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THE HOW-TO HOMEBREW BEER MAGAZINE

DECEMBER 2008, VOL.14, NO.8

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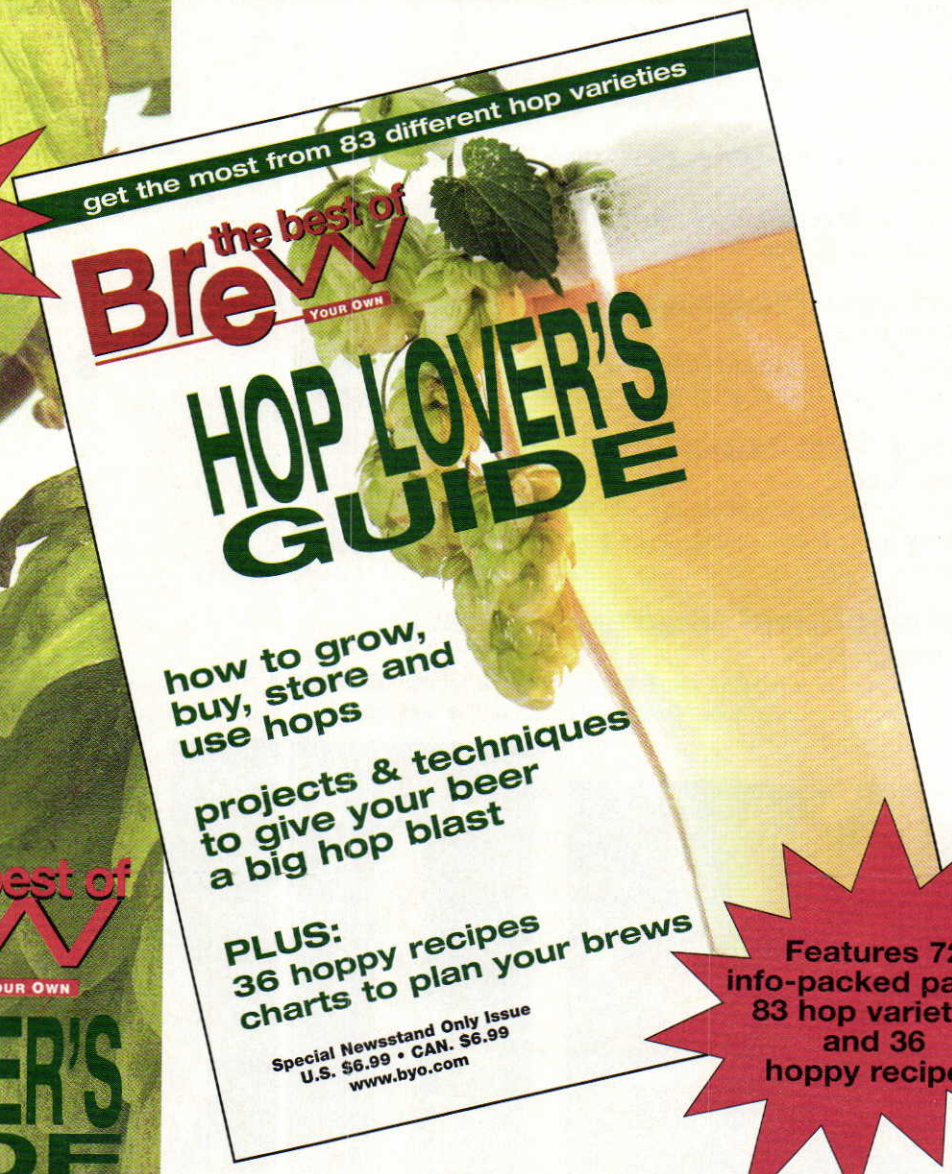

the best of Brew Your Own

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Features 72 info-packed pages, 83 hop varieties and 36 hoppy recipes

We've collected and updated the best hops information from the past 12 years of *BYO* and included updated charts with the specs for 83 hop varieties including new varieties and suggested substitutions for hard-to-find hops. We've also detailed different hopping methods, hop growing info, hop-related build-it projects and 36 hoppy recipes. A few of the reasons you will love this new reference...

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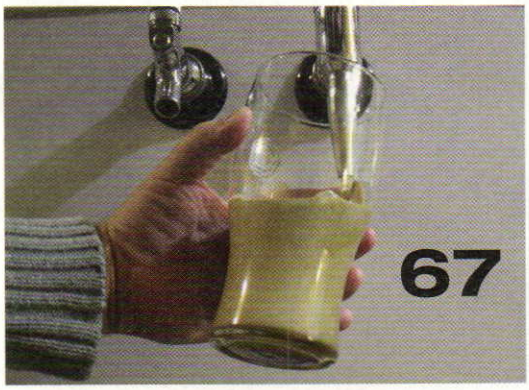
THE HOW-TO HOMEBREW BEER MAGAZINE

DECEMBER 2008
Volume 14 Number 8



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by Chris Colby
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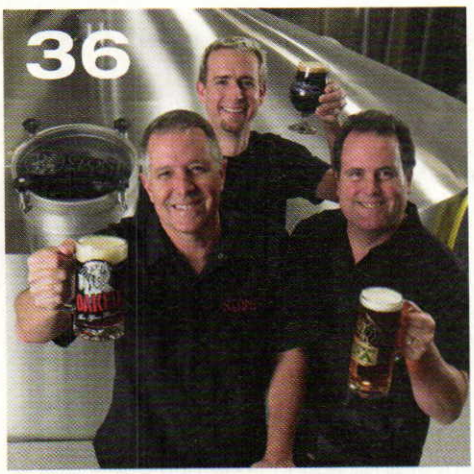

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How well do you really know your beer?

Graduate From "Beer Know-It-All" To Really Knowing It All.

What's the difference between Saaz hops and Hallertaus hops? What impact did the Bavarian purity law have on the evolution of brewing? Why is an American lager the best beer to drink when you're eating a spicy Thai dish? Beer novice or beer expert, there's still plenty to learn from ***The Beer Connoisseur*** on **herestobeer.com**. Educating you on such topics as the brewing process, beer and food pairings, the ingredients that go into beer, and the role of each ingredient in determining a beer's flavor, ***The Beer Connoisseur*** wants you to understand and appreciate beer like you never thought possible. Give it a try and find out for yourself why to know beer is to love beer.

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BYO RECIPE STANDARDIZATION

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.

Brew YOUR OWN
THE HOW-TO HOMEBREW BEER MAGAZINE

EDITOR
Chris Colby

ART DIRECTOR
Coleen Jewett Heingartner

ASSOCIATE EDITOR
Betsy Parks

TECHNICAL EDITOR
Ashton Lewis

CONTRIBUTING WRITERS
Jon Stika, John Palmer, Marc Martin, Terry Foster, Glenn BurnSilver, Kristin Grant, Forrest Whitesides, Jamil Zainasheff

CONTRIBUTING ARTISTS
Shawn Turner, Jim Woodward

CONTRIBUTING PHOTOGRAPHERS
Charles A. Parker, Les Jörgensen

CANINE ASSOCIATES
Heidi, Louie

PUBLISHER
Brad Ring

ASSOCIATE PUBLISHER & ADVERTISING DIRECTOR
Kiev Rattee

ADVERTISING SALES COORDINATOR
Dave Green

EVENTS/MARKETING COORDINATOR
Ellen Adams

BOOKKEEPER
Faith Alberti

SUBSCRIPTION CUSTOMER SERVICE MANAGER
Linda Marlowe

NEWSSTAND DIRECTOR
Carl Kopf

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How to reach us

Editorial and Advertising Office
Brew Your Own
5515 Main Street
Manchester Center, VT 05255

Tel: (802) 362-3981
Fax: (802) 362-2377
E-Mail: BYO@byo.com

Advertising Contact
Kiev Rattee
kiev@byo.com

Editorial Contact
Chris Colby
chris@byo.com

Subscriptions Only
Brew Your Own
P.O. Box 469121
Escondido, CA 92046

Tel: (800) 900-7594
M-F 8:30-5:00 PST
E-mail: byo@pcspublink.com
Fax: (760) 738-4805

Special Subscription Offer
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Web Site
www.byo.com

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.

Cover Photo: **Studio Schulz**

Mail

Hop Hammer Help (I)

In the November 2008 issue of *Brew Your Own*, there was an extract recipe for Hop Hammer beer ("Imperial IPA," by Jamil Zainasheff). As the article by Mr. Zainasheff notes, I am one of those who have grown to appreciate and crave bold hop bitterness. However, being a relatively novice homebrewer, and always using extract kits that give exacting step-by-step instructions, I am stuck on a couple of points with this recipe:

First, where can I purchase the ingredients as listed? I checked a couple of homebrew web sites and could not find the majority of the ingredients. Note, I will need to purchase the ingredients online as there are no homebrew stores within 100 miles of where I live.

Second, the step-by-step instructions state to add the bittering hops, then add the other hop additions according to schedule. As I stated earlier, I am a relatively novice brewer and have only used extract kits that take you through each hop addition noting the name and time to add — therefore, I have no concept of what a hop addition schedule looks like — especially when there are nine different hops listed. Any assistance you can give me will be greatly appreciated.

Rich Mueller
Ft. Madison, Iowa

Hop Hammer Help (II)

I just finished Jamil's "Imperial IPA" article, which was excellent. One question: is the corn sugar added at the beginning of the boil. I assume so, but the recipe doesn't address this.

Richard De Palma
via email

Jamil's Hop Hammer Recipe — based on Russian River's Pliny the Elder — is brewed with American 2-row malt, wheat malt and crystal malt (40 °L). So, we'll hazard a guess that it's the hops you're having trouble finding. As a new brewer, you may be unaware that the brewing world is experiencing a hop shortage. As such, many commonly used hop varieties — including many in Hop Hammer — are in limited supply. You may have trouble finding them now, but in a year or so they should be back on shelves. This year, whenever possible, we have tried to give acceptable hop substitutions for our recipes. However, in this case,

reasonable substitutions are hard to come by as most of these hops are very distinctive and used in large amounts. You just wouldn't get the same result if you substituted, say, Palisades and Santiam hops for the printed varieties.

As for the hop addition schedule, look at each hop addition in the recipe — each has a time printed next to it. This time is the total time that that hop addition is boiled, or, equivalently, the number of minutes from the end of the boil that the hops are added. Frequently, non-hop additions — such as Irish moss, yeast nutrients or other spices — will have a time by them as well.

And finally, speaking of things that should have had a time listed next to them, the corn sugar can be added at almost any time during the boil. Adding sugar at the beginning of the boil is convenient, but you can also wait for the last 15 minutes of the boil. Since hop utilization is dependent on wort gravity, you may get a slight boost in hop bitterness if you wait until near the end. (Given the relatively small amount of sugar, however, this difference would likely be fairly small.)

Chilling, Green Style

I enjoy all aspects of the magazine, especially the projects as they help me to improve my own brewery or give me ideas for such. I did notice that in light of the whole "green" thing, your article on a wort chiller falls a bit short. Every immersion chiller I see for sale or read about is about the same — they all use hook-ups designed to flow water from either the sink or a garden hose, and the outflow goes wherever you direct it — while that may make the grass green (in the event

Contributors

ASHTON LEWIS, wears many brewing hats. He is the Master Brewer at Springfield Brewing Company and Process Engineer for Paul Mueller Company in Springfield , Missouri. As pictured here, Ashton is also BYO's own "Mr. Wizard" columnist and has answered hundreds of brewing questions since 1995. A collection of his favorite questions, *The Homebrewer's Answer Book* was released in 1997. In addition, Ashton is also BYO's Technical Editor, reviewing each manuscript for accuracy. In this issue on page 15, he explains why homebrewing is one of life's most important skills.

BETSY PARKS, Associate Editor of *Brew Your Own*, is the regular author of "Beginner's Block" and "Tips from the Pros." In addition to her duties overseeing BYO's department writers and keeping up with our "Homebrew Nation," Betsy has been helping to redesign and launch the all new www.byo.com. In this issue, Betsy went totally pro: She found three brewers to share some advice for brewing smoked beers (page 13), as well seven homebrewing-turned-commercial brewers to ask what it was like to "go pro." Read it on page 48.

GLENN BURNSILVER, is a freelance writer, backcountry adventurer, record collector and frequent contributor to *Brew Your Own*. Glenn has authored many recipe collections for BYO, including "Five Belgian-Inspired Clones" in the July-August 2008 issue as well as "Organic Beer Clones" in October 2008.

In this issue, Glenn takes a break from recipe cloning and formulation to talk to three small-scale commercial brewers and find out what it is like to go pro — without going too big. Read his story on page 54.

you send it to the lawn), it's incredibly wasteful. My chiller is fed by a nylon hose attached to a small pond pump, which can be purchased inexpensively at any Lowes or similar hardware store garden section. The hose is immersed in a mop bucket full of ice — either a 10 lb. (4.5 kg) bag or ice I made in the freezer the night before — and just enough water to prime the pump and get the flow started. The outflow hose runs to the bucket and the hot water from the chiller helps melt the ice, which feeds more cold water back into the system. This will cool the wort far faster than faucet-temperature water, and uses far less water to do so.

Joseph Richter, Jr.
via email

A recirculating chiller loop fed from an ice bath can chill wort with far less water than with a standard immersion chiller. This is a solution many brewers in hot parts of the country use to decrease their chill times. However, your solution is not necessarily more green. It takes electrical energy to freeze your ice and, in the case of store-bought ice — the ice also needed to be shipped in a refrigerated truck to your store. If you use the outflow water from an immersion chiller for purposes you had already planned on (hot water for washing clothes or cleaning equipment, cool water for your garden), then the water isn't wasted. In pointing this out, we're not trying to be obstinate; it's just that sometimes it's not easy figuring out the most green solution. If you simply allowed your chiller water to flow into the sewer or used it to water your lawn unnecessarily, then your solution would indeed be better.

Tubing Tip, Green Style

I've been sharing this with all my local brewing buddies, and I hope it might be useful to your readers. One of my concerns in homebrewing has been the use of vinyl tubing. The production and disposal of vinyl is environmentally unfriendly, and cheap vinyl tubing may not be rated for hot wort transfers out of the mash tun. So in order to protect my carefully-crafted brews, I recently switched to silicone tubing. The tubing I now run from my mash tun is rated to 500 °F (260 °C), and since I bought a thicker-walled variety, it holds its shape well when filled with hot wort. Even better, though, is my switch to silicone tubing for use in racking. The more flexible silicone stretches enough to slide right on, holds well, then rolls easily back off again. And it stays relatively straight — —unlike vinyl that holds that annoyingly tight coil forever.

Greg Siering
Muncie, Indiana

Questions, concerns, comments?

Contact us!

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Refreshing beer with a delicious but delicate aroma. Perfect for hot summers or as a surprising aperitif! Original gravity: 1.053, ABV: 5.5%.

OLD FLEMISH BROWN (makes 12 litres)
A very aromatic dark brown beer, with liquorice overtones and a medium alcohol content. Original gravity: 1.060, ABV: 6%.

PILS (makes 12 or 20 litres)
A light, blond, thirst-quenching beer for every day. Original gravity: 1.042, ABV: 4.5%.

GRAND CRU (makes 9 litres)
A gold coloured beer with a subtle "herbal" aroma and a full, malty flavour with a light fruitiness. Original gravity: 1.075, ABV: 8%.

CHRISTMAS (makes 7 litres)
Strong brown beer with a pleasant malty flavour: a real dessert-beer. Requires long maturation. Original gravity: 1.065, ABV: 7.5%.

TRIPLE (makes 9 litres)
A heavenly abbey beer: gold coloured, soft but strong with a full malty flavour. Slightly spiced and well hopped. Original gravity: 1.075, ABV: 8%.

ABBEY (makes 9 litres)
Dark brown, full-bodied with a malty flavour. A divine beer requiring long maturation. Original gravity: 1.070, ABV: 8%.

AMBIORIX (makes 15 litres)
A copper coloured summer beer with a light sourness but with a sweet aftertaste. Original gravity: 1.060, ABV: 6.5%.

GALLIA (makes 12 litres)
Amber coloured beer with a noble bitterness and a soft, refreshing flavour. Original gravity: 1.055, ABV: 5.5%.

WHEAT BEER (makes 15 litres)
A thirst-quenching, super light, slightly cloudy blonde beer with a refreshing flavour and a marvellous aroma: A genuine 'blanche' Original gravity: 1.052, ABV: 5%.

DIABOLO (makes 9 litres)
Fiery gold in colour with a soft flavour and a high alcohol content: a devilish beer! Original gravity: 1.075, ABV: 8%.

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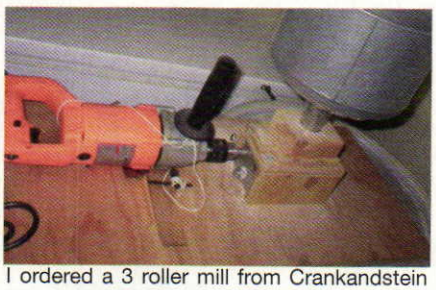
Bill French
Portland, Oregon

I built an adjustable wooden rack for the system with 4x4 and 2x6's. I put wheels on the bottom of it, but this thing isn't going anywhere anytime soon.

These two 22-gallon (83-L) barrels have served me well as primary fermenters. I use a thermostat with a stainless steel probe in the wort to keep the temperature where I need it. I usually will put 15 gallons in each one and then do another 5 or 10 gallons in a different chest freezer for a lager.

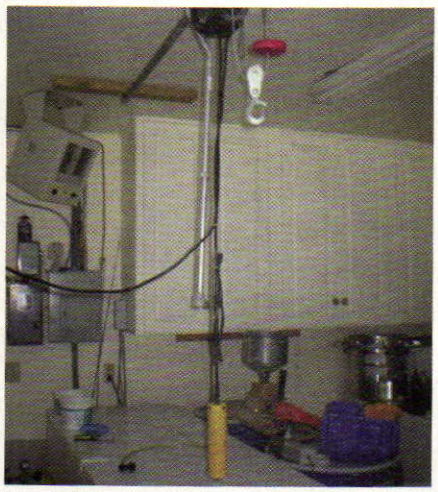


I ordered a 3 roller mill from Crankandstein and built the housing around it. The drill works well in that in that I can set it at any speed without having to hold onto it.

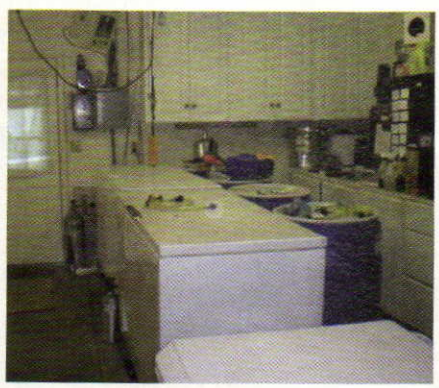
I had a hard time finding the right sized stainless steel kettle so I found a welder that could build one for me with an adjustable burner rack. It can boil up to about 40 gallons (151 L) of wort, although I usually shoot for around 35–38 gallons (132–144 L).

A professional brewer let me go in on a grain order so I was able to buy my grain in bulk. These used malt extract containers each hold 5 bags and keep the bags dry.

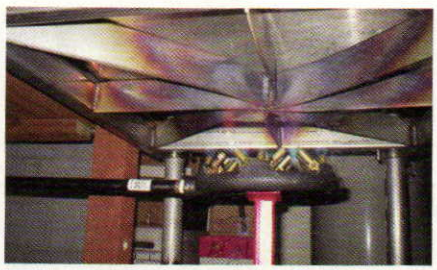
I ordered the parts and put together an inline oxygen stone for aeration and thermometer for when I'm transferring wort to the fermenters.



I installed a bar in the ceiling with a winch that can slide along the length of two of my chest freezers. I usually will pump liquids out of the chest freezer when I transfer them but I don't want to have to stop brewing someday if my back ever gives out on me.



I was able to find 3 used chest freezers for pretty cheap, which is good because they occasionally die. I use one for serving, one for ale fermenting, and one for lagers.



This thing is loud and makes the neighbors wonder what I'm doing, but it brings 35 gallons of water to a boil in about 45 minutes.

club PROJECT and RECIPE
Modesto Mashers
Modesto, California

The Modesto Mashers came up with this group project during a meeting between member Peter Munoz and Matt Brynildson, the brewmaster for Firestone Walker.

Pete had the opportunity to chat up Matt and soon a deal was struck to obtain one of Firestone Walker's used barrels. We then got to thinking about what would benefit the most from the barrel and decided (rather quickly) to brew an English-style barley wine.

The Modesto Mashers have been brewing up big batches of beer to use in an oak barrel they received from the Firestone Walker Brewing Company in Paso Robles, California.

To make our club brew, we had a lot of decisions to make: what recipe to use, where to brew it, who will tend the barrel, etc. The recipe came together quite fast, allowing for substitutions in hops (we were able to get some magnums). My house was offered as a brew site because it has a cool room that can get down to 60 °F (16 °C) in the 100+ °F (38+ °C) summer weather we have in Northern California.

One problem we ran into right from the beginning was figuring out how to brew the beer with consistency across the board. For example, do we do one BIG mash and ferment, or take the route of mashing, boiling and fermenting 70 gallons (265 L) amongst 7–8 brewers? The latter looked like the best option and Wayne Baker, the owner of Barley and Wine homebrew shop in Modesto let us borrow a 300-L (79-gal.) variable capacity wine fermenter to use.

