermenter, which means less trub when it comes time to bottle. The only thing left to do is brew a batch of beer with your new homemade gadget — have fun! BYO

This is John Brooke's first "Projects" column for Brew Your Own.



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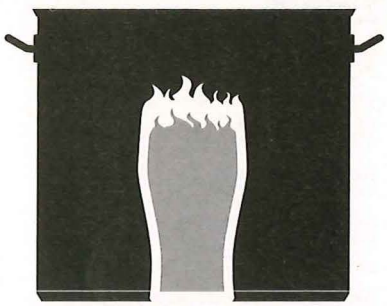
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Hometown Brew

Homebrewing in Missoula, Montana

Douglas Pinto • Missoula, Montana

Greetings! I live in Missoula, Montana, where there is a lot going on in the world of beer. Not only are there many great beer bars and some world-class craft breweries, we have a great homebrewing scene, and even our own homebrew club. Here are the facts that all homebrewers need to know about my homebrew hometown.

Hometown: Missoula, Montana. City population: 66,788, county population 109,299 (per 2010 census)

Homebrew Clubs: The Zoo City Zymurgists (www.montanahomebrewers.org)

Where to Buy Homebrew Supplies: Chapman Homebrew and The Green Light.

Where Homebrewers Drink Craft Beers: Missoula is home to the University of Montana and has more than twenty drinking establishments in the downtown area alone. Just to name a few watering holes and breweries: Big Sky Brewing, The Kettlehouse(s), Bayern Brewing, The Rhino, The Old Post, The Iron Horse, The Tamarack, Sean Kelly's and Charlie B's.

Local Homebrewers of Note: This year, ZCZ member, Bill Ruediger, won the Community Brew contest hosted by Big Sky Brewing Company with his "Missoula Five-O," which is a coconut chocolate imperial porter. The winner of the contest brews a commercial-sized batch at Big Sky. When the beer was ready, it was sold in the taproom at the brewery and served at the local Brew Fest in Missoula. The beer's proceeds were donated half to the brew club and half to a charity of the club's choosing, which was Animeals, a no kill pet adoption center serving western Montana. Bill's winning beer was inspired by a chocolate coconut porter at Maui Brewing fresh off the taps. It took him eleven batches to finally find the winning combination. (See Bill's recipe, right). BYO

> "Missoula is home to the University of Montana and has more than twenty drinking establishments in the downtown area alone."

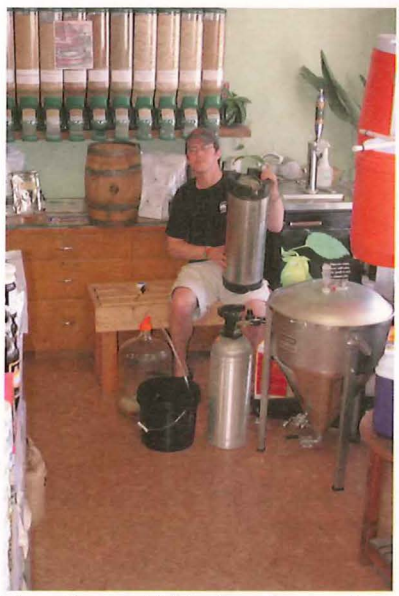


Photo Courtesy of Dougls Pinto

The Green Light homebrew shop in Missoula, Montana is owned by Jared Robinson (above).

Missoula Five-O Chocolate Coconut Imperial Porter (5 gallons/19 L, extract plus grains)