Mashers member Jim Harrelson had taken the lead on coming up with a manifold to fit in the mash tun. We were unsure if this would give us the efficiency we were looking for (75%+) so we decided to do a test run using 120 pounds (54.4 kg) of 2-row versus using 300 lbs. (136 kg) of grain for the full recipe.

In the test run we ran about 60 gallons (227 L) of wort into a 150-qt. (142-L) cooler and split that amongst the brewers, then ran off the rest and split that again. We achieved our 75%+ and everyone would have the same gravity to start with. This worked out well as some people made IPA by steeping grains. I made an old ale and a pale ale (with Sorachi Ace hops). We decided that running off the wort into a "grant" would ensure that everyone would be on the same gravity, IBU's, boil time etc.

Brew day got started around 6 a.m. and went fairly uneventfully, save for the lookie loo's and the neighbors coming over and seeing what was happening. We hit 1.094 for a SG, and finished about 1.026. We transferred into the barrel and kept 5 gallons (19 L) as a benchmark to taste against. We took weekly tastings and all decided to pull it out after three weeks in the barrel. Ultimately we should have pulled it out 3–4 days earlier as we were getting more of the vanilla, subtle oak flavor. Instead, we got a little more oak and the sweetness of the barrel had taken a back seat.

One thing we learned in the process was to have all the kegs and carboys on hand once the beer goes into the barrel so we would not have to wait until everyone brought them in. That would be the biggest lesson learned, actually, as we all have some degree of experience in homebrewing and all the jimmy-rigging that goes into it.

Since the initial brew, the Mashers have also brewed the next batch for the barrel — a robust porter — and will use a liter or two of bourbon to infuse the barrel. After the infusion, we will then rack the porter right on top of the bourbon. We will do an ESB next. When the barrel is finished, Matt claims it should have about twenty brews left in it when we got it — after that we will sour it and have a club lambic project for years to come!

— *Aaron Wharton*

Modesto Mashers' Barrel-aged Barley Wine
60 gallons/227 L

O.G. = 1.094 F.G. = 1.026
IBU = 112 ABV = 11.3 SRM = 27

Ingredients:
220 lbs. (99.79 kg) Maris Otter 2-row malt
15.0 lbs. (6.80 kg) of crystal malt 40 °L
15.0 lbs. (6.80 kg) of crystal malt 80 °L
22.5 oz. (638 g) of Magnum hops (13% alpha acids) (60 mins.)
12.25 oz. (347 g) of East Kent Goldings (4.5% alpha acids) (20 mins.)
12.25 oz. (347 g) of Fuggles 20 mins 4.5% alpha acids
London Ale yeast (5-gallon/19-L starter batch)

Step-by-Step
We boiled the beer for 120 minutes, then fermented at 70 °F (21 °C) for 3 ½ months. We aged the beer in the barrel for three weeks and then kegged out of the barrel.

byo.com BREW POLL

Would You Consider Becoming a Professional Brewer?

I've thought about it, but I'm not sure **47%**

It's my goal for the near future **22%**

I'm going to someday, but not soon **21%**

I've never considered it, never will **10%**

How Much of Your Brewing Equipment is Homemade?

A few pieces, but most I bought **42%**

None — I'm more into brewing than building **25%**

Lots of pieces, but one or two aren't my own **19%**

Pretty much everything **14%**

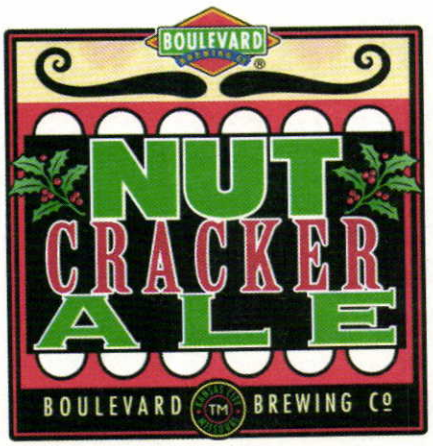
Check out the latest poll question and vote today at byo.com

replicator
by **Marc Martin**

Dear Replicator,

Boulevard Brewing Co. in Kansas City, Missouri makes a beer that is definitely my favorite. It is their winter seasonal called Nutcracker Ale. In my opinion this beer is an example of the perfect blend of malt and hops. I have not been able to locate a clone recipe and was wondering if you could help me get some details. I have looked at their Web site and found that they use pale, Munich, and malted wheat plus Magnum, Cascade, and Chinook hops. Any help that I could get in developing a recipe would be much appreciated.

Mike Klimek
Omaha, Nebraska



While finding great holiday beers out here in the great Northwest is not a problem I know from talking to several Midwestern friends that their choices are very limited. They do, however, rave about the beers from Boulevard Brewing and eagerly anticipate the November release of Nutcracker Ale.

This is a brewery with humble beginnings dating back to 1988. It has now grown to be a central U.S. powerhouse with capacity of over 700,000 barrels. In fact, with the recent purchase of Anheuser-Busch by InBev they can now truthfully advertise as the largest independent brewery in the state of Missouri.

The founder, John McDonald discovered an early 1900s brick building on Kansas City's historic Southwest Boulevard and decided it would be perfect for a brewery. His business model was to establish a local brewery similar to those of the pre-prohibition era. The original brewhouse, which is still in use today, was a vintage 1950s, 35-barrel, copper-clad Bavarian system. The first batches of beer were ready for sale in the fall of 1989. John delivered the first half barrel personally in his pickup truck to a nearby Mexican restaurant.

In 2005 a major $20 million expansion was begun. The new building, adjacent to the old, includes a kegging/bottling facility with a sky lit atrium, two large hospitality rooms and a terrace overlooking downtown. They now list 13 active styles of beers being produced but their American Weizen and Pale Ale account for 80% of the sales with Unfiltered Wheat as their best seller.

I was fortunate enough to meet one of their brewers, Caton Orrell, while attending the 2008 Hops and Brew School at Hop Union in Yakima, Washington. Much like the brewery, he has developed his skills from the ground up and was happy to discuss the making of Nutcracker Ale. Taught by his father (an avid homebrewer), Caton started homebrewing at age 18. Inspired by Charlie Papazian's first book he progressed to become the lead brewer at River City Brewing Co. in Wichita, Kansas. He has now been at Boulevard for seven years and will help to produce 1,000 barrels of Nutcracker this season. Normally available in bottles, this year 30% will be kegged.

He describes this beer as a classic winter warmer. It is definitely malt forward with the Magnum hops offsetting the residual sweetness while the Cascade and Chinook hops provide the finishing nose. The wheat malt creates a creamy white head with the brown sugar boosting the alcohol and developing a rich hint of molasses. The English ale yeast accentuates the malt profile and helps develop a slight nuttiness. A truly fine beer that is perfect for the holidays.

Now Mike, you can fill your friends' Christmas stockings with your replica of Nutcracker Ale because you were able to "Brew Your Own."

For further information about Boulevard Brewing Co. and their many other beers visit their Web site www.blvdbeer.com or call them at 816-474-7095.

Boulevard Brewing Nutcracker Ale

(5 Gallons/ 19L, extract with grain)

OG = 1.063 FG = 1.015
IBUs = 32 SRM = 23 ABV = 6.1 %

Ingredients

3.3 lbs. (1.5 kg) Muntons light, unhopped, malt extract
1.8 lbs. (0.81 kg) light dried malt extract
1.0 lb. (0.45 kg) crystal malt (50 °L)
1.0 lb. (0.45 kg) Weyermann CaraMunich® (60 °L)
10.0 oz. (283 g) Carapils® malt (75 °L)
6.0 oz. (170 g) wheat malt
1.25 lb. (0.56 kg) brown sugar
7.8 AAU Magnum pellet hops (60 min.) (0.6 oz./17 g of 13% alpha acid)
1.7 AAU Cascade pellet hops (30 min.) (0.3 oz./8.5 g of 5.75% alpha acid)
1.4 AAU Cascade pellet hops (0 min.) (0.25 oz./7 g of 5.75% alpha acid)
6.5 AAU Chinook pellet hops (0 min.) (0.5 oz./14 g of 13% alpha acid)
½ tsp. yeast nutrient (last 15 minutes of the boil)
½ tsp. Irish moss (last 15 minutes of the boil)
White Labs WLP002 (English Ale) or Wyeast 1028 (London Ale) yeast
0.75 cup (150 g) of corn sugar for priming (if bottling)

Step by Step

Steep the crushed grain in 2 gallons (7.6 L) of water at 152 °F (66.7 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.9 L) of hot water. Add the liquid and dry malt extracts and bring to a boil. While boiling, add the hops and Irish moss as per the schedule. Stir in the brown sugar at the end of the boil. During the boil, use this time to thoroughly sanitize a fermenter. Now add the wort to 2 gallons (7.6 L) of cold water in the sanitized fermenter and top off with cold water up to 5 gallons (19 L).

Cool the wort to 75 °F (24 °C). Pitch your yeast and aerate the wort heavily. Allow the beer to cool to 68° F (20° C). Hold at that temperature until fermentation is complete. Transfer to a carboy, avoiding any splashing to prevent aerating the beer. Allow the beer to condition for 1 week and then bottle or keg. Allow to carbonate and age for 2 weeks.

All-grain option:

This is a single step infusion mash. Replace the malt syrup and dry malt extract with 8.5 lbs. (3.9 kg) 2-row pale malt. Mix the crushed grains with 3.75 gallons (14.2 L) of 170 °F (76.7 °C) water to stabilize at 152 °F (66.7 °C) for 60 minutes. Sparge slowly with 175 °F (79 °C) water. Collect approximately 6 gallons (22.7 L) of wort runoff to boil for 60 minutes. Reduce the 60 minute hop addition to 0.5 oz. (14 g) and the 30 minute addition to 0.25 oz. (7 g) to allow for the higher utilization factor of a full wort boil. The remainder of this recipe and procedures are the same as the extract with grain recipe.

Homebrew CALENDAR

December 6
Dunedin, Florida
Walk The Line on Barleywine
Now expanded to include "imperial" styles, judging will be for any entries made in all BJCP beer styles (1-23). Entries will be accepted from November 1 through 28, $6 per entry with a maximum of two entries for each BJCP substyle. Registration information and entry details available at http://www.dunedinbrewersguild.com/.

December 6
Columbia, South Carolina
Palmetto State Brewers Open
The tenth year of the Palmetto State Brewers club annual homebrew competition. Entries will be accepted in all BJCP/AHA categories beginning October 1, 2008. More info available at http://www.palmettostatebrewers.com/psbopen/.

December 8–19
Boston, Massachusetts
Entries Accepted: Samuel Adams Patriot Homebrew Contest
The winning recipe for this annual competition will be served at the Samuel Adams Brewhouse in Gillette Stadium during the entire 2008–2009 football season. Detailed rules, BJCP 2008 guidelines and regulations apply. To enter or for more information, visit http://www.samueladams.com/promotions/PatriotHomeBrew/LogIn.aspx.

December 29, 2008–January 10, 2009
St. Paul, Minnesota
Entries Accepted: Upper Mississippi Mashout
Entries for this year's mashout include two special categories: New Brewer and Eis-Beer. New Brewer is for anyone who has never entered a competition. Each new brewer may enter one beer to be judged against only other new brewers. Eis-Beer entries can include EIS-Bock, EIS-Barleywine, EIS-Mead . . . you name it, anything goes. More information is available online at http://mnbrewers.com/mashout/index.php.

BEGINNER'S block

Reusing Yeast

by Betsy Parks

Once you've mastered brewing basic batches of beer, one of the next natural steps may be to start experimenting with techniques to save ingredients and money. For the sanitization-conscious homebrewer, one method to attempt is reusing yeast.

Why reuse?

Most commercial brewers reuse yeast all the time, mostly because propagating large batches of yeast is costly and time consuming. For example, if a typical Anheuser-Busch brewery used fresh yeast for every brew the brewery would need to propagate about 50,000 gallons (189,271 L) of yeast every day. Also, many commercial brewers use their own proprietary strains of yeast.

Commercial brewing is an ideal environment for harvesting yeast because batches of beer never stick around any longer than they need to before being packaged for sale, and yeast is best harvested just after primary fermentation is finished. But you can reuse yeast at home, too, as long as you follow a few simple guidelines to prevent ruining your batch of beer with sub-par yeast.

Guidelines

Keep it clean. Yeast slurries are especially vulnerable to contamination, so be sure all your tools and containers are sanitized before harvesting your yeast.

Only harvest the healthy. Don't bother trying to save any yeast that didn't come from a good quality strain, had problems during fermentation or didn't reach the proper attenuation levels. Also don't harvest yeast from high gravity beers as the high alcohol can stress the yeast. Stick to harvesting yeast from beers that are less than 6.5% ABV.

Cold storage. If you don't reuse your batch of yeast right away, be sure to store your harvested yeast at 32 to 38 °F (0 to 4 °C). Store your harvested yeast in a glass container with a cotton plug or in a plastic container with a screw cap as pressure from CO_2 released by the yeast can cause the container to explode.

Age is important. Don't reuse any yeast that is more than a few generations old. Each brew is considered a generation, and the more generations there are the greater the chance of mutation and contamination, so don't use recycled yeast for more than five generations — some brewers even keep it to less than three. Also, don't store the harvested yeast for more than two weeks. If yeast is stored longer than a few weeks it can start to deteriorate and die.

Technique

There are a few approaches to harvesting yeast, but BYO's Mr. Wizard, Ashton Lewis recommends a simple approach if you ferment in a carboy in *The Home Brewer's Answer Book*, which is as follows: About a week after primary fermentation is finished and the yeast is flocculated (clumped together and collecting at the bottom of the carboy), rack the beer away from the yeast leaving a little bit of beer behind. Swirl the carboy around and pour the yeast into a sanitized container.

Store the yeast in a plastic container with a little bit of headspace at the top, such as a sanitized soda bottle with a screw cap, as pressure can build from the release of CO_2. A screwcap will also allow you to open the bottle periodically to release the pressure. Don't forget to label and date the container so you know when it was harvested. Keep the container in the refrigerator for up to two weeks and use just like any yeast when you're ready, or you can use it to make a yeast starter.

Remember, though, if the yeast isn't good the first time, it won't be any better the next time around. If you think your yeast didn't ferment properly, start again on your next brew with fresh yeast.

Smoked Beers

Smoke your own malt or import it — your choice

by Betsy Parks

Where there's smoke, there's . . . beer? At least that's how we think it should be. With all the great smoked suds showing up on the market these days, we decided to ask this issue's three brewing pros, "What exactly makes a great smoked beer, and why?"

BRIAN O'REILLY, Brewmaster at Sly Fox Brewing Company in Royersford, Pennsylvania. Brian's Rauch Bier won the gold medal for Smoke-Flavored beer at the 2008 Great American Beer Festival. He originally planned to become either a teacher or lawyer, but fell under the spell of good beer during an overseas study program in Austria while attending Franciscan University in Ohio, inspiring him to begin homebrewing about 14 years ago. He worked as the Assistant Brewer at Brewers Bier Haus in New Hampshire and took over when Phil Markowski left to create Southampton Publick House. He also worked for the John Harvard's chain and helped create the short-lived New Road Brew House in Collegeville, Pennsylvania. He joined Sly Fox in March 2002.

Our Rauch Bier is a traditional German recipe, and the toughest part of making it was finding the right malt. For German beers that's the most important thing. The maltster does a lot of the work — we basically make a clean lager with smoked malt.

At Sly Fox, we buy imported, beechwood-smoked German malt from Bamberg, Germany, which makes up about 97% of the grain bill. I would say, however, that that kind of malt formulation is unique to beechwood smoked malt because you wouldn't want to use that much smoked malt with peat smoked or other types of smoked malts — the smoked flavor would be too overwhelming. In fact I've never heard of other types of smoked malts being used at 100 or even 50 percent of the grain bill. In our case there is just a small amount of German caramel malt to make up the remainder of the grains.

Besides the malt, we also use all German ingredients in our Rauch Bier, and we brew it pretty much straight to style. We brew it using a German mid-alpha hop to balance out the beer, because Rauch Bier is traditionally not a hoppy beer — the hops shouldn't get in the way.

Our Rauch Bier is pretty stable. It's not something that you would necessarily want to age, however, it's not a fast seller and we only keg it, and it's definitely good for six to ten months.

My advice to homebrewers who want to make a smoked beer is don't reinvent the wheel — there's no magic to this style, it's just using great smoked malt. Don't get in the way of that.

ANDREW BROWN, Head Brewer at Wynkoop Brewing Company in Denver, Colorado. Andrew has been brewing professionally for 10 years and for seven he was the head brewer at Left Hand Brewing Company in Longmont, Colorado. He later worked at Oskar Blues Brewery in Lyons. He took over at Wynkoop about half a year ago. He won two gold medals at the 2008 GABF.

Wynkoop's Silver Back Smoked Porter is not a traditional German style, but it's become a very popular style — there are a lot of smoked porters out there. Ours is fairly strong at 6.5% ABV. I try to achieve a nice bitterness between smoky and chocolate flavors.

We buy our smoked malt from Germany, which is beechwood smoked. I have smoked my own malt before at other breweries, but it is hard to make enough of it to use regularly. The best smoked flavor comes from freshly smoked malt. Time and freshness makes a difference.

If you're smoking malt, start with the base of a Munich malt. Be sure to mist it and keep it from drying out while you're smoking, which you can do on a rack or a screen. Smoking malt is not any harder than smoking food. For a porter, a good balance of smoked malt is about ¼ to ⅓ of the grain bill — 25 to 33%. If you use too much you can get bacon beer — and that's one that no one likes.

For yeasts and hops, usually the yeast character is subdued. For instance, I've never had a smoked Belgian beer. The hops we use are the subded English noble types, and like the Belgian, I've never had a smoked IPA or anything. Smoked beers are more about the malt.

Smoked beers can be aged, and actually we just had a 1994 Alaskan Smoked Porter at the 2008 GABF and it stood up over 14 years eventhough it isn't a super high-alcohol beer. The bigger, more alcoholic versions can definitely age. Most smoked beers, though, are pretty good fresh — I wouldn't say they always improve with aging.

If you want to try making a smoked beer at home, I would say try going lighter on the smoked malt at first until you figure out what a good level is for your beer. Your friends will definitely tell you if it's too smoky. Also, smoked beer and food pairing also has a lot of possibilities — so think about foods when you're making the beer.

CURTIS HOLMES, Plant Manager at Alaskan Brewing Co. in Juneau, Alaska. From brewing supervisor to production manager, Curtis has held many roles during his 17 years with Alaskan Brewing. As Plant Manager, Curtis is involved in all aspects of brewery operations, including the one barrel "Rough Draft" experimental brewing program and smoking the malt used in Alaskan Smoked Porter.

When Alaskan Brewing Company's owner Geoff Larson started developing the recipe for our Alaskan Smoked Porter, originally we were looking at doing a Rauch Bier and experimenting with the style using something indigenous to Alaska. Geoff settled on smoking the malt with Alder wood, which many Alaskans use to smoke fish and is a pretty common tree around here. For him it was pretty obvious and kind of fun to use in porter to give it an Alaskan flair.

Smoking your own malt is not too bad if you have the process to do it. It's helpful if you have a smokehouse or a friend with a smokehouse, but on a home scale if you have a small home smoker that works too. The trick to smoking malt is to have some kind of control. If the malt gets too hot and starts roasting it will give you characters you don't want. Since the grains are damp you don't want the grain to convert so keep the temperature under 100 °F (38 °C). Also, try not to smoke the malt for too long — we go on and off for about two hours.

Choosing a smoked malt really depends on the type of wood you use to smoke it. The wood we use is pretty delicate. Alder doesn't have a lot of sharp, burnt characters and we shoot for using less than 10% of the smoked malt in the grain bill. On the other hand, I know people who use beechwood smoked malt for up to 90% of the grain bill in their recipes. Probably our malt might be a little more intense because we smoke it ourselves, but choosing is all a matter of experimenting.

Some smoked beers can age well and our Alaskan Smoked Porter is a fun beer to experiment with. In 1993 we started doing vintages to see how they would age. Now we use those vintages for vertical tastings of about ten years. The beer and the smoke go through a bunch of changes and it gets sherry/port wine characters and the smoke flavor stays with it too.

Probably the biggest thing in making smoked beers is to try out a lot of experimentation with the type of wood the malt is smoked with and make sure the malt is slightly wet while you're smoking it. Different malts exhibit different wood characteristics. For example, pale malts tend to pick the smoke up better. You can really overdo it with ratios and the smoke can come through way too much.

Why Homebrew?

Caramelizing the electric way and diacetyl

"Help Me, Mr. Wizard"

by Ashton Lewis

Why homebrew?

After perusing *Homebrewing for Dummies*, which lists you as technical editor, and *The Homebrewer's Answer Book*, my previous experience converting really good apple juice, made from apples that my son and I picked, crushed, and pressed, into an undrinkable swill that I proudly called "cider", and the fact that it took me longer to peruse the two books than it would have taken to have made multiple trips to the supermarket to buy some superb craft-brewed beers, I concluded that for people like me, homebrewing is for dummies. Decision made, happy again, nothing to worry about — until my October 2008 edition of *Popular Mechanics* arrived. Now I'm supposed to believe that homebrewing beer is one of the 100 skills that, "every man should know," and it was ranked above knowing how to escape from a sinking car! Please explain to me why I need to know how to homebrew beer. Plus, can homebrewed beer ever be as consistently good as the likes of Sierra Nevada or Anchor?

Greg Lewis
Idaho Falls, Idaho

This question, albeit one of the campier questions I have received, left me scratching my head for an answer for several days. I can only answer by combining my personal feelings with assumptions I have about what may make some homebrewers tick. Homebrewing in the United States historically has its roots in pragmatism. At one time in our history homebrewing allowed people to (illegally) produce at home what they could not legally purchase. I think the homebrewers during the days of Prohibition were happy if they could brew something that was halfway drinkable as long as it provided a pleasant buzz.

There were not very many breweries that survived Prohibition and those that remained did not produce a very broad range of offerings. The number of breweries continued to decline after Prohibition's repeal as did the selection of beers until the number of domestic brewing companies dropped to fewer than 100 in the 1970's. This is really when today's homebrewing scene began to take shape. It seems that young Americans were aggressively seeking more flavorful foods and beverages; homebrewers during this time were brewing beers at home to satisfy this craving for flavor. One thing led to another and articles began popping up in news rags about microbreweries. Most of the early microbreweries had one thing in common and that was a group of brewers who began their journey brewing at home.

Nearly thirty years later the terms microbrewery and brewpub, collectively termed "craft breweries" in today's lexicon, are part of the fabric of America offering consumers a wonderful selection of beer. So I think things have reversed. Before, homebrewers brewed out of necessity. Now, many homebrewers brew because they feel encouraged by the number of really great beers available on the market largely brewed by those who got their starts as homebrewers.

In other words, craft brewers are trend-setting hipsters inspiring others to take the brewing plunge. That's why *Popular Mechanics* listed homebrewing as one of the 100 things real men must know how to do. And the editors of that magazine correctly listed knowing how to homebrew above how to escape out of a sinking car. Seriously, how many men do you know who drink beer? And how many do you know who have been in a sinking car, alive or deceased? It's clear to me that the latter skill is far more practical!

OK, so the above argument is a self-serving and narcissistic observation since I am a craft brewer. Maybe there are other reasons for homebrewing other than joining the ranks of the über cool. Some homebrewers want to outdo what we commercial brewers do. Given the excellent selection of palate-pushing beers available in most areas of the country this is not as easy as it once was, but a rising bar also leads to more aggressive competitors. And homebrewing competitions are certainly among the things motivating many backyard brewers. This unofficial training ground continues to spawn commercial brewers and upstart breweries.

Homebrewed beer can be truly exceptional in terms of flavor and these beers give brewers a lot of pride in their work. The honest answer about consistency is that commercial beers, with few exceptions, win that contest hands down. The two breweries you cite, Anchor and Sierra Nevada, are among my favorite domestic craft breweries and their consistency is notable. But consistency is only one aspect of quality. You can consistently produce something that is uninspired. You can also produce delicious beers that are totally inconsistent from batch-to-batch, yet each batch is delicious. While that lack of consistency would certainly result in failure in today's highly competitive beer market, it is not such a big deal for homebrewers.

As far as hobbies go, homebrewing does require some academic preparation before beginning and some investment in equipment. To some, building the gear is half the fun and I have tasted homebrew from those who have more talent building equipment than brewing beer. It doesn't matter if you are a builder, chef, chemist, biologist or artist. Homebrewing can be rewarding to all types and that is why I believe *Popular Mechanics* listed it as one of the top 100 skills every man must know.

Electric caramelization

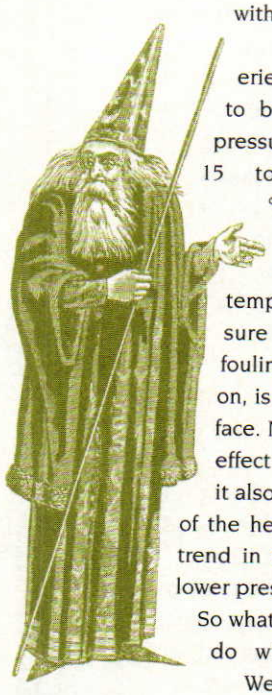
I'm currently building an electric kettle, upgrading my system to a double batch capability. I've done a lot of reading about electric kettles and there seems to be one camp that swears electric kettles won't caramelize the wort and the other camp swears they do. Can

you please clear this once and for all? Will an electric kettle caramelize wort?

Tony Brown
Queensland, Australia

I think I can set the record straight on this question rather quickly by stating that not all electric kettles will caramelize wort. Just as with cooking, be it in a sauté pan or on the grill, different amounts of darkening will occur depending on the temperature of the grill or sauté pan. If you want to caramelize onions, for example, you need to use a pretty hot pan and cook the onions long enough to caramelize the sugars. If onions are sautéed at a lower temperature they will turn clear and will be cooked, but they will not caramelize.

Boiling wort is a bit different than cooking onions, but many of the chemical reactions are the same. If you have a very high temperature differential between the kettle heating surface and the wort, the rate of browning reactions, such as caramelization, will be higher compared to kettles operating at lower differential temperatures. Stroh's beer, once a popular American lager, marketed the fact that it was "fire-brewed." This meant that they used small copper kettles that were heated by direct flame and this process detail did indeed impart flavors to Stroh's that made it taste different from beer brewed with steam heated kettles.



Indeed most breweries these days use steam to boil wort and the steam pressure typically ranges from 15 to 50 psi (~250–298 °F/121–148 °C). Higher steam pressure corresponds to higher steam temperature and if the pressure is too high excessive fouling, a nice word for burn-on, is seen on the heating surface. Not only can this have an effect on beer flavor and color, it also decreases the efficiency of the heating system. The going trend in steam heated kettles is lower pressure steam.

So what does any of this have to do with electric elements? Well actually, quite a lot. Since the temperature of an electric heating element can be changed just as the temperature of a steam coil, the notion of differential temperature applies equally to both. Except with an electric heater temperature is changed by reducing the amount of current that flows to the heating element. If you want to really geek out on this topic you can read up on Ohm's Law, potentiometers and resistors. But the key here is that you can control how hot an electric heating element gets when you supply power to it and by controlling the temperature you can successfully use electric heaters for brewing. Add a current controller, such as a rheostat, to your design and you will be in business!

Down on diacetyl

I seem to have a common issue with excessive diacetyl. I am quite wary of certain yeasts being more prevalent to this issue and the need for a temperature rest post primary fermentation. At first I thought it was a Wyeast 1968 issue, however I have since had issues with the Wyeast strains 1084, 1318 & 1272.

I am brewing all-grain beers using a stainless set-up with good fermentation temperature control to the nearest one degree. I typically ferment my ales between 18 and 20 °C (64 and 68 °F) with a rest of at least 2+ days. The beers usually spend a total of 2 weeks in the fermenter before I keg with yeast drawn off sometimes early and sometimes late. Note: I aerate the wort using pure O_2 for 30–60 seconds for a 35-L (9.2 gal.) batch and use a cone-bottom fermenter.

At the time of kegging, I always taste the green beer and cannot detect noticeable amounts of diacetyl. I then put the kegs in a smallish under-bench keg chiller and pressurize to ~15 psi at approximately 4-6 °C (39-43 °F). I then wait a couple of weeks. The beers all seem to develop diacetyl over this period. At first I thought it could be the forced carbonation that was causing it so I tried kegging early to naturally pressurize. This however didn't seem to make a difference.

Now I'm wondering if it is the chiller, which constantly vibrates — considerably more than your average fridge. Could the yeast be flocculating prematurely and stressing or is it potentially something else, for example, bacteria?

I am on non-chlorinated country water and use Proxitane as my non-rinse sanitizer. I am fairly confident it shouldn't be bacterial, however I have had the 20-L (5.3-gal.) drum of Proxitane for about five years now. Does it have a shelf life in its concentrated pre-mixed form? I am basically looking for any advice regarding potential cause of my consistent diacetyl issue, particularly how it seems to develop once in the keg.

Craig Fitzpatrick
Tauranga, New Zealand

At first glance I suspect that the yeast strains you like may be the culprit. Most of the strains are described as highly flocculent on the Wyeast Web site and these types of strains often drop out so effectively that a diacetyl rest is difficult because much of the yeast is on the bottom and contact between diacetyl in the beer and yeast cells is limited. I have had problems with diacetyl using flocculent strains in unitank fermenters and solved my problem by simply changing yeast strains, in particular selecting less flocculent yeast.

To test this idea I suggest giving Wyeast 1056 a try. This yeast is popular among homebrewers and US craft brewers. A feature of this strain is that it is not very flocculent and if you like clear beer you will need to do more than simply wait for the beer to clarify. Finings or filtration is really required for a bright beer. Clarity aside, you should be able to produce a very clean and diacetyl-free beer using 1056. If you are unsuccessful with this strain, then you may be picking up your diacetyl from bacteria as you suggest.

The sanitizer you are using contains peroxyacetic acid (PAA) and this is one of my favorite sanitizers. PAA, although sharp-smelling and wicked on skin and mucous membranes, is very beer friendly since it decomposes into water and vinegar. This decomposition occurs when PAA, a strong oxidizer, comes into contact with soils and also occurs over time with storage, especially if stored hot. It is important to recognize the fact that PAA, like other peroxide-based cleaning products, does not have an indefinite storage life.

While the storage life of PAA does depend on how it is stored, I have seen data sheets that indicate a reasonable shelf life of 6–12 months at room temper-

ature. If your 20-L (95.5-gal.) jug of PAA is five years old, and it is the only sanitizer you are using, you may be unknowingly omitting your sanitize step. PAA has a strong odor because of the acetic acid portion of the molecule and concentrated acetic acid is just as sharp as PAA.

There are other diacetyl remedies that I did not mention because I don't think they are the cause of your problems. Increasing the length and/or temperature of the diacetyl rest and minimizing air pick-up after the diacetyl rests are two things that brewers use to combat diacetyl. But I really think your problem is either due to yeast selection or the efficacy of your sanitizer. Good luck!

Homegrown bittering

There has been a fair amount of information on growing hops in *BYO* and other places, but each source basically suggests home grown hops should only be used for aroma or flavoring purposes. Since I'm putting a lot of work into digging, planting, fertilizing, and watering hops I would like to get the maximum use out of my hop work. Is there a way to make an estimate of the bitterness potential of my home grown hops using brewing equipment before brewing, or is there some place we could send our hops for analysis to get the alpha acid value that wouldn't break the bank?

John Jackson
Accokeek, Maryland

So you are growing hops and want to use them for all things in your homebrew. That's great, but just because you cannot use ProMash to calculate your hop bill and don't have access to an HPLC or an organic chemistry lab does not mean that you have come upon a brick wall. I encourage you to look back instead of forward. Forget about trying to find a lab that will perform hop analyses for a fee and pretend you have never heard of an alpha-acid unit.

My suggestion to home hop growers who really have enough hops to use for all brewing purposes is to make a blend. The blend will be used exclusively for bittering. Aroma varieties can be kept separate and evaluated for before using. The blend may be a blend of your entire harvest, or if you have enough hops of a given variety may be a blend of all of the hops of a given variety harvested in the same year.

Now it is time to do some test brews. Make enough wort to have reasonably sized test batches in the hope that you can blend the batches together and have a decent beer to drink at the end of the study. Each test batch will be boiled and fermented separately with the only difference between batches being the hopping rate. The objective is to assess the bittering value of the crop and to do this you really should use a single addition at the beginning of the boil to reduce the number of variables in the experiment. You can dry hop later if you want aroma.

Some assumption needs to be made on hopping rate. Since we do know about alpha-acids and varietal characteristics we can use that information. Suppose you have Cascades. You could reasonably

assume that the widest range in alpha acid content will be anywhere from 2–10%, where 2% is extremely low and unlikely for commercially grown hops and 10% above the varietal norm.

The experiment is relatively easy and uses your brewing equipment. Begin by making enough wort to produce five test fermentations. One-half to 1 gallon (1.9 to 3.8 L) of beer per test batch will suffice. Since 0.5 gallon (1.9 L) glass jugs are easy to obtain it makes sense to produce enough wort for five 0.5-gallon (1.9-L) batches all made from the same wort. Calculate your hopping based on 2, 4, 6, 8 and 10% alpha and target the same bitterness level in all cases and add the hops at the beginning of the boil.

Cool, aerate, pitch and ferment the five test batches in the same fashion. After primary fermentation is complete and the yeast has begun to settle, pull samples from all batches. Using a commercial reference with a known bitterness level you can determine the two samples that surround your reference. For example, if your commercial reference beer is a helles lager with 20 IBUs of bitterness you will taste your samples and select the two samples that are closest in bitterness to your reference. Then you can use your brewing calculations to estimate the alpha-acids in your home grown hops.

"My suggestion to home hop growers who really have enough hops to use for all brewing purposes is to make a blend."

If this is all sounding too approximate do some reading on the hop storage index and you may find that brewing trials are an improvement! Since hop analyses are typically performed at the time of harvest and hop acids deteriorate with age, most brewers actually know a lot less about hop alphas than they think. So with a bit of experimentation you can come up with a pretty darn good feel for what you have at hand and be able to utilize your crop in a controlled fashion.

Brew Your Own Technical Editor Ashton Lewis has been answering homebrew questions as his alter ego Mr. Wizard since 1995. A selection of his Wizard columns have been collected in "The Homebrewer's Answer Book," available online at brewyourownstore.com.

Do you have a homebrewing question for Ashton? Send inquiries to *Brew Your Own*, 5515 Main Street, Manchester Center, VT 05255 or send your e-mail to wiz@byo.com. If you submit your question by e-mail, please include your full name and hometown. In every issue, the Wizard will select a few questions for publication. Unfortunately, he can't respond personally. Sorry!

Fruit Beer

Making the case for a good base

by Jamil Zainasheff

Many brewers think fruit beer is a style for beginners. While great fruit beers are not particularly difficult to make, they do require that the brewer make a great base beer first. If the base beer is no good, adding fruit will not make it better. It might help mask some off flavor or add some character to a beer with little flavor to begin with, but you'll never make a truly great fruit beer this way. Great fruit beers are not created by accident; they're carefully crafted.

Selecting a base beer style

When making fruit beer, first think about what character (flavor, aroma, mouthfeel and appearance) you are trying to achieve. I like to think of favorite foods to help me decide which fruits might go with different beers. Often the food for my inspiration is a dessert of some kind, but any food that incorporates fruit can be a source of ideas. Let's say I want to make a beer with apricots from the tree in my yard. I might look at apricot pie for inspiration. What are the key flavors of an apricot pie? Apricots certainly, but don't forget the pie crust. The crust is bready with some sweetness. What beer style is similar to those pie crust flavors? Perhaps American wheat beer might have some of those pie crust flavors? If you want to use a dark beer style as your fruit beer base, think of foods that incorporate coffee or chocolate. Once you have a few fruit beers under your belt, you can branch out and be a little more wild and creative, but if you want success early on, stick with the flavor combinations you know will work.

In selecting a base beer, beer styles with minimal hop aroma and flavor work best. Not that it is impossible to marry hop character and fruit character, but the two can conflict in unusual and unpleasant ways. Once you decide what beer style to use and what fruit to add, you can use any balanced recipe as the base for your fruit beer. However, you'll probably want to make some adjustments. If you're trying to create the impression of a sweet dessert, you'll want to make the beer a little sweeter than a standard, evenly-balanced recipe. Generally, lowering the hop bittering by 10 to 20% will let just the right amount of sweetness come through. In most cases, if the recipe has a lot of late hop additions, you should significantly reduce or remove them from the recipe.

Selecting a fruit

Different fruits have different levels of acidity, tannins, bitterness, and sourness. In most fruit these characteristics would be unpleasant without some fruit sweetness to provide balance. Some years a fruit crop may be more tart or sweet, more flavorful or less, and you will need to keep that in mind as you try to balance the beer. Even though the fruit sugar may balance the fruit itself, you can't count on the fruit sugar to balance your beer. In a well-

RECIPE

Apricot Wheat

(5 gallons/19 L, all-grain)

OG = 1.049 (12.1 °P) / 1.051 (12.6 °P) with fruit
FG = 1.013 (3.2 °P)
IBU = 18 SRM = 6 ABV = 5.1%

Ingredients

4.8 lb. (2.2 kg) Great Western American two-row malt (2 °L)
4.8 lb. (2.2 kg) Great Western wheat malt (2 °L)
0.5 lb. (227 g) Great Western crystal malt (15 °L)
3.0 lb. (1.36 kg) Oregon Fruit Products apricot puree
3.75 Willamette pellet hops, (0.75 oz./21 g at 5.0% alpha acid) (60 min.)
White Labs WLP320 (American Hefeweizen), Wyeast 1010 (American Wheat) or Fermentis Safale US-05 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 154 °F (68 °C). Hold the mash at 154 °F (68 °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 6.5 gallons (24.6 L) and the gravity is 1.038 (9.4 °P).

The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes left in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill rapidly to 65 °F (18 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Use 10 grams of properly rehydrated dry yeast, 2 liquid yeast pack-

RECIPE (continued)

ages, or make an appropriate starter. Ferment at 65 °F (18 °C). When initial fermentation slows, add apricot puree to a second fermenter and carefully rack the beer onto the fruit. Fermentation should pick up again as the yeast consumes the fructose in the fruit puree. Once fermentation finishes, carbonate to approximately 2.5 to 3 volumes.

Extract with Grains Option

Replace the American two-row and wheat malt with 6.6 lb. (3.0 kg) of liquid wheat extract. Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Steep the bag in ½ gallon (~2 liters) of 170 °F (77 °C) water for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Let the bag drip into the kettle while you add the extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil kettle volume around 6.5 gallons (24.4 L) and the gravity is 1.038 (9.4 °P). Follow the remaining instructions for the all-grain recipe.

Raspberry Robust Porter

(5 gallons/19 L, all-grain)

OG = 1.064 (15.7 °P) / 1.066 (16.2 °P) with fruit
FG = 1.017 (4.4 °P)
IBU = 30 SRM = 37 ABV = 6.5%

Ingredients

10.4 lb. (4.7 kg) Great Western American two-row malt (2 °L)
1.5 lb. (0.68 kg) Durst Munich malt (8 °L)
14 oz. (397 g) Great Western crystal malt (40 °L)
11.0 oz. (312 g) Great Western chocolate malt (350 °L)
7.0 oz. (198 g) Briess black patent malt (525 °L)
3.0 lb. (1.36 kg) Oregon Fruit Products raspberry puree
1.33 oz. (38 g) Kent Goldings pellet hops, 5% alpha acid (60 min.)
White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Fermentis Safale US-05 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 154 °F (68 °C). Hold the mash at 154 °F (68 °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 6.5 gallons (24.4 L) and the gravity is 1.050 (12.3 °P).

The total wort boil time is 90 minutes. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort rapidly to 67 °F (19 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Use 12 grams of properly rehydrated dry yeast, 2.5 liquid yeast packages, or make an appropriate starter. Ferment at 67 °F (19 °C). When initial fermentation begins to slow, add raspberry puree to a second fermenter and carefully rack the beer onto the fruit. Fermentation should pick up again as the yeast consumes the fructose in the fruit puree. Once fermentation finishes, carbonate to approximately 2 to 2.5 volumes.

Extract with Grains Option

Replace the American two-row and Munich malt with 3.3 lb (1 kg) of a blended Munich liquid malt extract and 4.5 lb (2 kg) of a pale or light liquid malt extract. Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Steep the bag in 1 gallon (~4 liters) of 170 °F (77 °C) water for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Let the bag drip into the kettle 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 kettle volume around 6.5 gallons (24.4 L) and the gravity is 1.050 (12.3 °P). Follow the remaining instructions for the all-grain recipe.

attenuated, average or lower strength beer, any added fruit sugars will ferment out, contributing little to the residual sweetness. Think of it this way: the sweet is going to ferment out and the sour or other flavors will be left behind. By contrast, if you add fruit to a beer high in alcohol and/or residual sweetness, the additional fruit sugars may not attenuate much. If you add a really sweet fruit, it can make an already sweet beer cloying. In all cases, if the yeast has reached its limit, don't expect it to work miracles on the fruit sugars. When making bigger beers, like barleywine, it is best to select a type of fruit that is not overly sweet or to tweak the recipe so that the beer attenuates a bit more than normal. If you use fruit with a substantial sour or bitter character, you may want to reduce the hop bittering to compensate. Pay attention to the amount of sweetness and sourness in your fruit and target your recipe changes to balance it with the right level of malt sweetness.

Fruit forms and amounts

The common fruit forms used in fruit beer are whole fruit (fresh or frozen), fruit puree, and fruit flavoring (extract). The form of the fruit can make quite a difference in the final beer. In general, you want to use real fruit in fruit beers, but that doesn't necessarily mean whole, fresh fruit. I can appreciate the desire to use fresh fruit, and in a beer style with light flavors, the difference can be noticeable. If you happen to have a tree that produces a lot of great fruit, then this can be a good option. However, I find the results of most fresh fruit additions highly variable, often disappointing and expensive if purchased at the grocery store. A more convenient and often better choice is fruit that has already gone through some processing, like canned fruit puree. It is consistent, easy to use and reasonably priced. The flavor of fruit puree compares favorably with fresh fruit and is far superior to fruit flavoring. Fruit flavoring is very convenient and inexpensive, but the flavor can seem artificial in most beers. In side-by-side tests, everyone I've asked has been able to pick out the beer made with fruit flavoring.