OG = 1.089 FG = 1.018
IBU = 15.4 SRM = 35.8 ABV = 8%

Ingredients

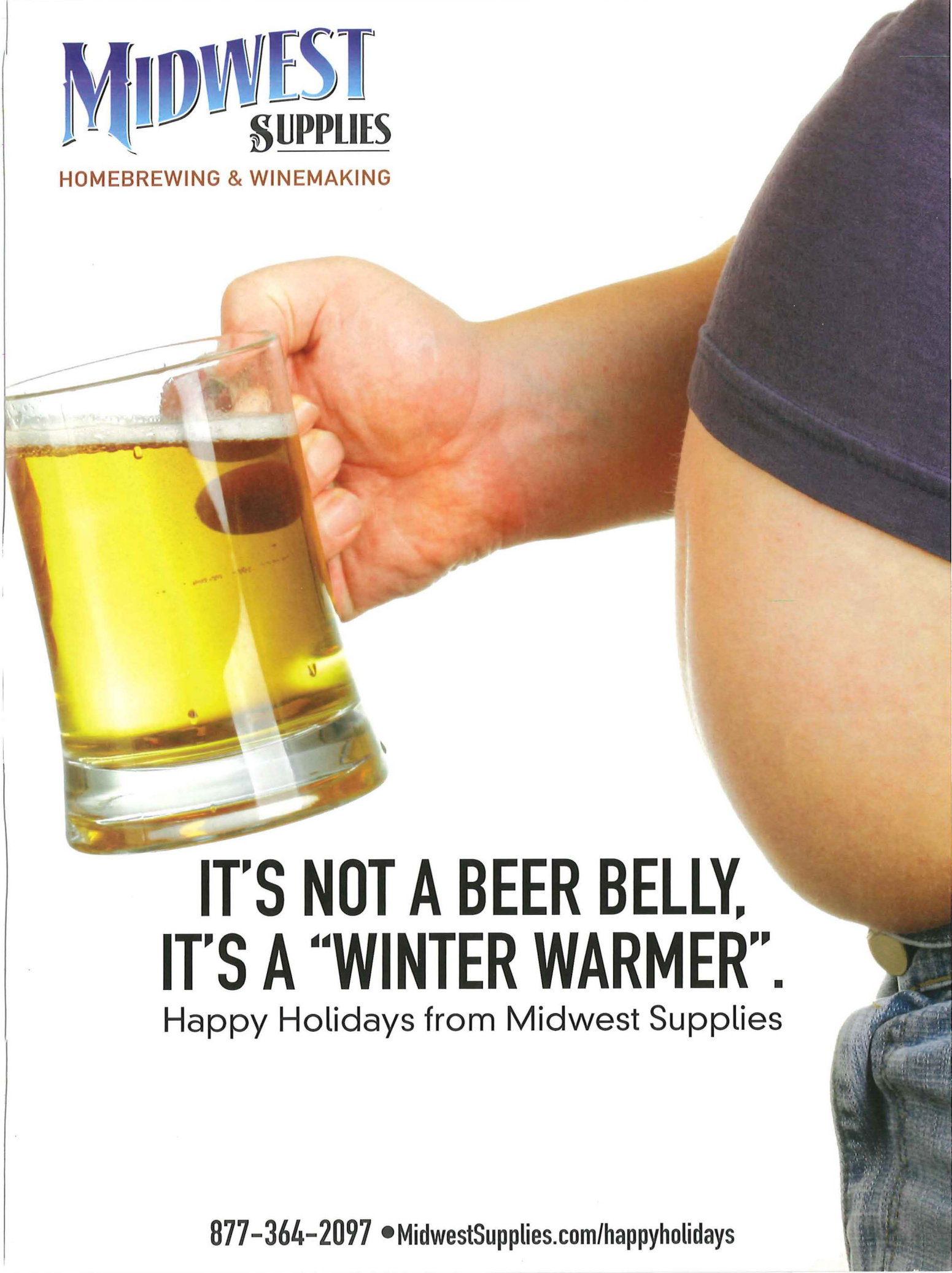
7.5 lbs. (3.4 kg) light dried extract (60 min)
1.0 lb. (0.45 kg) wheat liquid malt extract (15 min.)
1 lb. 6.5 oz. (0.64 kg) Weyermann Caramunich® malt
13 oz. (0.81 kg) Briess caramel malt
11.3 oz. (0.32 kg) Briess chocolate malt
6.5 oz. (0.18 kg) honey malt
2.4 oz. (68 g) Dingemans de-bittered black malt
6 AAU Cascade hops (60 min.) (1.0 oz./28 g at 6% alpha acids)
4.2 AAU Hallertauer hops (20 min.) (1 oz./28 gm at 4.2% alpha acids
5 oz. (0.14 kg) cacao nibs
10 oz. (0.28 kg) toasted coconut
Wyeast 1968 (London ESB) or White Labs WLP002 (English Ale) yeast

Step by Step

Steep grains in 4.0 gallons (15 L) of water for 45 minutes at 154 °F (68 °C). Next, remove the grains and bring to boil. Total boil time is 60 minutes. Add the dried malt extract at the beginning of the boil and begin hop schedule. At 15 minutes add the liquid malt extract. At flame out add water to bring up to 5 gallons (19 L), chill, aerate and pitch the yeast. Add cacao nibs and toasted coconut in secondary for up to seven days.

Web-bonus: Visit www.byo.com/component/resource/article/2476 for an all-grain version of Bill's award-winning recipe.

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