The amount of fruit needed is going to vary from beer to beer and fruit to fruit. In a beer with very little specialty malt the fruit character comes through quite well

and less fruit is needed. In a beer with a lot of specialty malt or lots of dark malt flavors, it takes more fruit to get the flavor to be evident. For example, if you were making a cherry beer, you'd need far fewer cherries in an American lager than you'd need in a Russian imperial stout. Of course, fruits are different too. Some fruits, such as raspberry, have a very bold flavor and take less fruit to make an impact on the beer. Other fruits, like strawberry, require a lot more before the flavor is noticeable. A good starting point for most fruits is about 0.5 lb (227 g) of fruit puree per gallon (3.8 L) whether you are using a mild fruit in a mild beer or using a bold fruit in a bold beer. If you are adding a milder fruit in a bold beer, using 2 to 4 times the amount of fruit is not unreasonable. If you're using a bold fruit in a mild beer, you might cut the amount of fruit in half. The idea in most cases is to get a nice balance between the fruit and the beer. Of course, there are exceptions. If you want to make something similar to a New Glarus Raspberry Tart, you'll want to use a very light beer style and a massive amount of fruit. You don't want balance in that case, but rather an overwhelming fruit character and very little beer character.

A common concern when working with whole fruit is how to sanitize it. Some folks just toss the fruit, wild yeast and all, into the beer and count on the beer's alcohol and pH to prevent the organisms from taking over. That might be OK for higher alcohol beers (> 8% ABV), but I still don't like the risk. If you're using fruit with a skin and don't plan on adding the skin to the beer, then washing the fruit and peeling off the skin will suffice. If you want the skin in the beer (for some fruits much of the fruit character is in the skin) wash the fruit and cut off any nooks and crannies that can't be washed thoroughly. Of course, if you're using raspberries, or something similar, there is no easy way to wash away wild yeast and bacteria. In that case it is better to quickly pasteurize the fruit by raising its temperature to 161 °F (72 °C) for 15 seconds. The easiest way to do this is to heat some water to approximately 170 °F (77 °C), add the fruit, and hold for approximately 1 minute. You can then cool the fruit back down with cold water. For most fruits, it is best not to add them to the boil. Adding fruit to the boil tends to drive off

the more delicate fruit character, gives fruit a cooked flavor, and will often cause a pectin haze in the beer.

Another concern is how to expose the insides of the fruit to the beer and the yeast. If you dropped a whole watermelon into your beer, you wouldn't get much flavor. You need to cut the fruit open to expose as many of the cells and the contents of the cells as possible (this is one reason puree is easier). You can take a knife, blender or hammer to your fruit to accomplish this, but another method that works well with many fruits is freezing, which can break down the cell walls. For greater effect, freeze the fruit slowly (to encourage larger ice crystals to form and pierce more cell walls). If one freezing cycle isn't enough, you can thaw and refreeze the fruit to further break down the cell walls.

I prefer to add fruit to beer when the most active part of fermentation is beginning to slow, as vigorous fermentation can drive off precious aromatic compounds. First I add the fruit to a clean fermenter, and then I transfer the beer onto the fruit. The longer the beer sits on the fruit, the greater the fruit flavor in the finished beer. There is a practical limit however. If the fruit you're using has a very tannic or bitter skin, pith, seeds, or core, leaving the beer on the fruit for too long can add harsh notes to your beer. Try to minimize headspace to reduce oxidation while your beer sits on the fruit.

What about fruit extract?

While flavor extracts may not make the greatest fruit beer, the reality is that it is a very easy and inexpensive method. In some cases a few extracts, such as peach, tend to be much more effective than real fruit. Extracts are also handy if you've brewed a fruit beer that seems lacking in fruit character. With judicious application of fruit extract, you can brighten up the fruit character as needed. Keep in mind, though, only some fruit flavors work well. Some extract flavors, like cherry, always seem artificial.

If you're willing to experiment and put some time into the use of fruit extracts, there are a few techniques that can help give the impression of real fruit. The mistake most brewers make is to just dump in whatever fruit extract is close at hand. They buy a 4 ounce (118 mL) bottle of extract from their homebrew store and dump in the entire thing. Ask yourself one question: Does it make sense that every beer would require exactly the same amount of fruit extract? No, so don't add the whole bottle. How much extract does it require? It depends on the beer.

The problem with many fruit extracts is that they either taste or smell like fruit, but not both. The trick is to use more than one fruit extract. You want to find an extract that produces the best fruit flavor

> "Just because a hop may be described as citrusy, that doesn't mean it is a great partner with citrus fruits."

and another that produces the best fruit aroma. Here is an example. Often the raspberry fruit extract that you find at your local homebrew shop has a nice fruit flavor, but not a great fruit aroma. If you add that extract to a beer, by the time the aroma is acceptable, the flavor is often over the top. Let's say you pick up another brand of extract, maybe at your local grocery store, and you find that it doesn't have much flavor, but a great aroma. Using both extracts together, it is possible to get the right balance of flavor and aroma, providing a much more realistic fruit character than using just one extract. Another common problem with extracts is that they often don't convey the tartness of real fruit. Adding a small touch of acid blend or citric acid can enhance the overall perception that you used real fruit.

Any time you plan to dose a beer with extract or acid, you'll want to experiment on a small sample first, and then scale it up to the entire batch. Start by setting up your blending/tasting area. It should be free from distractions, strong aromas, and so forth. Make sure you have plenty of sample cups, accurate measuring instruments, water and un-salted crackers to cleanse your palate, and something for taking notes.

Measure a given amount of the base beer (perhaps 100 mL) and then add, in measured doses, fruit extract. The amount you add might be anywhere from 1 drop to 100, depending on how prominent the flavor or aroma is that you're trying to create. As you work, smell and taste the beer. If something goes wrong, start over. If you mess up, don't try to fix it by dumping more beer in the cup and losing track of your measurements. Instead, start with a fresh beer sample. When you've found the right combination, scale your measurements up to the volume of beer you want to dose. At first, add only ¾ of the calculated amount, mix, then taste the beer. Maybe wait a day or two and see how it tastes when your palate hasn't been bathed in fruit extract all afternoon. If it needs the rest of the extract you can add it, but keep in mind it is easier to add extract than it is to remove it.

Hops and yeast

The hops, yeast, and fermentation profile for a fruit beer vary widely. Keep a couple of things in mind as you make your selections. Just because a hop may be described as citrusy, that doesn't mean it is a great partner with citrus fruits. In general, less hop flavor is better. If the beer needs substantial bittering, select a high alpha, clean bittering hop, like Magnum or Horizon. This helps keep hop flavor to a minimum.

Yeast selection is a little trickier. The easy way is to go with "cleaner" strains of yeast, which don't produce a lot of esters or phenols, such as White Labs WLP001 California Ale, Wyeast 1056 American Ale or Fermentis Safale US-05. The benefit is less yeast character to get in the way of or clash with the fruit character. But if you're trying to brew a fruit beer based on a classic style that requires phenols or certain esters, then you can't use a neutral yeast. If that is the case, you can always play with fermentation temperatures, pitching rates, and oxygen levels to develop a fermentation profile that is in harmony with the fruit and the beer.

Jamil Zainasheff writes "Style Profile" in every issue of Brew Your Own.

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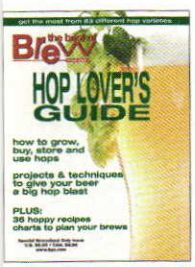

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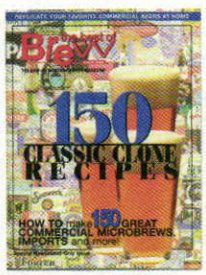

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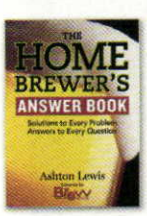

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by **Chris Colby**

SMOKED

SMOKED BEERS tend to elicit strong reactions from beer drinkers. The first time most people try one, they either say, "It tastes like a campfire. Yuck" or, "It tastes like a campfire — awesome!" The first smoked beer I ever had was an Aecht Schlenkerla Rauchbier Märzen. I was in graduate school, relaxing at a bar with some friends. The place had a huge beer list and I was determined to try at least one new beer every time we went there. I remember being blown away by the almost bacon-like smoke character in the beer. I had just started brewing not long before, so one of my friends asked, "How did they do that?" At that point, I had no idea. None of my homebrew books mentioned smoked beers. At that time, I guessed that the brewers either stored the beer in wooden barrels or bubbled smoke through it.

As it turns out, I was way off. Brewing a smoked beer requires no special steps or equipment, just a special ingredient — smoked malt. Smoked malt is simply malt that has been dried in the presence of smoke. There are commercially-produced smoked malts and you can also smoke your own malt at home.

BEERS

Smoked Beers

You can make a smoked version of any beer you like, but commercial examples come from a few select styles. Two breweries in Bamberg, Germany — Schlenkerla and Spezial — have produced smoked German lagers and ales for centuries. These include Märzens, bocks, doppelbocks and weizenbocks. American microbreweries have also experimented with smoked beers, with porter being the most commonly smoked style. (See the recipe for Stone Smoked Porter on page 44.) Although smoked beers are relatively uncommon, smoked foods are not and we can learn much from examining them.

Smoke and Food

Smoke has many component molecules, and its interaction with food has been extensively studied. Common smoked foods include fish (especially salmon), ham and bacon, sausages, cheeses, chipotle (smoked jalapeño) peppers and many others — including, of course, smoked malt used in the brewing of smoked beers and in the production of whiskey.

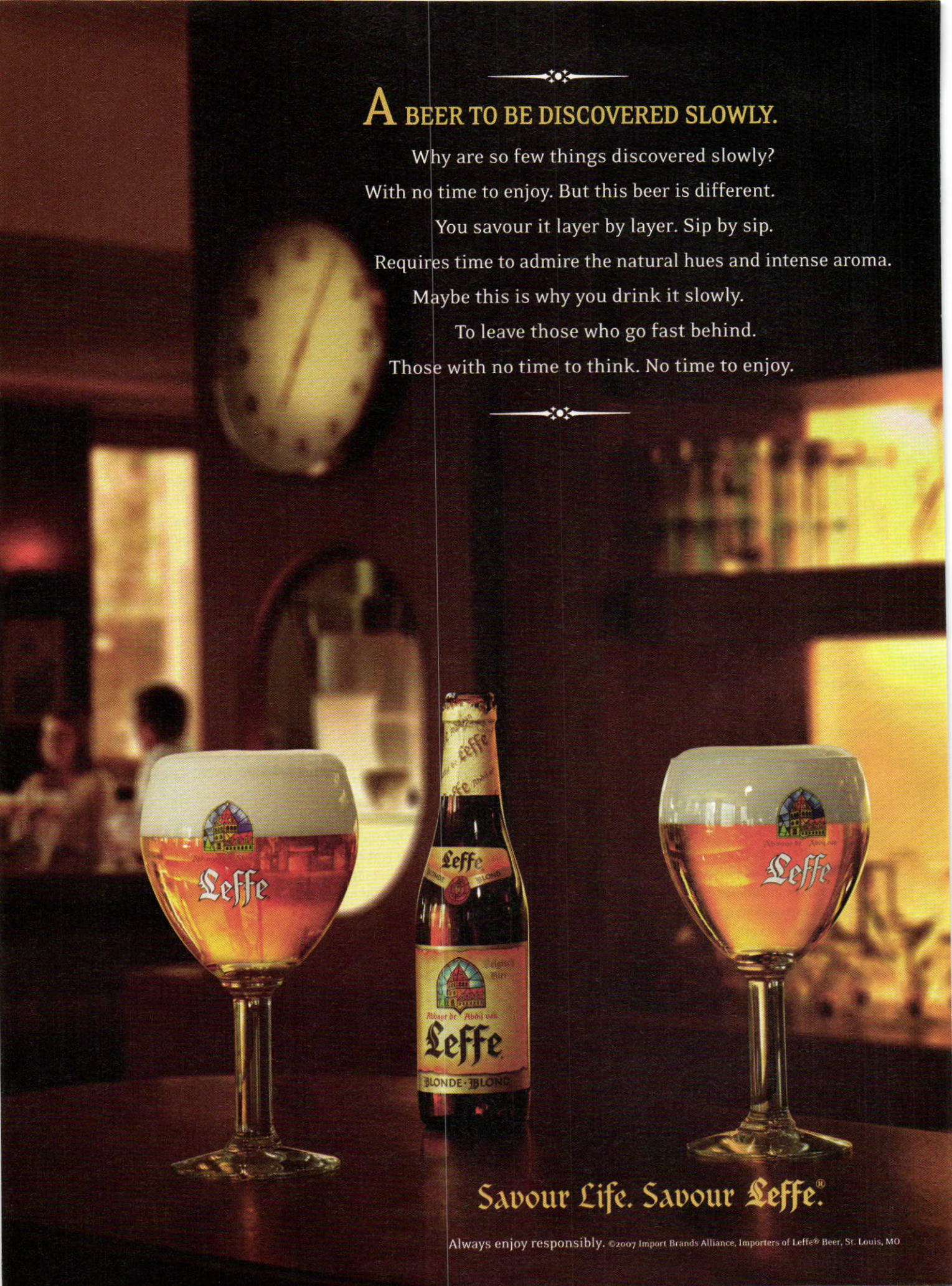
Smoke contains a variety of compounds that retard spoilage, including formaldehyde, acetic acid (the acid in vinegar) and various phenolic compounds. Some of these phenolics also have anti-oxidant properties. The anti-oxidant properties of smoke were a big reason it was used on fish before refrigeration. The anti-oxidants kept the fats and oils on the surface of the fish from going rancid. (Rancidification is the decomposition of fats or oils.) This — usually in combination with salting or drying — allowed fish to be stored for weeks. The pH of smoke is also very low, usually under 2.5, which makes it hostile to microorganisms.

These days, food is smoked primarily for the flavor contribution of the smoke. When wood is burned, smoke can smell of caramel, bread, fruits, flowers, vanilla, clove and many other things. It also, of course, has a smoky pungency to it. The character of the smoke depends largely on what kind of wood is being burned and under what conditions. Many of the phenolic compounds in smoke are quite reactive and thus smoke flavors can diminish in foods, sometimes in a matter of weeks.

For all the wonderful properties of smoke, it does have the potential to cause health problems. Burning wood gives off polycyclic aromatic hydrocarbons (or PAHs). Many of these compounds have been found to be carcinogenic. Commercially produced smoked malt is made under conditions to minimize PAH content and in the sidebar on smoking malt, I'll explain how to reduce your risk. PAHs are found in many foods — most especially foods grilled over wood — and you can never completely eliminate your exposure to them.

What's in Wood

Wood is composed of three major materials, cellulose, hemicellulose and lignin. Cellulose is a linear chain of glucose molecules, similar to starch, but bonded together in such a way as to be indigestible by animals. (Termites can digest the cellulose in wood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Bamberg, Germany is home to two breweries that specialize in smoked beers — Sclenkerla and Spezial. Sclenkerla (pictured here) goes so far as to make their own beech-smoked malt.

due to bacteria in their guts that can degrade cellulose.) A typical chain of cellulose contains 7,000 to 15,000 sugar subunits.

Hemicellulose is similar to cellulose, but is composed of many different types of sugars beside glucose. These include xylose, and lesser amounts of mannose, galactose and arabinose. Hemicellulose usually contains around 200 sugar subunits in a branching configuration.

When cellulose or hemicellulose is burned, it gives off many compounds, including furans (which smell sweet, bready and floral), lactones (which smell like coconut or peach) acetaldehyde (green apple), acetic acid (vinegar) and diacetyl (buttery).

Lignin is a class of molecule composed of many rings of carbon atoms. The more lignin in wood, the hotter it burns. The phenolics in smoke come from the decomposition of lignin. These include guaiacol (which smells smoky or spicy), vanillin (the main aromatic compound in vanilla), phenol (pungent), isoeugenol (sweet or clove-like) and syringol (spicy, sausage-like).

One of the minor components of wood is protein, so smoke can also contain Maillard products, those "browning products" formed by the interaction of sugar and amino acids under heat. If you are an advanced homebrewer, you probably recognized many of the compounds mentioned above. If not, though, don't worry, the point is that smoke contains a large number of molecules that can confer flavors or aromas to smoked malt.

Malt

If you're going to brew a smoked beer at home, you first need to find a source of smoked malt. There are two commonly-available commercial smoked malts available to North American homebrewers , Weyermann rauchmalz (smoked malt) and peat-smoked malt. Peated malt is available from maltsters Hugh Baird, Thomas Fawcett and Simpsons. In addition, you can smoke your own malt — see the sidebar on page 34.

Weyermann rauchmalz is a pale, base malt (1.7–2.8 °L), smoked over beechwood. Beech is native to Europe and North America and is used frequently as firewood because it burns steadily and cleanly. (Beech is also the wood that Anheuser-Busch uses to age Budweiser on. In their conditioning tanks, it serves as a place for the yeast to settle.) Rauchmalz has a fairly mild smoke character and can be used for up to 100% of the grist.

Peat-smoked malts are also light in color — generally 2–3 °L — but have a much more intense smoke character. Peat is partially-decomposed organic matter (mostly mosses and lichens) that forms in acidic wetlands called bogs. In many countries, it is dried and burned as fuel and its smoke has a very distinctive aroma. For awhile in North American homebrewing, it was practically *de rigueur* to add peat-smoked malt to Scottish-style ales. These days, the pendulum has swung the other way and this practice is avoided as it never was a traditional commercial practice.

Some maltsters make peat-smoked malt with different levels of smoke character. In general, peat-smoked malt should be used in very small quantities, perhaps up to 5% maximum for the lightly-peated versions. The primary customer for peat-smoked malts is distilleries.

How much?

The big question many homebrewers will have is, of course, how much smoked malt to add when brewing a smoked beer. As it turns out, it's hard to give a firm answer. For one thing, the strength of smoked malt varies. Even if the maltster imparted exactly the same amount of smoke character to each batch — which is doubtful — smokiness declines over time. And, when using home-smoked malt, your results can vary wildly. If you were brewing a series of smoked beers, you could easily use the first as a gauge of the intensity of the smoke in the malt. However, for most homebrewers, their smoked beer is going to be a standalone brew. So, with that in mind, here is a rough guideline for smoked malt additions.

When brewing with peat-smoked malt, restraint is the watchword. With this malt, it is unlikely that you would ever want to

"The big question many homebrewers will have is, of course, how much smoked malt to add when brewing a smoked beer."

exceed 5% of the total grist. In fact, unless you really like gobs of smoke, with a pungent "peaty" character, you'd be better off keeping this to 1% or below.

When brewing with the milder rauchmalz, even a small amount will give a hint of smoke. Using from 1 to 5% rauchmalz will yield a beer with smoky highlights that accentuate the other flavors in the beer. At around 25% rauchmalz, the beer will have a definite smoky character that stands out, but doesn't dominate the beer's flavor and aroma. This is a nice level for smoked porters, if you want both the smoke and dark grains to be on near equal footing. At around 50% rauchmalz, you will have a distinctively smoky beer. The smoke will not completely overpower the other flavors in the beer, but it will be the dominant one. At this level, the smoke intensity will be similar to that of the beers produced by Schlenkerla Brewery. From there, you can scale the smoke malt all the way to 100% of the grist. I've made beers with around 98% rauchmalz (and just a little CaraMunich®) and they have been smoky, but not over-the-top for a smoked beer lover.

Water

When brewing a smoked beer, you need to ensure that you eliminate any form of chlorine from your brewing liquor. Otherwise, the phenols in smoke will react with the chlorine (including chloramines) and produce off flavors. One sure way to eliminate all forms of chlorine in your brewing water is to treat it with a potassium metabisulfite. To do this, add one Campden tablet — available at any home winemaking shop — to every 20 gallons (76 L) of water and let it sit overnight, loosely covered. The Campden tablet will dissolve and produce SO_2 gas that will react with the chlorine, neutralizing it. This will happen very quickly. The overnight stand is simply to let the gas diffuse out of the water. (If you're pressed for time, you can skip that last part.)

Hops

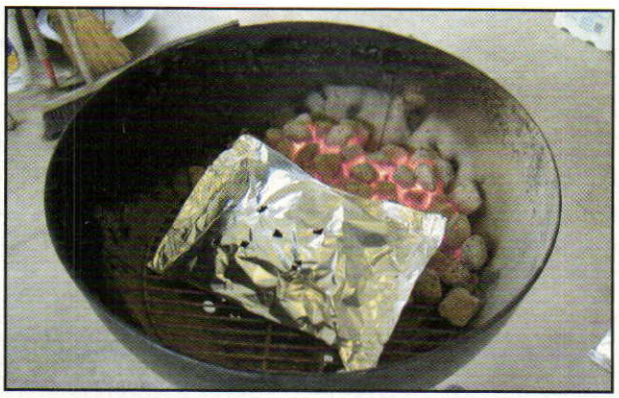
Smoked beers can have a moderate amount of hop bitterness, but smoke seems to clash with hop flavor or aroma. Most smoked beer recipes are either malt-focused or get all their hop character from an early addition of hops. On the other hand, you might find a combination of wood, hop variety and other ingredients that mesh well. Feel free to experiment, if you know the risks.

Yeast and Fermentation

Every commercial smoked beer I've ever tasted has been made with a "clean" strain of yeast. Lager yeasts for the Märzen-style beers and ale yeasts with a restrained amount of fruitiness for the porters and other ales. To preserve as much of the smoke character as possible, it would be wise to ferment the beer at the low end of the recommended temperature range. Be sure to pitch an adequate amount of yeast, however.

There are smoked wheat beers, and the clove-like aspects of a German hefe-weizen strain could mix well with the smoke — and, if you're feeling adventurous, maybe a smoked Belgian? The possibilities are only limited to what you can think up sitting around the campfire.

Smoking Malt at Home



Smoking your malt at home is straightforward and allows you to give your beers a very personal touch.

Types of Wood

There are many types of wood that can be used for smoking malt, and your best bet is to look for common woods used in smoking food. These include alder, oak, hickory, mesquite, pecan, maple, apple, beech and cherry. Avoid soft woods, such as pine, and do not use lumber (which may be treated and could give off toxic fumes when heated). Barbecue or grilling supply stores are a great place to find cured hardwood chips that will work well.

Types of Smoking

When it comes to food, there are numerous kinds of smoking, including smoking (or barbecuing), hot smoking and cold smoking. Smoking, as the term is most commonly used, refers to slow-cooking meat at around 250 °F (120 °C) for several hours. During this time, the food absorbs smoke from the hardwood burned as the heat source. Hot smoking is a term used to describe foods that are smoked at 165–185 °F (74–85 °C) until they have cooked and absorbed the proper amount of smoke flavor. Ham is commonly hot smoked until is reaches an internal temperature of 150 °F (66 °C). Cold smoking involves exposing food to smoke at relatively cool temperatures, usually under 100 °F (38 °C). The exposure time can be short, just long enough to get the desired smoky character. Foods smoked in this manner must be cooked prior to eating.

When smoking malt, keep in mind that the hotter the temperature, the more you will be roasting it — developing more color and, for base malts, reducing it's diastatic power. For home-smoking malts, a cold-smoking approach can deliver smoke flavor without "cooking" the malt too much. This isn't to say you couldn't use smoking to both impart a smoked flavor and to kiln the grain, but you'll likely get better results the first time you try it if you cold smoke the grains. (Cold smoking also reduces the risk from PAHs.)

You can employ a home smoker, a grill or a barbecue to home smoke malt. I'll describe how I've done it at home on my Weber grill.

Take a couple handfuls of wood and soak them over night in water. Using big chips or small chunks will work best for a short, cold-smoking procedure. When they are ready, pour the water off and wrap them in heavy-duty aluminum foil, making a flat pouch. Poke a few dime-sized holes in the pouch. Place a couple layers of coals over one half of the lower grill grating and let them burn completely down to coals. (If you do this on a day you are grilling something for dinner, you can grill your food, put the cover on — with the vents open — while you eat and then come back and smoke your malt.) Place the wood pouch directly on top of the coals. Put the top rack on the grill and place aluminum screening, cut from screen door material, over that rack. (If you grilled food earlier, scrub the upper rack well or use a different one.) Place the lid on the grill, with the vents open, and wait for the wood to start smoldering. Once it is producing a steady amount of smoke, prepare your malt.

Take a squirt bottle of chlorine-free water, and wet the malt. How wet you get the malt will depend on how long you plan to smoke it. For your first time, you will probably get the best results by lightly wetting the grain and smoking it for a relatively short amount of time (30–45 minutes). Roughly 3–4 oz. per pound of grain (90–120 mL/kg) should suffice. On a standard Weber grill, you can comfortably smoke about 2.0 lbs. (0.91 kg) of grain at a time — easily enough to use in a 5.0-gallon (19-L) batch. Extract brewers can smoke crystal malt, for steeping, and all-grain or partial mash brewers can smoke this or some of their base malt.

Once the grill is ready and the malt has been wet, spread it on the screen on the side away from the coals. Place the lid on the grill, with the vents still open, and let the grains smoke. Ideally, you want the interior of the grill to be fairly cool, under 100 °F (38 °C). If it's hotter than this, don't panic, but consider placing the lid so it is slightly ajar or elevating the lid slightly (perhaps with bricks) to keep the temperature down.

You can smoke the grain for as long as you'd like. Even a short, 15-minute, exposure to smoke will be noticeable. If you let it go for a few hours, you'll get a much higher level of smoke. Keep in mind that you need the grain to dry completely before you're done. As such, short smoking times will need to be followed by some drying.

Once the malt is smoked, and hopefully just about dry, spread it on a cookie sheet and dry it the rest of the way in your oven (at 200 °F/93 °C or less — leave the door open, if need be). This step does two things. It makes the grain dry so you can store it stably and perhaps drives off some unwanted volatiles — such as acetic acid — that are found in smoke.

Once your dried, smoked malt has been produced, put it in a paper bag (or other container that is not air-tight) and allow it to rest for a couple weeks in a dry place at room temperature or slightly higher. Now, you're ready to brew.

To use your home-smoked malt, just crush it and steep or mash as you normally would, ensuring that your brewing water is free of chlorine compounds.

Smoke on the Lager

(Märzen-style Rauchbier)
(5 gallons/19 L, all-grain)

OG = 1.057 FG = 1.014
IBU = 30 SRM = 14 ABV = 5.5%

Ingredients

9.5 lbs. (4.3 kg) Weyermann rauchmalz
2.0 lbs. (0.91 kg) Weyermann Munich Type I malt (~6 °L)
0.5 lbs. (0.23 kg) Weyermann CaraMunich® III malt (~60 °L)
8 AAU Magnum hops (60 mins) (0.57 oz./16 g of 14% alpha acids)
Wyeast 2206 (Bavarian Lager) or White Labs WLP820 (Oktoberfest/Märzen) yeast (3 qts./3 L yeast starter)

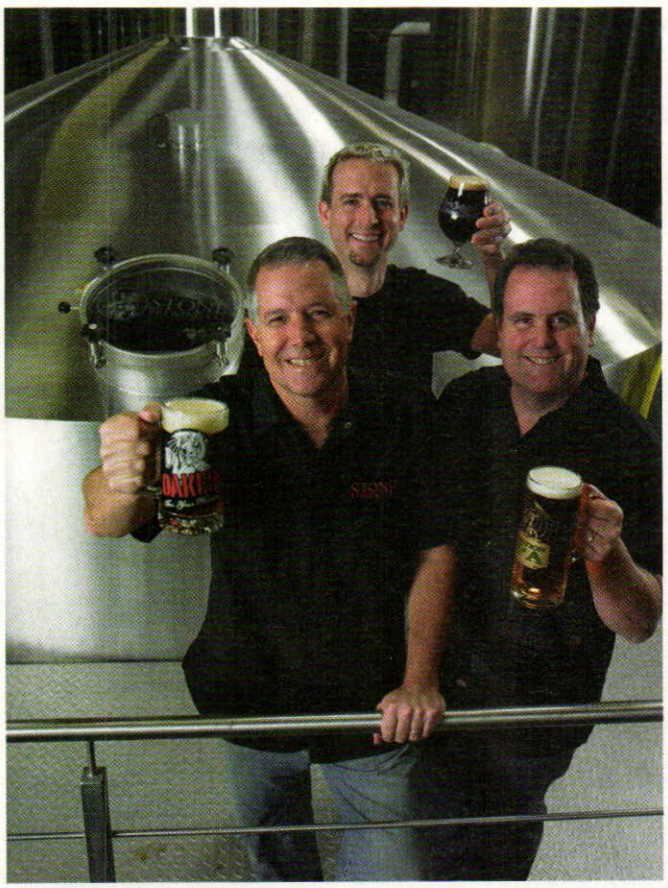
Step by Step

Ferment yeast starter at room temperature, then transfer to lagering fridge at beginning of brewday. Treat brewing water with one Campden tablet the night before brewday. For wort production, use a single decoction mash. In your kettle, mash in to 131 °F (55 °C) with 17 qts. (16 L) of water. Pull first decoction, roughly the thickest one-third of the mash, and place it in a large kitchen pot. Heat decoction to 158 °F (70 °C) and hold for 5 minutes, then bring decoction to a boil. Boil decoction for 20 minutes, stirring constantly. Return decoction to main mash and add heat, if needed, to bring temperature to 152 °F (67 °C). Hold for 45 minutes. Heat mash to 168 °F (76 °C), then transfer to lauter tun. (Try to minimize any splashing when you transfer it from the kettle to lauter tun.) Let grain bed set up for 5 minutes before you begin recirculating and running off the wort. Keep sparge water heated so that the top of grain bed remains at 165–168 °F (74–76 °C) while you collect your wort. Collect 6.5 gallons (25 L) and boil for 90 minutes, expecting to yield 5.0 gallons (19 L) of wort after boil. Cool wort to 54 °F (12 °C) and transfer to fermenter. Aerate well, pitch chilled yeast from starter and let ferment at 54 °F (12 °C) until rate of fermentation slows greatly (usually after 10–14 days). Let temperature rise to 60 °F (16 °C) to finish off fermentation. Lager beer for 4–6 weeks, then keg.

Chris Colby is Editor of Brew Your Own *magazine and a smoked beer fan.*

by **Brad Ring**

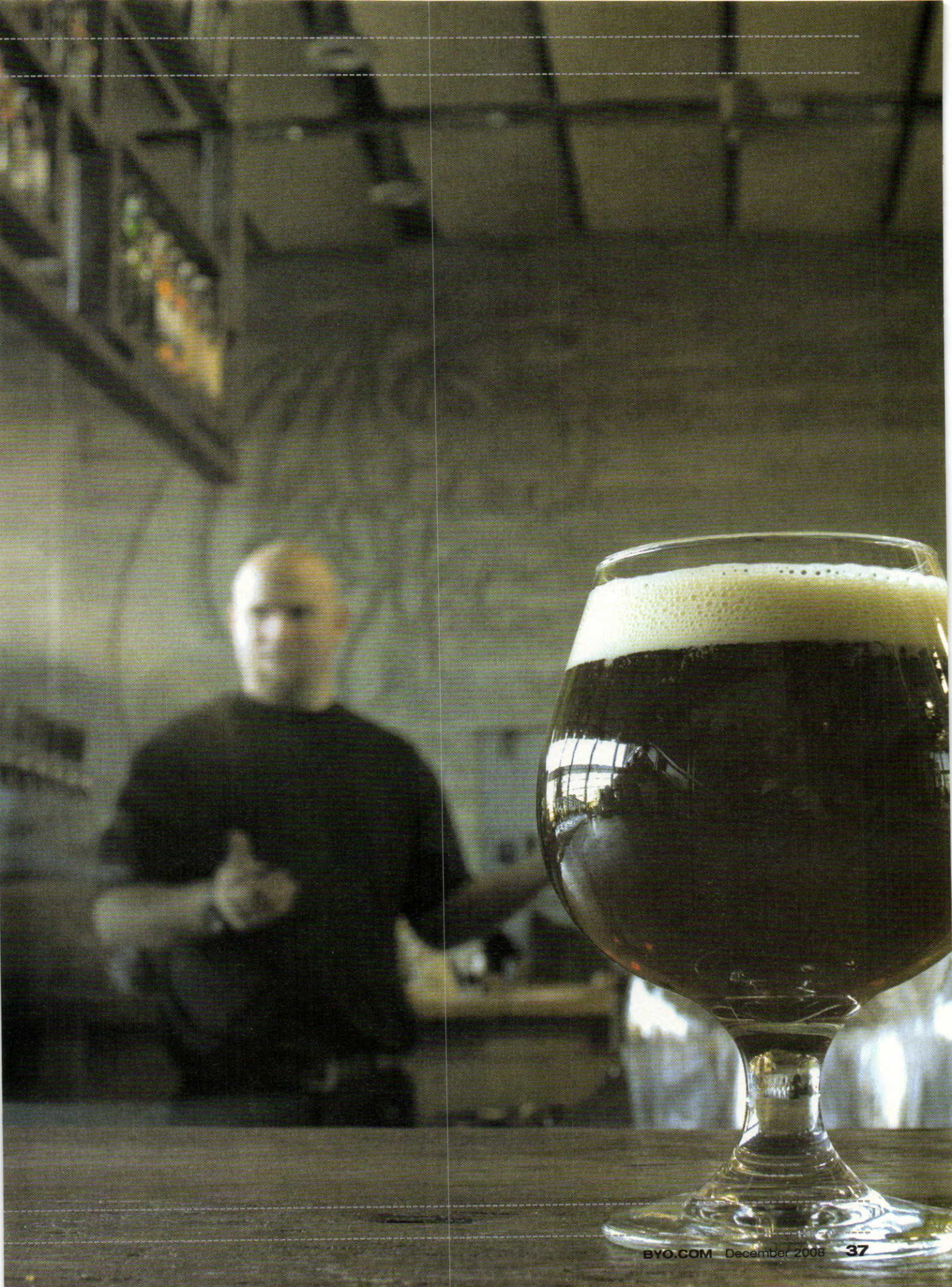
BREWING in the STONE AGE



In the brewhouse (left to right): President/Brewmaster Steve Wagner, CEO Greg Koch and Head Brewer/Production Manager Mitch Steele.

STONE BREWING shares tips, techniques & recipes for BIG, AGGRESSIVE BEERS

Photos by **Studio Schulz**



For the last dozen years Stone Brewing Company has been driven by a bigger-than-life personality. Its beers are big and aggressive. Its marketing has a sharp edge. This is a company that has earned an international reputation for its huge hop bombs while taunting beer drinkers by proclaiming "You're not worthy" right on its beer bottles. From the start Stone followed its own path. The result of over a dozen years of big attitude? Stone has garnered a place as one of the fasting growing craft breweries over the last decade as well as gaining a cult-like status among beer fans and homebrewers.

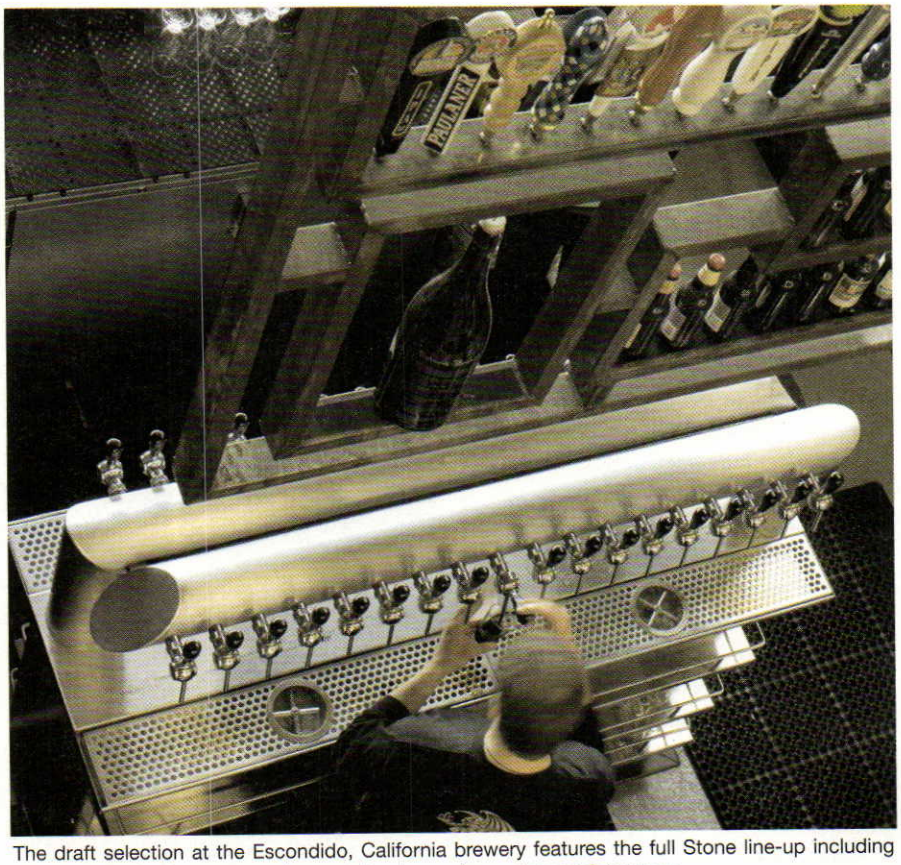
In many ways Stone operates with the swagger of a cocky homebrewer. When you listen to co-founders Greg Koch or Steve Wagner describe their approach to creating new beers, it feels like you're at a monthly homebrew club meeting. "We make beers for ourselves. Beers we like first and foremost," Wagner says. "If other people like it, great. If they don't, it's their loss. This has always been our guiding principle. It might be foolhardy, but it has worked for us." Koch adds, "We keep true to ourselves. True to who and what we are. And that means aggressive beers that are amazing. What do we like as beer geeks? That will be our guide."

Stone has had an experimental bent from their North San Diego County, California beginning back in 1996. In fact it was an experiment gone wrong that resulted in one of their most popular beers now accounting for 30% of their sales, Arrogant Bastard Ale. Wagner, who acts as President and Brewmaster, was working on a pilot test batch for a new single hop, pale ale recipe. But he made a mistake. "I accidentally put in probably three times as many hops as I wanted. It was way over-hopped. But then Greg tasted it and said 'I love it.'" Arrogant Bastard Ale was born.

"We keep in touch with the homebrewer and beer geek side that we came from with our experiments," Koch says. "For example, what would our Stone IPA taste like fermented with a Belgian yeast? The result was a new beer, our Stone Cali-Belgique IPA. It is all about mov-

Stone Brewing World Bistro & Gardens stresses fresh, local and organic Southern California ingredients including their very local beers brewed just a few feet away from the restaurant.

> "It is all about moving forward what beer can and should be."



The draft selection at the Escondido, California brewery features the full Stone line-up including special limited releases as well as rotating brews from other craft brewers.

ing forward what beer can and should be."

Brewing the type of big, aggressive styles of beer at home that Stone is known for takes some specific techniques and a checklist of important considerations. First off, if you want to showcase the ingredients, the malts and hops need to be high quality and fresh. Also homebrewers need to be very in tune with the flavors those ingredients contribute. "We're not afraid to change hops or malts as needed to get the flavors we want," says Mitch Steele, Head Brewer and Production Manager at Stone.

Whenever a beer's alcohol heads north as in many Stone beers, taking care of your yeast and keeping it healthy and happy is critical. "A high alcohol environment does not make brewers yeast happy, and they can start throwing off some undesirable flavors when finishing up a high-gravity fermentation," Steele says. "Therefore, taking care of your yeast, making sure it is healthy and has good viability when it is pitched, and is pitched at the right amount, is critical to keeping the yeast healthy and happy throughout the entire fermentation."

It is also important to get to know your beer every step of the way from active fermentation right through bottling. And that means pouring yourself small samples of your beer during the entire process so you can gain a better sensory understanding of where your beer is at every phase. "This way we know exactly what our beers should taste like at every part of the process, and we can address any issues right away," Steele says.

Consistency is a huge consideration for any commercial brewer who knows their customers are expecting a certain remembered taste experience when they open, let's say a Ruination IPA. But homebrewers should also pay attention to being consistent in their brewing techniques even though they don't have to worry about satisfying the marketplace. "If you want to learn to be a better brewer and brew big beers, you really need to keep careful notes as a homebrewer, that would be my main advice," says John Egan, Lead Brewer. "Otherwise you can't remember the temperatures or ingredients and you won't be able to repeat any success you have. Brewing the same great beer more than once is a sign of real skill and that means note taking."

Another lesson homebrewers can take away from the brewers at Stone is the value of conducting a forced fermentation on your wort for 24 hours. This will accurately predict your finishing gravity, help predict alcohol content and help with other decisions such as when to cool the beer and allow you to make any mashing adjustments to get the proper ratio of unfermentable sugars and alcohol in the finished beer. "This test is really easy, all you need is a stir plate and an Erlenmeyer flask or a beaker," says Steele. "Put some wort into the flask, overpitch it with dried yeast, and stir it for 24-48 hours and read the terminal gravity."

Stone employs a 90-minute boil on their lineup of beers targeting an evaporation rate between 8 and 10 %. They add their bittering hops right at the start of the 90-minute boil. Their flavor and finishing hops for most of their beers are added post-boil during

their whirlpool phase, before cast-out of the kettle. These hops get a total of about 90 minutes of contact time with the 200 °F (93 °C) wort (15 minutes of whirlpool fill time, 15 minutes rest and about 60 minutes to knock out of the brew kettle). "Surprisingly, we do get a fair amount of bitterness from this addition, but we also get a ton of hop flavor, because very little is volatilized," says Steele.

With bigger beers, especially big, hoppy beers, Steele recommends keeping your beer as dry as possible. "Our beers are really pretty dry. A big beer that is really sweet can sometimes lack drinkability, and so we've made efforts to get some of our bigger beers a bit drier on the finish," Steele says. Plus one nice side benefit of keeping your beers on the dry side is you won't have to use as many of your precious hops during the current supply shortage. "Making your beer drier can help accentuate the hop character in your beer, so you can get away with using a little less hops. Plus you can sacrifice a little bitterness in a drier beer, leaving some of your hops for more dry-hopping," Steele suggests.

With several oak aged beers in its portfolio, Steele also can offer homebrewers some advice for those looking to get some oak into future pints. "We've had a lot of success using American Oak Chips. And the team here knows I love the French Oak chips as well. These chips are easy to use and add great flavor to your beer," says Steele. "Experiment! Try different beers and different types of oak products. Also, making an oak tea using a little bit of your beer makes it real easy to dial in the flavor you want. Just age part of the beer on the chips to make a strong oak flavor, then blend it back to your main batch until you get the oak intensity and flavor you are looking for."

Each year Stone brews a special anniversary ale. This year's Stone 12th Anniversary Bitter Chocolate Oatmeal Stout (see recipe on page 45), was a departure from the huge, hoppy beers of anniversaries past. It was created in response to the worldwide hop shortage and used bitter chocolate in addition to hops. "A lot of people are suggesting the use of herbs and spices to replace or supplement hop bitterness, and that's a cool way to brew also," Steele says. "We kind

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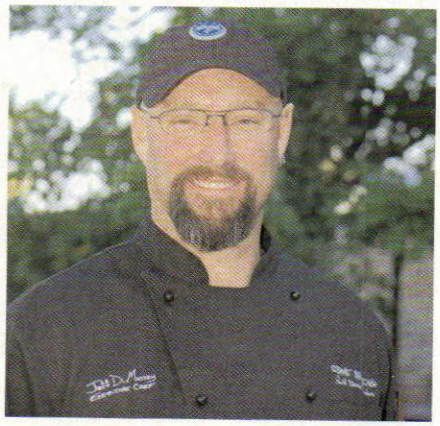
COOKING with BEER in the STONE AGE



Food and its relationship with beer has become a major focus for Stone Brewing since their restaurant, the Stone Brewing World Bistro & Gardens, opened its doors as part of their new brewery two years ago. Stone CEO Greg Koch and President Steve Wagner are big proponents of the international Slow Food movement that stresses all things local from ingredients to culinary traditions. Koch proudly points to the menu featuring locally raised meats, organic vegetables grown down the road, regional artisan cheeses and of course their very local beers produced on site. "It is all about really knowing where the source of your food or beer comes from," Koch says.

Jeff D. Massey, Stone's Executive Chef, creates his menu with an eye towards both the fresh local ingredients available seasonally and his portfolio of aggressive Stone beers. He has experimented quite a bit with cooking with the same beers brewed a few feet away from the kitchen. Some of the experiments are successful. "I used an Old Guardian Barley Wine and reduced it down and made a Crème Brulee with it," he says. "I had no idea what I was getting into when I tried it, but I was very pleased with the results." Other experiments provide some lessons of what not to do. "The biggest no-no that I have found is that the super-hoppy beers do not lend themselves to reducing well to be used in cooking. They become too bitter for culinary purposes," Massey says.

One other lesson Massey has learned is that you don't always have to add beer to a dish as an ingredient to create a great end result in bringing the worlds of beer and food together. Sometimes creating a food recipe to mirror the taste profile of a beer is the right approach to a great beer and food dining experience. "A lot of times I don't add beer to dishes, I try to use the flavor profiles of the beer and match food to it or vice-versa. For example, a beer with citrus overtones, using citrus zest in the dish in some way to augment the flavor in the beer," he suggests.

Enjoy the following two food recipes on the next page straight from Chef Massey and don't ever be shy to experiment when it comes to using beer when cooking. "Have fun and experiment and see what works," Massey says.

FIVE TIPS for COOKING with BIG, AGGRESSIVE Beers

1. Be careful. The bigger and bolder the beer, the more cautious you need to be. A little bit goes a long way.

2. Keep in mind that not everything will work. For example, I tried to make a Bastard Chicken by using Arrogant Bastard instead of a Marsala wine to make a chicken and mushroom dish — the dish didn't work, but I had fun trying.

3. Know the flavor profiles of the beer you are using - in other words, drink it before you try cooking with it. And remember, a little bit goes a long way.

4. Don't put beer into a dish just for the sake of putting in beer (See #2 - Bastard Chicken experiment.) Make sure you know what the flavor is for and why you want to add beer in the first place.

5. I personally concentrate more on matching food with beers, instead of just adding beer to a dish for no rhyme or reason.

~Jeff D. Massey, Executive Chef, Stone Brewing World Bistro & Gardens


Stone Pale Ale & Garlic Stir-Fried Brussels Sprouts

Pancetta & Clams

2 tbl. Olive Oil
½ cup Pancetta, diced
1 cup Stone IPA (Stone Pale Ale could also be used)
1 Onion, sliced
3 Tomatoes, chopped
1 tbl. Smoked Paprika
1 tsp. Red Pepper Flakes, or more if more heat is desired
Kosher Salt to taste
Black Pepper, freshly ground to taste
2 lb. Clams in shell, scrubbed
4 tbs. unsalted Butter
4 tsp. fresh Cilantro, chopped
1 Lemon, quartered

Directions

In a large saucepan, heat the olive oil. Sauté the pancetta until slightly crispy. Deglaze the pan with the beer. Add the onions, tomatoes, paprika and pepper flakes, and cook gently until the onions are soft. Add salt and pepper to taste.

Wash the clams, discarding any that are open. Add the clams to the onion/tomato mixture. Add the butter. Cover and cook over high heat until all the claims have opened, about 5 minutes, then cook for an additional minute.

Divide the clams and onion/tomato mixture among 4 soup bowls. Top with chopped cilantro and lemon wedge. Serve with a nice hunk of crusty bread.

Stone Pale Ale & Garlic Stir-Fried Brussels Sprouts

1 oz. Grapeseed Oil
2 tbl. Minced garlic (more if desired)
2 cups Brussels sprouts, blanched*
6 oz. Stone Pale Ale
½ tsp. Kosher Salt
½ tsp. Black Pepper, freshly ground
1 tsp. Tomato concasse* (small dice)

Directions

Heat oil in a wok until just smoking. Add Brussels sprouts to oil. Stir-fry until Brussels sprouts are starting to brown. Add garlic and cook until browned (be careful not to burn garlic, it becomes bitter and not in a good way). Add beer and simmer to reduce. Season to taste with salt and pepper. Serve with the tomato sprinkled over the top of the Brussels sprouts.

Definitions

Blanch: This term means to plunge foods into boiling water for a few seconds or a few minutes, then remove and place in ice water. This process sets the color of vegetables, lets you easily peel fruits, and slip the skins off nuts. The food does not cook all the way through, so crisp texture is preserved.

Concasse: Fom the French 'concasser', to crush or grind, is a cooking term meaning to rough chop any ingredient, usually vegetables. This term is most specifically applied to tomatoes, with tomato concasse being a tomato that has been peeled, seeded (seeds and membranes removed), and chopped to specified dimensions. Specified dimensions can be rough chop, small dice, medium dice, or large dice.

Stone's **KEYS** to **DRY HOPPING**

1. Make sure you have really good quality hops. Aged, brown hops are not what you want to use in your dry hop!

2. Watch your residence times. Dry hop flavor peaks for us at about 5-7 days after dry hopping. Eventually, too much beer storage time on the hops will result in excessively vegetative and what I call "stemmy" flavors.

3. Don't dry hop when a lot of yeast is still in suspension. If your beer is reasonably clear, you will extract more hop flavor. Yeast tends to suck up a lot of hop components, which means that the beer sometimes loses out.

4. Blend! I love using 2 or 3 different varieties in a dry hop. I think blending adds wonderful layers of complexity. Our Stone Ruination IPA is 100% Centennial in the dry hop, but we have a lot of fun adding other hop varieties to casks of it or Stone IPA, or taking a batch and dry hopping it again with another variety. Our 10th and 11th Anniversary Ales were dry hopped with hop blends, as was this year's 08.08.08 Vertical Epic Ale.

5. Multi-stage dry hopping is something that some really great brewers are doing. Basically, you dry hop for a few days, pull those hops out of the beer and dry hop again with a fresh batch of hops. This multi-stage infusion of hops adds up to a really intense fresh hop character. Some of the best hoppy beers I've tried are made this way, and we've done it on small scale batches of Double Dry-Hopped Stone IPA, and Triple Dry-Hopped Stone Ruination IPA.

6. A bit of warm (fermentation) temperature storage after dry hopping helps increase dry-hop flavor. We get better dry hop flavor when we dry hop in the fermenter vs. dry hopping in a filtered (bright) beer tank where the beer is close to freezing temperature.

7. Don't be afraid to use non-traditional hop varieties for dry hopping. We've tasted some great beers dry hopped with Palisades, Willamettes, and several other hop varieties that are not one of the 4 "C's" or one of the newer high-alpha varieties like Simcoe or Amarillo.

- Mitch Steele, Head Brewer/Production Manager

> "Keep the craziness in your brewing and keep testing new, unusual ingredients in your recipes."

of went that route with our Stone 12th Anniversary Bitter Chocolate Oatmeal Stout this year. Coriander is one ingredient that works really well, but it has a pretty strong flavor, so you have to know that going in."

Stone uses a proprietary yeast strain, but for those homebrewers looking to recreate Stone beers at home, Steele offers some advice on their house strain that has an alcohol tolerance up to 11 or 12 percent. "I think our yeast throws a lot of tropical fruit esters, especially in the bigger beers, so the (White Labs) California Ale yeast strain may not be the best choice. Our yeast attenuates and flocculates well, and to me, our yeast is great for producing English style ales. In the past we've recommended (White Labs) WLP002, and I think the (White Labs) WLP005 strain might work also as a reasonable substitute," Steele says. We offer up 6 homebrew recipes to recreate Stone beers starting on the next page thanks to help and advice from Steele.

Finally, don't stop testing and experimenting as a brewer, no matter how large your batch size. "Keep the craziness in your brewing and keep testing new, unusual ingredients in your recipes," says Wagner. Koch adds he really enjoys having homebrewers be a part of the Stone mix. He points to the fact that Stone hosts two different homebrewing clubs that meet regularly at the brewery and has even shared Stone wort with local homebrewers looking to conduct club experiments. "Homebrewers are on the front lines of creativity," Koch explains. "They bring personal passion to brewing. How can you not love and support that?"

6 STONE clone recipes

Notes on Brewing These Clone Recipes:

Stone adds their late hops in their whirlpool tank and they steep — at around 200 °F (93 °C) — for about 75–90 minutes. In these recipes, we've moved these hops to the last 15 minutes of the boil, as most homebrewers do not employ a whirlpool stage and our kettles would cool to far below 200 °F (93 °C) after 90 minutes.

Stone uses a proprietary strain of yeast. For homebrew clones, they suggest substituting White Labs WLP002 (Wyeast 1968 would be the equivalent) or White Labs WLP005.

Stone Pale Ale clone

(5 gallons/19 L all-grain)

OG = 1.056 FG = 1.014
IBU = 45 SRM = 20
ABV = 5.4%

Ingredients

10 lbs. (4.5 kg) 2-row pale malt
1.5 lbs. (0.68 kg) crystal malt (60 °L)
6.0 oz. (0.17 kg) crystal malt (75 °L)
9.25 AAU Magnum hops (90 mins) (0.66 oz./18 g of 14% alpha acids)
1.0 oz. (28 g) Ahtanum hops (15 mins)
1 tsp. Irish moss (15 mins)
White Labs WLP002 (English Ale) yeast (1 qt./1 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step

Mash at 156 °F (69 °C). Boil for 90 minutes. Ferment at 68 °F (20 °C).

Stone Pale Ale clone

(5 gallons/19 L, extract with grains)

OG = 1.056 FG = 1.014
IBU = 45 SRM = 20 ABV = 5.4%

Ingredients

2.5 lb. (1.1 kg) light dried malt extract
3.3 lbs. (1.5 kg) light liquid malt extract (late addition)
0.5 lbs. (0.23 kg) 2-row pale malt
1.5 lbs. (0.68 kg) crystal malt (60 °L)
6.0 oz. (0.17 kg) crystal malt (75 °L)
10 AAU Magnum hops (60 mins) (0.71 oz./20 g of 14% alpha acids)
1.0 oz. (28 g) Ahtanum hops (15 mins)
1 tsp. Irish moss (15 mins)
White Labs WLP002 (English Ale) yeast (1 qt./1 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step

Steep crushed grains in 3 qts. (~3 L) of water at 156 °F (69 °C) for 45 minutes. Add water to make 3.5 gallons (13 L) of wort, add dried malt extract and bring to a boil. Boil for 60 minutes, adding hops at times indicated. Add liquid malt extract for last 15 minutes of the boil. Cool wort, transfer to fermenter and top up to 5 gallons (19 L). Aerate wort and pitch yeast. Ferment at 68 °F (20 °C).

Stone IPA clone

(5 gallons/19 L, all-grain)

OG = 1.065 FG = 1.012
IBU = 77 SRM = 10
ABV = 6.9%

Ingredients

12.75 lbs. (5.8 kg) 2-row pale malt
14 oz. (0.40 kg) crystal malt (15 °L)
6 AAU Magnum hops (90 mins) (0.43 oz./12 g of 14% alpha acids)
4.5 AAU Perle hops (90 mins) (0.64 oz./18 g of 7% alpha acids)
2.0 oz. (57 g) Centennial hops (15 mins)
1.0 oz. (28 g) Centennial whole hops (dry hops)
0.5 oz. (14 g) Chinook whole hops (dry hops)
1 tsp. Irish moss (15 mins)
White Labs WLP002 (English Ale) yeast (1.5 qt./1.5 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step

Mash at 149 °F (65 °C). Boil for 90 minutes. Ferment at 66 °F (19 °C).

Stone IPA clone

(5 gallons/19 L, extract with grains)

OG = 1.065 FG = 1.012
IBU = 77 SRM = 10 ABV = 6.9%

Ingredients

5.0 lbs. (2.3 kg) light dried malt extract
1 lb. 10 oz. (0.74 kg) light liquid malt extract (late addition)
1.0 lbs. (0.45 kg) 2-row pale malt
14 oz. (0.40 kg) crystal malt (15 °L)
7 AAU Magnum hops (60 mins) (0.50 oz./14 g of 14% alpha acids)
4.5 AAU Perle hops (60 mins) (0.64 oz./18 g of 7% alpha acids)
2.0 oz. (57 g) Centennial hops (15 mins)
1.0 oz. (28 g) Centennial whole hops (dry hops)
0.5 oz. (14 g) Chinook whole hops (dry hops)
1 tsp. Irish moss (15 mins)
White Labs WLP002 (English Ale) yeast (1.5 qt./1.5 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step

Steep crushed grains in 3 qts. (~3 L) of water at 149 °F (65 °C) for 45 minutes. Add water to make 4.5 gallons (17 L) of wort, add dried malt extract and bring to a boil. Boil for 60 minutes, adding hops at times indicated. Add liquid malt extract for last 15 minutes of the boil. Cool wort, transfer to fermenter and top up to 5.0 gallons (19 L). Aerate wort and pitch yeast. Ferment at 68 °F (20 °C). Dry hop for 3–5 days.

Stone Ruination IPA clone

(5 gallons/19 L, all-grain)

OG = 1.072 FG = 1.012
IBU = 100+ SRM = 12
ABV = 7.7%

Ingredients

14 lb. 2 oz. (6.4 kg) 2-row malt
14 oz. (0.40 kg) Briess crystal malt (15 °L)
36 AAU Magnum hops (90 mins) (2.25 oz./64 g of 16.0% alpha acids)
16 AAU Centennial hops (15 mins) (1.5 oz./43 g of 10.5% alpha acid)
2.0 oz. (57 g) Centennial whole hops (dry hops)
1 tsp. Irish moss (15 mins)
White Labs WLP002 (English Ale) yeast (2 qt./2 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step

Mash your grains at 149 °F (65 °C) for 60 minutes. Collect enough wort to boil for 90 minutes and have a 5.0-gallon (19-L) yield. Ferment at 68 °F (20 °C).

Stone Ruination IPA clone

(5 gallons/19 L, extract with grains)

OG = 1.072 FG = 1.012
IBU = 100+ SRM = 12 ABV = 7.7%

Ingredients
7.0 lbs. (3.2 kg) light dried malt extract
1.0 lb. (0.45 kg) Briess 2-row malt
14 oz. (0.40 kg) Briess crystal malt (15 °L)
1 tsp. Irish moss (15 minutes)
36 AAU Magnum hops (60 mins) (2.25 oz./64 g of 16.0% alpha acids)
16 AAU Centennial hops (15 mins) (1.5 oz./43 g of 10.5% alpha acid)
22.0 oz. (57 g) Centennial whole hops (dry hops)
1 tsp. Irish moss (15 mins)
White Labs WLP002 (English Ale) yeast (2 qt./2 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step
Steep the two crushed grains in 3 qts. (3 L) of water at 149 °F (65 °C) for 45 minutes. Remove grains from wort, add water to make 6.0 gallons (23 L) of wort, add malt extract and bring to a boil,. Boil for 60 minutes, adding hops at the times indicated in the recipe list. Cool the wort, aerate and pitch yeast. Ferment at 68 °F (20 °C) and hold at this temperature until the yeast has finished fermentation. Add Centennial hops and dry hop for 3 to 5 days.

Stone Smoked Porter clone
(5 gallons/19 L, all-grain)

OG = 1.064 FG = 1.018
IBU = 53 SRM = 55
ABV = 6.0%

Ingredients
10.75 lbs. (4.9 kg) 2-row pale malt
12 oz. (0.34 kg) crystal malt (75 °L)
1.75 lb. (0.79 kg) chocolate malt
4.0 oz. (0.11 g) lightly-peated malt
12.5 AAU Perle hops (90 mins) (1.8 oz./51 g of 7% alpha acids)
0.5 oz. (14 g) Mt. Hood hops (15 mins)
White Labs WLP002 (English Ale) yeast (1.5 qt./1.5 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step
Mash at 154 °F (68 °C). Boil for 90 minutes. Ferment at 68 °F (20 °C).

Stone Smoked Porter clone
(5 gallons/19 L, extract with grains)
OG = 1.064 FG = 1.018
IBU = 53 SRM = 55 ABV = 6.0%

Ingredients
3.0 lbs. (1.4 kg) light dried malt extract
3.75 lbs. (1.7 kg) light liquid malt extract (late addition)
12 oz. (0.34 kg kg) crystal malt (75 °L)
1.75 lb. (0.79 kg) chocolate malt
4.0 oz. (0.11 g) lightly-peated malt
13.5 AAU Perle hops (60 mins) (1.9 oz./55 g of 7% alpha acids)
0.5 oz. (14 g) Mt. Hood hops (15 mins)
White Labs WLP002 (English Ale) yeast (1.5 qt./1.5 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step
Steep the crushed grains in 3 qts. (3 L) of water at 154 °F (68 °C) for 45 minutes. Remove grains from wort, add water to make 3.5 gallons (13 L) of wort, add dried malt extract and bring to a boil,. Boil for 60 minutes, adding hops at the times indicated in the recipe list. Cool the wort, transfer to fermenter and top up to 5 gallons (19 L). Aerate and pitch yeast. Ferment at 68 °F (20 °C).

Stone Imperial Russian Stout clone
(5 gallons/19 L, all-grain)

OG = 1.096 FG = 1.020
IBU = 90+ SRM = 74
ABV = 10%

Ingredients
16 lb. 14 oz. (7.7 kg) 2-row pale malt
2.0 lbs. (0.91 kg) amber malt
1.25 lbs. (0.56 kg) roasted barley (500 °L)
8 oz. (0.23 kg) black malt
27.3 AAU Warrior hops (90 mins) (1.7 oz/48 g of 16% alpha acids)
White Labs WLP002 (English Ale) yeast (3 qt./3 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step
Mash at 150 °F (66 °C). Boil for 90 minutes. Ferment at 66 °F (19 °C).

Stone Imperial Russian Stout clone
(5 gallons/19 L, partial mash)
OG = 1.096 FG = 1.020
IBU = 90+ SRM = 74 ABV = 10%

Ingredients
9.0 lbs. (4.1 kg) light dried malt extract
2.0 lbs. (0.91 kg) amber malt
1.25 lbs. (0.56 kg) roasted barley (500 °L)
8 oz. (0.23 kg) black malt
30 AAU Warrior hops (60 mins) (1.9 oz/53 g of 16% alpha acids)
White Labs WLP002 (English Ale) yeast (3 qt./3 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step
Partial mash the crushed grains in 6 qts. (5.9 L) of water at 150 °F (66 °C) for 45 minutes. Add water to make 6.0 gallons (23 L) of wort, add dried malt extract and bring to a boil,. Boil for 60 minutes, adding hops at the times indicated in the recipe list. Cool the wort and transfer to fermenter. Aerate and pitch yeast. Ferment at 68 °F (20 °C).

Stone Bitter Chocolate Oatmeal Stout (12th Anniversary Beer) clone
(5 gallons/19 L, all-grain)

OG = 1.094 FG = 1.022
IBU = 45 SRM = 64
ABV = 9.3%

Ingredients
16 lbs. (7.3 kg) 2-row malt
0.5 lbs. (0.23 kg) CaraPils malt
0.5 lbs. (0.23 kg) crystal malt (15 °L)
2.0 lbs. (0.91 kg) flaked oats
1.0 lb. (0.45 kg) chocolate malt
0.25 lbs. (0.11 kg) roasted barley (500 °L)
0.25 lbs. (0.11 kg) black malt
3.25 oz. (92 g) cocoa (15 mins)
3 AAU Galena hops (90 mins) (0.25 oz./7.1 g of 12 % alpha acids)
2 AAU Willamette hops (60 mins) (0.4 oz./11 g of 5% alpha acids)
2 AAU Ahtanum hops (60 mins) (0.4 oz./11 g of 5% alpha acids)
6.5 AAU Summit hops (60 mins) (0.38 oz./11 g of 17% alpha acids)
White Labs WLP002 (English Ale) yeast (3 qt./3 L yeast starter)
⅞ cup corn sugar (for priming)

Step by Step
Mash at 150 °F (66 °C). Boil for 90 minutes, adding hops and cocoa at times indicated in the ingredient list. Ferment at 66 °F (19 °C).

by **TONY PROFERA**

build the HOPINATOR

In the November 2008 issue of BYO, the serving platform designed and built by the Carolina BrewMasters, called Junior, was presented. Part of that project included The Hopinator, a redesigned Randall for adding a blast of hops to beer as it was served. Here are some more details about The Hopinator and some direction on how to build your own.

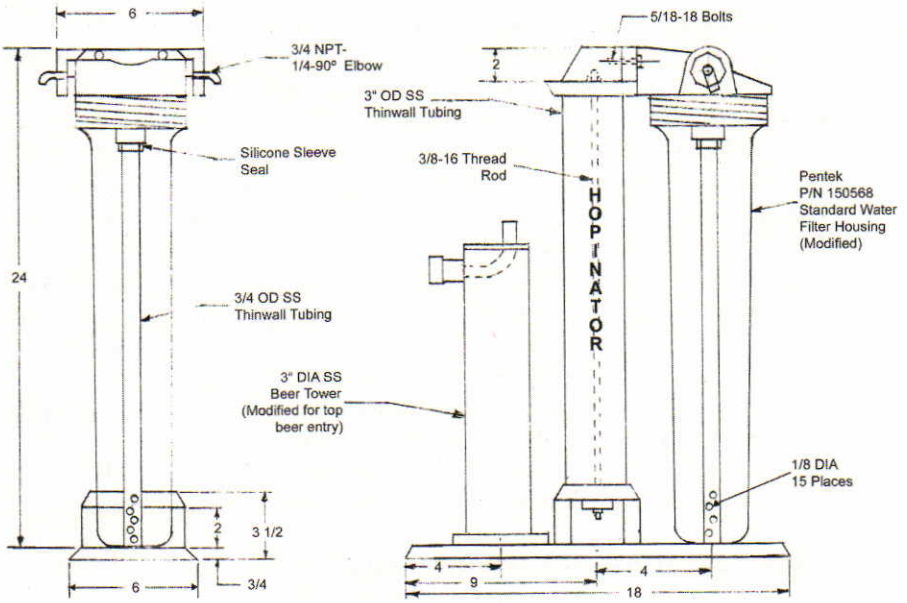
Want to add a blast of hop goodness to your beers, but avoid the foaming often associated with Randalls? Check out the design of The Hopinator.

The design of The Hopinator is meant to reduce foaming, a problem that plagues many Randall designs. In the Hopinator, beer enters the top of the acrylic water filter housing, flows down through the hops and is picked up by a stainless steel pickup tube. We used a long length of 3/16" beer line — enough to balance 15 PSI of pressure — leading to the hops and took strides not to have the beer path make any sudden turns. Still, even if the beer foams on contact with the hops, the pickup tube is at the bottom of the cartridge, in beer not foam. Using the design drawings and a little experimentation with beer line length, serving temperature and pressure, you should be able to build and operate your own easily.

DESIGN FEATURES INCLUDE:

- Red oak and stainless steel upright filter canister holder to hold canister vertical and make it easy to remove, perform maintenance, and store.
- Extra large clear acrylic water filter housing to hold the hops.
- A custom machined stainless up tube. Tube holes are concentrated near the base to force the beer to filter through most all of the hops.
- A chrome draft tower and faucet are dedicated for serving the hoppy goodness. The entry of the beer line is through a drilled hole in the tower's cap. No picnic taps this time!
- 9 foot length of thick wall beer line. The beer hose is wrapped around the large diameter support shaft.
- Extreme efforts were made to keep the beer line from making any abrupt turns causing turbulence.
- Unit firmly attaches to the center of bar top (server side) with a C-clamp.

Beer flows toward The Hopinator in 3/16" beer line. Longer lengths lower foaming, but require more pressure to push the beer. The beer enters at the top of the filter housing. It is picked up at the bottom of the cartridge by a length of ¾" OD stainless steel tubing, with holes cut in the bottom 3 inches (8 cm). Opening the tap all the way when pouring also helps reduce foaming. Tony Profera would like to thank Scott Wallace and David Jones for their help on the Junior project.



by **Betsy Parks**

So you think you want to go pro? It's no secret that many of the commercial beers out there are brewed by homebrewers who made their hobbies a career. But while going pro once meant writing up a business plan and picking out some real estate, these days there are plenty of brewing jobs with existing craft brewers out there that don't involve opening your own business. We talked to some homebrewing graduates of the American Brewers Guild who are working in the industry about what it really takes to break out of the home brewery and into the pro brewery.

GOING pro ROUNDTABLE

What did you do to make a professional brewing career happen? Were there challenges or setbacks?

JOSEPH LEMNAH, Dogfish Head Craft Brewery: I found it difficult to get a brewer's apprenticeship in upstate New York. I knocked on many doors and was turned away every time. I got a job on the Old Saratoga Brewing Company's packaging line and then transitioned into their cellars. It can be tough to get into this industry and I realized I needed formal education and training. While at the American Brewers Guild I sent my resume to breweries across the country and received a few offers before Dogfish Head Craft Brewery offered me a brewer's position, which to me is amazing. Only a few years ago, I was living in Wichita, Kansas reading *Brewing up a Business* by Sam Caligione, and now I'm brewing for Dogfish Head. But, don't get me wrong — this was not an easy journey. There were long hours in packaging lines stuffing six packs and stacking cases, and even longer hours scrubbing floors.

DAVID BERG, August-Schell Brewing Co.: When I decided to go to school I was living in Portland — 1996. There really weren't a lot of options for brewing schools in the US: UC-Davis, the American Brewer's Guild and Siebel. I ended up choosing the American Brewer's Guild because of the apprenticeship program.

BOBBY JACKSON, Bohemian Brewery: During my junior year of college I started thinking about what I was going to do after I got out of school. I had been working at a vineyard in South Hero, Vermont and thought about sticking around there when I started looking into schools. I found the American Brewers Guild not even an hour a way and decided that's what I had to do. I did a five-week apprenticeship at Otter Creek in Middlebury and was hired at Bohemian before I was even done with the apprenticeship.

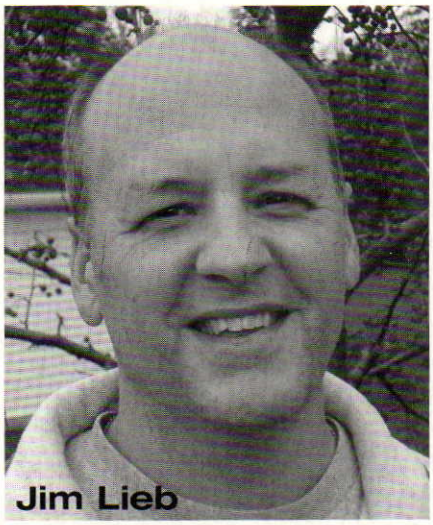
MATT JOHNSON, Karl Strauss Breweries: I tried to go find an assistant job at one of the breweries in my area when I found out that a friend's father was an investor in a brewpub. I talked to his brewer and brought him some of my homebrew and he actually told me that I shouldn't be a professional brewer, which made me want it more so I decided to go to school.

DUSTIN JAMISON, Boulevard Brewing Co: I looked at different brewing courses when I got serious about wanting to make brewing a career.

Was it hard to make the transition from homebrewer to pro?

JOSEPH LEMNAH, Dogfish Head Craft Brewery: The transition was difficult. I think many, like myself, have a romantic impression of professional brewing. I soon discovered that, as with any job, there was time to be spent on the bottom rung — scrubbing tanks

BREWERS



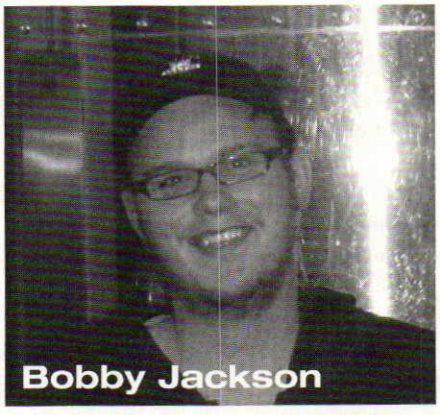
JIM LIEB, Rocky River Brewing Co., Cleveland, Ohio
Jim has a B.S. in Chemistry from Clarion University of Pennsylvania and a certificate from the American Brewers Guild. He brewed at Hereford & Hops' Cranberry Township, Pennsylvania location for more than two years and has been with Rocky River since August 2008.

DAVID BERG, August-Schell Brewing Co., New Ulm, Minnesota
David earned a B.S. in Aerospace Engineering in 1988 and graduated from the American Brewers Guild Craft Brewer's Apprenticeship Program in 1996. He was the Head Brewer at Water Tower Brewing Company in Eden Prairie, Minnesota from 1996 to 2002, the Head Brewer at Bandana Brewery in Mankato, Minnesota from 2002 to 2006 and has been the Assistant Brewmaster at August Schell since 2006.

COTY BELL, Humperdinks Restaurant and Brewery, Dallas, Texas
Coty started homebrewing after stumbling across the local homebrew shop. After a few years of pipe dreaming he signed up for classes at the American Brewers Guild, which led to an apprenticeship at Humperdinks.

MATT JOHNSON, Karl Strauss Breweries, San Diego, California
Matt holds a B.A. in speech communication from California State University, Northridge and attended the American Brewers Guild Intensive Course in Brewing Science and Engineering.

JOSEPH LEMNAH, Dogfish Head Craft Brewery, Milton, Delaware
Joseph has been homebrewing for three years and brewing professionally since the start of 2006. He worked at Olde Saratoga Brewing Co. in Saratoga Springs, New York for a year then attended the American Brewers Guild. He has been brewing at Dogfish Head Craft Brewery for the last year.



BOBBY JACKSON, Bohemian Brewery, Midvale, Utah
Bobby began homebrewing as a college student at the University of Vermont. He attended the 2007 American Brewers Guild Summer Residential class and did an apprenticeship at Otter Creek Brewing in Middlebury, Vermont before he was hired as Head Brewer at Bohemian.

DUSTIN JAMISON, Boulevard Brewing Co, Kansas City, Missouri
Dustin graduated from the American Brewers Guild in 2007 and did an apprenticeship at Flying Dog Brewery in Denver, Colorado. He is a member of the Lawrence Brewer's Guild and has been homebrewing for over six years.

and floors. Brought into the cellars, I was trained on filtration operations and taking responsibility for the beer. While it was tough, I appreciate the time I spent packaging. It gave me a better understanding of what it takes to get from grain to glass.

COTY BELL, Humperdinks Restaurant and Brewery: It really wasn't hard to make the transition but it took a leap of faith. Once I was committed there was no turning back.

DAVID BERG, August-Schell Brewing Co.: Yes and no. I don't think any job turns out to be what you expect. I started out as a head brewer, which is absolutely ridiculous looking back. Fortunately, I was too stubborn to quit and too dumb to know I was in over my head. I had to learn a lot of things with my feet over the flame. I wouldn't trade the experience for anything in the world, but I also wouldn't wish it on anyone.

BOBBY JACKSON, Bohemian Brewery: I didn't find it very hard to make the transition. I was kind of scared at first because I was no longer working for free under the supervision of several other brewers — I was in charge, making the decisions, and there wasn't anyone there that had been brewing for 15 years to answer my questions or stop me from opening an incorrect valve.

MATT JOHNSON, Karl Strauss Breweries: I was ready. I really didn't like my job and this was something I really wanted to do and I was willing to do whatever it took. It was pretty hard work.

DUSTIN JAMISON, Boulevard Brewing Co: It wasn't too hard of a transition. I had been devoting 20–30 hours a week to homebrewing in addition to my full time job so I was used to working long hours and devoting late nights to cleaning, transferring and — on the lucky days — brewing. The biggest hurdle was learning the ins and outs of working with much larger volumes and getting comfortable with the different equipment.

You brew for a company that is not your own. Is that an eventual goal of yours — to own your own business, or do you find this kind of brewing more rewarding?

JOSEPH LEMNAH, Dogfish Head Craft Brewery: My first professional job was at a contract brewery. The opportunity to make almost a half dozen brands was astonishing. Making multiple styles for all the different breweries made every day interesting. I met and brewed with all the brewers of the respective brands, which was priceless. Brewing for a company like Dogfish Head is also crazy rewarding. But, yes, it is a goal of mine to own my own brewery.

COTY BELL, Humperdinks Restaurant and Brewery: I one day hope to have my own brewery. I really appreciate the opportunity I have now to learn the business and the reality of what a brewery faces and I am learning from three very experienced and accomplished brewers who are preparing me for my future in the brewing industry, which is very rewarding.

DAVID BERG, August-Schell Brewing Co.: I think most people begin in the industry with ownership in mind, but I've reached a stage in my life where if it hasn't happened by now, it never will. And that's far from being a bad thing. My situation is pretty unique. I was head brewer at two start-ups, so the beers I brewed were always my own, good or bad. It was a lot of fun, but I came to this profession pretty late in life (I was 32 at the time). Shoveling out a mash tun is all well and fine when you're 30, and maybe 40, but I was starting to wonder what I was going to do when I was 50 or 60. When I was offered a management position at a regional brewery, I jumped at the chance. I'm having as much fun as I've ever had in the brewing industry. Indeed, probably more fun than if I was an owner having to worry about cash flow in addition to making great beer.

BOBBY JACKSON, Bohemian Brewery: It is my goal to eventually open my own brewery somewhere. For the time being I like not having the responsibilities of having my own brewery — especially financially. I also think it is helping me to build connections so when I do decide to go for it I might be more plugged into the network and will be able to piece it together with less frustration.

JIM LIEB, Rocky River Brewing Co.: I like brewing, I'm not so much into the business end of the situation. It might be nice to be an owner but a lot of guys who own the business don't get to actually brew unless they set it up that way because they end up dealing with a lot of the business end of it.

DUSTIN JAMISON, Boulevard Brewing Co: I really enjoy working in a production brewery right now, mainly because I like getting to work with the beer all the time. A brewery of my own does sound like it would be fun but I realize that many brewery owners don't get to spend as much time brewing as they would like and they have to spend more time running the business.

What are some of the challenges to brewing professionally that you learned along the way, but weren't necessarily expecting?

JOSEPH LEMNAH, Dogfish Head Craft Brewery: Unlike the 9 a.m. to 5 p.m. jobs, brewing is 9 a.m. to done.

COTY BELL, Humperdinks Restaurant and Brewery: I have a pretty good grasp on the science and engineering at our locations, it's the planning that can be a challenge. Four fermenters, seven bright tanks plus kegs to keep six proprietary beers and a few seasonals always flowing at the taps can get tricky.

DAVID BERG, August-Schell Brewing Co.: Being a professional brewer has very little to do with actually making beer. Working in a pub, you may brew 20% of the time. That leaves 80% of the time you're doing other things that are equally important. When you're not cleaning or fixing something, you're talking to customers. People think just because they can brew good beer means they could be a brewer. Well, maybe you could be a brewer, but it certainly doesn't follow that you could run a brewery . . . and that's what it is all about.

BOBBY JACKSON, Bohemian Brewery: Hiring people — I didn't

expect that one. I get three brewers a day showing up looking for work, and I wish I could hire them all but I really can't. I also can't really have five people hanging around the brewery all the time. Our brewery is small and even three people working at the same time gets pretty tight.

JIM LIEB, Rocky River Brewing Co.: It's definitely tough in terms of physical things like carrying and dumping 500—600 pounds of grain. It's also a challenge trying to brew the same beer time after time and getting it as close as possible. There are some advantages of being in a brewpub, for example you get to brew all different beers. In the big production breweries they brew a much more limited spectrum.

Aside from the usual differences (like batch sizes) what are, to you, the biggest differences between homebrewing and professional brewing?

JOSEPH LEMNAH, Dogfish Head Craft Brewery: Endlessly striving for consistency, equipment operation and the technical aspects of the process separate professional brewing from homebrewing. Professional brewing involves handling dangerous chemicals and particulates and working around extremely high pressures — up to 60 lbs./sq inch. At work, I am around deadly quantities of carbon dioxide and other dangerous conditions I never had in my kitchen or driveway.

COTY BELL, Humperdinks Restaurant and Brewery: Homebrewing has a lot less consequences but greater freedom of expression and experimentation. I can't risk having to dump a full batch of beer if it doesn't come out right. However, I also can't get over letting my creative juices flow doing a batch of homebrew. I will always be a homebrewer for that reason.

DAVID BERG, August-Schell Brewing Co.: Understanding you are in a business to sell a product. The goal is to make money to pay bills so we can make more beer. If that means you have to brew a style of beer that you don't like but sells like hotcakes, so be it. Back in my early pub days someone once asked me why I brewed a golden ale. My response was, "So I can brew a barleywine."

BOBBY JACKSON, Bohemian Brewery: For me I think it comes down to creativity. At home you can just read about something and go for it. In a professional situation an owner may not be down with trying to brew thirty new beers in a year. The money may not be there, he may be stubborn and stuck in his ways, you may not have the capacity, etc. There are a million reasons. I take what creative license I can when it comes and enjoy it even more. And I can always brew what I want at home.

MATT JOHNSON, Karl Strauss Breweries: Consistency. Customers are looking for the same beers they had three weeks ago. Customers are the ones that bring in the money — if they liked your blonde ale a month ago it had better taste the same. You also need a willingness to brew beers that you might not like.

DUSTIN JAMISON, Boulevard Brewing Co: At Boulevard the biggest difference is definitely the amount of lab work and testing that goes into every batch of beer. Another major difference is consistency. When you are having new raw materials coming in or even having to substitute different ingredients it becomes a challenge to keep the final beer the same from batch to batch.

What advice would you give a homebrewer interested in going pro as far as being prepared, what to know that you didn't know, what to look out for, finding a job, etc.

JOSEPH LEMNAH, Dogfish Head Craft Brewery: Get your foot in the door some way, somehow. Show an interest in brewing. Give some of your homebrew to professional brewers. Go to beer festivals and ask local brewers if they need help. Most brewers in brewpubs start as apprentice brewers and work up to brewing. This will take hard work and long days on very little pay.

COTY BELL, Humperdinks Restaurant and Brewery: I would suggest going to a local brewery and asking to volunteer for a few days. Realize that 90% of the job is cleaning and heavy lifting or physical labor. You are also almost guaranteed to have to relocate to get a job. If you can deal with that and have a true passion for beer and the business, go for it.

DAVID BERG, August-Schell Brewing Co.: Be prepared to do what it takes, which may mean moving, working odd hours, etc. Chances are someone is not going to open up a brewery across the street from your house, or even close to where you live. Try to get a job at a brewery to see if you really like the work. When you look for a job you need to realize a few things: you're not going to get paid very much, you're most likely going to be doing grunt work and you need to fit your schedule to the brewer's. It never ceases to amaze me how many people apply for a brewing job, but they only want to work on nights or weekends. As an employee you need realize I don't want to be at work nights or weekends, so if you want a job you need to adapt to my schedule.

BOBBY JACKSON, Bohemian Brewery: READ, READ, READ. I cannot stress reading enough. Books, periodicals, anything you can get your hands on. Go to a brewery and offer to help, but don't be annoying, that's a good way to be remembered as a jerk and not be taken seriously.

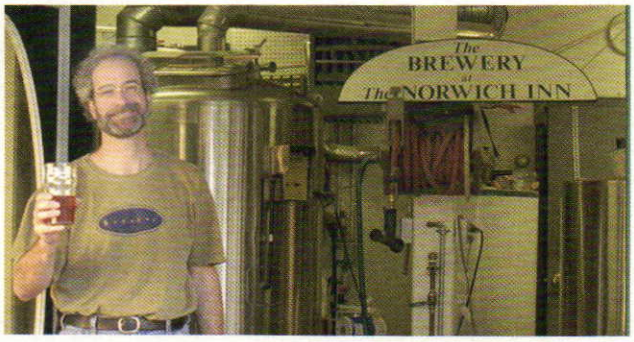
JIM LIEB, Rocky River Brewing Co.: Definitely when you're homebrewing learn all that you can about the technical end of it. If you can, take a short brewing course that fits in with your time and budget. Also, try to brew some lighter styles such as Pilsner and helles — you learn more brewing those styles because if there is a flaw in your technique it will show up a lot easier in your lighter beers as opposed to in an IPA, which could mask flaws with all the hops.

MATT JOHNSON, Karl Strauss Breweries: You have to be willing to put your time in as an assistant or relocate to where there are jobs. There are more brewers out there than there are brewing jobs so the best way to start out is to either be flexible and move or take an assistant position and put your time in. There are a lot of brewers that have experience and will get a job over someone who is brand new. Definitely consider places that are less desirable to get started.

DUSTIN JAMISON, Boulevard Brewing Co: Education is a huge thing that breweries are looking for, especially as the craft brewing market keeps maturing. Experience is the best training you can ever have and the hard part is trying to get started in order to gain the experience you need. This is where education and an apprenticeship help. Also, be persistent and have a true passion for brewing. Getting into the professional brewing community is tough. You will have to work hard and make sacrifices and most likely you will never get rich. But it is a career that if you really love what you are doing then you will never have any regrets and can wake up with a smile (and sometimes even a hangover).

Betsy Parks is the Associate Editor of Brew Your Own *magazine and a fan of both professionally brewed and homebrewed beers of all kinds.*

by **Glenn BurnSilver**



professional

It's well-known that many of today's commercial craft brewers discovered their brewing talents at home. In kitchens, basements and garages, these determined brewers refined their brewing techniques while developing recipes that, in some cases, became the barometer by which their breweries are now judged.

Starting a commercial brewery or brewpub, while enticing and perhaps the goal of many a homebrewer, is a serious and risky undertaking that is out of reach for many. Yet, three former homebrewers — Peter Ausenhus of Worth Brewing

"They aren't based in the home any longer, but they aren't far from it."

top left:
Peter Ausenhus of Worth Brewing brews commercially on equipment that many homebrewers use. He believes that following consistent procedures is an important step towards producing great beers.

top right:
Patrick Dakin raises a pint at Jasper Murdock's Alehouse. In 1995, they upgraded from a homebrew-scale brewery to a four-barrel system (bigger than most homebrewers would ever go, but still tiny by commercial standards).

bottom:
Hank Sanford and his son, Steve — of the Hank is Wiser Brewery — ferment their 15.5-gallon (59-L) batches in converted Sanke kegs. Hank advocates employing a single-stage fermentation under temperature-controlled conditions.

homebrewers

brewing commercially at a homebrew scale

Company in Northwood, Iowa, Hank Sanford of Hank is Wiser Brewery in Cheney, Kansas, and Patrick Dakin from Jasper Murdock's Ale House at the Norwich Inn in Norwich, Vermont — now operate commercial brewing establishments that keep their genesis close to home. They aren't based in the home any longer, but they aren't far from it as each brewer simply expanded their homebrewing knowledge to 10-gallon (38-L), 15.5-gallon (59-L) and 150-gallon (568-L) systems, respectively. (By comparison, a 7-barrel brewery — the size of many small brewpubs — produces roughly 220 gallons (830 L) or more per session). In this way, these three have been able to operate small-scale brewpubs and offer a wide variety of beers — even in limited runs — for their faithful customers.

Of course, opening a commercial brewery requires more than the ability to homebrew. You need a good business plan, some capital, a good location . . . and a little luck. The trials and tribulations of getting a brewery started are stories unto themselves. But, given the scale these guys brew at, and their backgrounds in homebrewing, we thought they might have some valuable insight into brewing at a scale relevant to homebrewers.

The three brewers took a little time out of their busy brewing schedules — you brew more frequently when you make smaller batches! — to share some brewing tips and time-tested secrets that they've uncovered for increasing their consistency and ease of brewing.

Is it Worth Brewing?

Ausenhus, who has been homebrewing since 1987, brewed professionally with Summit Brewing Company (St. Paul, Minnesota), is a certified BJCP National Beer Judge, and opened Worth Brewing in March 2007. (The name comes from the fact that Northwood, Iowa is located in Worth County.) The brewery's motto is, "If it's not hand crafted, it's not Worth Brewing."

At Worth, Ausenhus brews 10-gallon (38-L) batches using equipment that many homebrewers would find familiar. He crushes his grain with a Schmidling Maltmill, produces his wort with a Sabco Brew-Magic system, ferments in 27-gallon (100-L) Blichmann conical fermenters (two brews to a fermenter) and serves his beer from 5.0-gallon (19-L) Cornelius kegs.

Ausenhus notes that following regular brewing procedures is essential for turning out quality brews on a consistent basis. Professional brewers generally follow strict guidelines with each beer to ensure each batch is up to par. While homebrewing allows for a lot more variables to effect the nature of the beer, following a regular routine will cut down on potential errors that can lead to a bad batch or missing personal brewing goals.

RECIPES

Worth Brewing Belgian Grand Cru

(5 gallon/19 L, all-grain)

OG = 1.059 FG = 1.010
IBU = 31 SRM = 8 ABV = 6.3%

Iowa has a 5% alcohol by weight (ABW) limit — this works out to just over 6% alcohol by volume — for native brewers, so Belgian ales are a challenge. Here is a favorite that hits the limit but isn't quite as strong as most Belgian ales. — Peter Ausenhus

Ingredients

10 lbs. (4.5 kg) Belgian 2-row Pilsner malt
0.50 lb. (0.23 kg) Belgian Carapils malt
2.0 oz. (57 g) Special B malt
0.50 lb. (0.23 kg) candi sugar (light to dark, depending on the color you desire) (add toward end of boil)
0.50 lb. (0.23 kg) honey (0 mins) (Worth Brewing collects their own)
6 AAU Vanguard hops (60 mins) (1.2 oz./35 g of 5% alpha acids)
2.5 AAU Vanguard hops (45 mins) (0.5 oz./14 g of 5% alpha acids)
Wyeast 1214 (Belgian Ale) yeast

Step by Step

Protein rest at 137 °F (58 °C) for 10 minutes. Saccharification rest at 151 °F (66 °C) for 50 minutes. Dextrin rest at 158 °F (70 °C) for 10 minutes. Ferment starting at 65 °F (18 °C), but let temperature rise to 75 °F (24 °C).

Extract with grains option:

Reduce Pilsner malt to 1 lb. 6 oz. (0.62 kg) and add 1.5 lbs. (0.68 kg) light dried malt extract plus 4 lb. 6 oz. (2.0 kg) light liquid malt extract. Steep crushed grains in 3 qt. (~ 3 L) of water at 151 °F (66 °C) for 60 minutes. Add water to make at least 3 gallons (11 L) in brewpot. Add dried malt extract and bring wort to a boil, adding hops at the times indicated in the ingredient list. Boil for 60 minutes. Add sugar for final 15 minutes of the boil. At end of boil, stir in honey and liquid malt extract and let steep for 15 minutes (with the lid on). Cool wort, transfer to fermenter and top up to 5.0 gallons (19 L). Aerate wort and pitch yeast.

Hank is Wiser Brewery's Porter Potty Porter

(5 gallons, extract with grains)

OG = 1.050 FG = 1.012
IBU = 48 SRM = 34 ABV = 5%

Ingredients

6.6 lbs. (3.0 kg) amber liquid malt extract
10 oz. (0.28 kg) crystal malt (60 °L)
5.0 oz. (0.14 kg) chocolate malt
3.0 oz. (85 g) black patent malt
12 AAU Cluster hops (60 mins) (1.5 oz./43 g of 7.9% alpha acids)
4.6 AAU Willamette hops (5 mins) (1 oz./28 g of 4.6% alpha acids)
0.5 tsp. Irish moss
1 tsp. Wyeast nutrients
Wyeast 1084 (Irish Ale) yeast

Step by Step

Pour 3.0 gallons (11 L) of water into a large pot. Heat water to 155 °F (68 °C). Put hops into bags and place crushed grain into three 6-oz. cloth bags. Place bags of grain into 155 °F (68 °C) water and hold temp for 20 minutes. Raise temp to 165 °F (74 °C) and hold temp for an additional 10 minutes. Remove bags (do not rinse grain bags) and add 1-gallon (3.8-L) of water to pot. Raise temp to start boil.

When wort is boiling, cut off heat and stir in amber malt extract. Resume heat and watch carefully. When wort starts to boil over, cut off heat and skim off top of wort until foam is gone. Resume heat and add Cluster hops and boil for a total of 60 minutes. Add Irish moss and yeast nutrients 15 minutes before end of boil. Add Willamette hops for 5 minutes before end of boil. Cut off heat and remove hop bags. Top off pot with 2.0 gallons (7.6 L) of cold water. Adjust transfer wort flow through counter flow heat exchanger to achieve 70 °F (21 °C). Add yeast when fermenter is half full. When done transferring wort, take aerating stone and oxygenate for 3 minutes at 10 PSI. Ferment at 68 °F (20 °C) for one week. Keg and force carbonate then let beer condition for one week at 36 °F(2.2 °C).

All-grain option:

Replace malt extract with 9.0 lbs. (4.1 kg) of 2-row pale ale malt. Mash at 152 °F (67 °C).

Jasper Murdock's Alehouse Whistling Pig Red Ale

(5 gallons/19 L, all-grain)

OG = 1.050 FG = 1.013
IBU = 36 SRM = 19 ABV = 4.8%

Ingredients

8 lb. 15 oz. (4.1 kg) pale malt
13 oz. (0.37 kg) wheat malt
10 oz. (0.28 kg) crystal malt (60 °L)
2 oz. (57 g) roasted barley
9.6 AAU UK Target whole hops (75 mins) (0.96 oz./27 g of 10 alpha acids)
2.6 AAU UK Fuggle hops (10 mins) (0.64 oz/18 g of 4% alpha acids)
4.8 AAU East Kent Goldings hops (hopback, or at 0 mins) (0.96 oz./27 g of 5% alpha acids)
Fermentis S-33 ale yeast

Step by Step

Single infusion mash at 151–154 °F (66–68 °C) for one hour. Sparge at 160 °F (71 °C) or higher. Boil for 75 minutes. Pitch Fermentis S-33 ale yeast and ferment at 64 °F (18 °C).

Extract with grains option:

Reduce pale malt to 0.5 lb. (0.23 kg) and add 2.0 lbs. (0.91 kg) light dried malt extract plus 3.3 lbs. (1.5 kg) light liquid malt extract. Steep grains at 152 °F (67 °C). Add liquid malt extract for final 15 minutes of boil.

The Hank is Wiser Brewery is located in an historic building, built in 1898, in downtown Cheney, Kansas. The brewery is shown here during one of their summer biker beer-pancake feeds.

"Brewing good beer is very much about procedure — I'm not talking about following rigid guidelines in materials or beer styles, but in the mechanics of brewing, from mashing to sanitizing to fermenting and packaging," Ausenhus explains. "Find a routine that results in clean beers that hit your criteria and stick to it."

Hank is Wiser

"We're on our 300th batch now," says Sanford, who retired early from his manufacturing sales manager position to open his "dream job" brewery in 2005, filled with his collection of brewery memorabilia from around the world. "We're continually finding ways to make everything run smoother, easier and go better."

The Hank is Wiser brewery is located in a historic building in downtown Cheney, Kansas (near Wichita). In the brewhouse, Sanford makes 15.5-gallon (59 L) batches on a Sabco Brew-Magic system, ferments in converted Sanke kegs and serves his beer from 5-gallon (19-L) Cornelius kegs.

Sanford likes to toss about the term "repeatability." As a commercial brewer, even a small one open three days a week, he says it's critical that his beers are the same time and time again. For this reason he takes careful notes of each batch run, including, mashing times and temperatures, length of boil, hops additions, pitching temperatures, etc.

"In our first year in business we did a lot of experimenting, so recipe to recipe the beer might change in some aspects," Sanford said. "(But) when you are selling beer you have to achieve repeatability. In all my years as homebrewer, it was one of the things I had difficulty with because we didn't control the total brewing process, mainly the fermentation. When you are a homebrewer, if you brew the same recipe in the winter versus the summer you're likely to have a different taste in the beer."

One way these small brewers combat temperature shifts during fermentation is with special coolers with high temperature thermostats that allow them to dial in and control exact fermentation temperatures. While that might not be a cost efficient option

for many homebrewers, even a dorm or smaller refrigerator can work. Make sure it either has a temperature gauge, or do some experimenting (with warm wort-filled carboys if possible) to find the appropriate temperature gradients. A glass front can be useful (though coolers like this can be difficult to find) as well to monitor fermentation times.

The Brewer is Inn

Another option is the food-grade glycol jackets that Dakin uses on his fermenters at Jasper Murdock's Alehouse. Jasper Murdock's is located in the Norwich Inn, which was established in 1797. In 1993, the brewery opened and the began brewing English ales, brewed in 5-gallon (19-L) carboys. The brewery uses English malts and supplements their English hops with those from their own hopyard. In 1995, they upgraded to a new 4-barrel brewhouse ... which brings us back to the jacketed fermenters. These jackets measure the fermentation temperature and circulate liquid coolant as needed to maintain that temperature. They cannot heat the fermenter (he pitches at a slightly higher temperature because of this), but can cool it to the determined goal. In Dakin's case, this is 64 °F (18 °C).

Consistency and the Cold Side

"Consistency is a very important goal for our four year-round beers (pale ale, Slim Jim — a clean ale, brown ale and oatmeal stout)," says Ausenhus. "I have a 4-by-8-foot fermentation room that holds fermenters at ale fermentation temps year-round. I do lagers in a separate lagering chest freezer." Sanford follows a similar procedure, but at this point has not yet invested in a lagering cooler.

"We purchased a special walk-in cooler with a high temperature thermostat to maintain roughly 68–70 °F (20–21 °C) degrees in that environment and maintain consistent fermentation temperatures," Sanford adds. "That is probably the one biggest single factor that has allowed us to achieve repeatability."

By contrast, Dakin, who's been homebrewing since "Sam Adams was considered exotic" is less concerned with exactly duplicating beer after beer. For one thing, he's not sure your average customer can identify subtle variations that might occur from batch to batch. For another, he believes the most important thing uncovered as a homebrewer was that if the beer is high quality, people will enjoy drinking it. And if it is close enough to the style expectation, such as the Ale House's year-round offering, Whistling Pig Red Ale, then it's a job well done.

"I'm not sure you necessarily have to have things exactly the same," Dakin says. "I think that's part of the charm of brewing on (a smaller) scale. I know each batch is going to be slightly different. I follow the same recipe and attempt to use the same process, but there are differences. If the beer's within a certain range and people are going to recognize it for what it is and it tastes pretty much as they expect, and even if it's slightly different, I think that's okay."

While Sanford says he enjoys the chance to experiment — that's part of what home-

brewing is all about — with his seasonal offerings, he doesn't subscribe to Dakin's thinking. He believes the six regular house brews offered should, for the sake of customers, rarely waver in consistency.

"Once you get people who like it, you don't want it to change," he says. "Not even a small amount."

Homebrewers who brew a different beer each session may question if consistency is an important goal. However, even if you're brewing a pale ale one day and a porter several weeks later, consistency in your brewing can pay off. By using the same protocols, within the confines of your changing recipes, you are more likely to achieve consistent extract efficiencies and boil-off rates — things that will help you hit your target original gravity and volume. Likewise consistent yeast-handling procedures should yield fermentations that start reliably and always reach a reasonable final gravity.

Plan Your Work. Work Your Plan.

Another important step for these brewers is planning. In giving proper thought to what will be brewed and when, these brewers have learned to save both time, energy and money — three things homebrewers appreciate.

Sanford explains that at Hank is Wiser, he will often brew back to back batches of beer. While this might prove more of a challenge for homebrewers, the main advantage in consecutive batches is decreasing total cleanup. A quick clean is sufficient, he

Worth Brewing is located in an historic bank building, built in 1887, in Northwood, Iowa. The bar in the tap room is — the owners believe — the original teller booth for the bank.

says, between batches while the equipment is hot and in constant use. Once brewing is finished, of course, the usual deep cleaning is in order.

Sanford adds that another time saving technique employed at Hank is Wiser is doing a longer single fermentation to avoid racking to a secondary. Reasons for racking include increasing beer clarity, but also preventing off flavors from dead yeast. Sanford doesn't believe this is necessary, whether at the homebrewing level, or something larger.

"A lot of times that secondary is not necessary," he says. "It's designed to give you clearer beer. We condition in one fermentation cycle, but we make it long enough that it goes right into the second fermentation cycle.

"If you read about the actual process of making beer, it can be in that same container," he continues. "The fermentation slows down enough, and if it goes through the fermentation cycle and the secondary in the same container, it saves a lot of time and clean up. If you're brewing on a small batch like we are, you try to keep things as simple as possible."

When it comes to saving money, often a factor for the homebrewing population, producing similarly styled beers close together, usually within one to two weeks, can take advantage of repitched yeast. Pulling healthy yeast from the middle of a slurry can provide an active culture ready to go to work. Of course, this saves any time spent waiting for a yeast starter to peak, as well as the money spent on fresh yeast.

"I always repitch from one of my pale beers after one week of fermentation. I have a conical bottom fermenter and try to take about a half-cup of clean slurry from the middle of the dump," Ausenhus says, who adds that he's not used a new yeast culture in more than a year. "I'm sure there is some mutating, but again, consistent procedure seems to produce a clean, consistent product."

Another planning aspect that is equally as important for homebrewers without a fermentation cooler that can regulate temperatures is making sure the beer you want to make won't suffer from the heat or cold in the room where it might be fermenting.

"Don't fight mother nature by brewing a double bock in July and expecting the basement to provide lagering temps," Ausenhus cautions. "Schedule beers to ferment at appropriate ambient temperatures."

Got Gear?

One heartening thing about these brewers is that they prove you can make commercially viable beer on homebrewing equipment. (Not that we ever doubted that.) And, the brewers have some equipment-related advice.

Sanford has two other recommendations for homebrewers, both involving equipment he didn't have when homebrewing, but considers vital in his current operation: a wort chiller and an oxygen tank. Sanford says he, like most homebrewers, used to wildly shake his carboys for aeration. Certainly, he can't do that with

his 15.5-gallon (59-L) batches, so he uses an oxygen tank for aeration. Discovering the simplicity of this, he now wishes he had one when homebrewing.

As for the wort chiller, well, he'd have taken that "toy" over the tank in a second.

"If I were back to being a homebrewer, I'd get a wort chiller," he says with a laugh. "Got to have a wort chiller. Back then sometimes it was difficult to get your wort chilled. I remember sticking the kettle into an ice bucket and running water over it to cool it as fast as possible. A wort chiller does a heck of a job cooling it down, and does it consistently. It helps with repeatability too."

Each of these brewers works on different systems with different batch sizes, and with different expectations of results. That is not unlike homebrewers, who range from beginning stovetop extract brewers to experienced all-grain brewers (who may be brewing on a Sabco, just like Ausenhus and Sanford). Dakin says whatever the system, understand how it works, determine its limitations, and then work within that structure to make good beer.

"Every system has a box, or set of parameters, and there is a lot of wiggle room within those lines," Dakin says. "Even if it's something you've never tried before, if you stay within the system and know where there's flexibility and understand those concepts about your system, as long as you stay within the lines the batch is going to be drinkable."

One thing that the results from homebrew contests have shown is that you can make award-winning beer by any of the common homebrewing methods — extract, partial mash or all-grain. Brewing great beer is not about having the fanciest brewery, it's about getting the most from your brewery.

The Big Picture

At the end of the day, it all comes down to the same goal, producing quality, drinkable beers. And while these brewers differ in varying degrees in approach, expectations and ideals, it's not unlike the different homebrewer expectations. Some strive for exact duplication of favorite recipes, while others throw caution to the wind and wait with anticipation to "discover" what they made.

In that vein, Dakin notes that homebrewing has a lot fewer headaches than brewing on a large scale, even with his sometimes casual approach to beer making.

"I've come to learn that . . . there's probably a little more tolerance in the brewing process than many of us will allow ourselves to think," he says with a laugh. "This is certainly true on the smaller scale side. I get away with doing stuff a bigger brewery wouldn't even think of trying."

While all these tips are useful to anyone brewing, and Dakin makes it clear not to stress over making beer, Ausenhus offers one final reminder of why we began homebrewing in the first place:

"To enjoy and respect all aspects of good brew and the relationships they engender."

Glenn BurnSilver is a frequent contributor to Brew Your Own.

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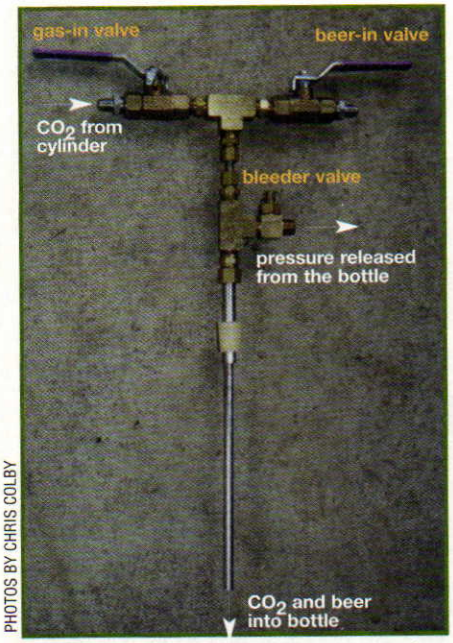
Under Pressure

The technique (and tricks) to counter-pressure bottling

by Chris Colby

So you made the move to kegging and you've got a few kegs on tap. You're pouring your own draft homebrew for you and your friends and everything seems great. Not only does this save you the hassle of cleaning multiple bottles for each batch, kegging is faster and eliminates the wait on bottle conditioning. Then, your club's annual homebrew contest is announced and you'd like to enter, but you don't want to go back to bottling all your beer. Luckily, there's a simple solution for moving beer from a keg to bottles — counter-pressure bottle fillers. In counter-pressure bottling, no sugar is added at bottling and the beer doesn't need to bottle-condition to carbonate. If the kegged beer is sufficiently conditioned, you will have clear, carbonated beer in the bottle . . . and no yeast sediment. You can bottle as many or as few bottles as you like, and the beer can be served immediately after bottling. Counter-pressure filling is great for homebrewers who keg, but also enter homebrew contests, attend homebrew club meetings or wish to bring a few beers to a party or barbecue.



PHOTOS BY CHRIS COLBY

This counter-pressure filler has three valves — a beer-in valve, a gas-in valve and a bleeder valve.

The main challenges of counter-pressure bottling are to retain the beer's carbonation and minimize its exposure to oxygen during the transfer. When performed correctly, almost all of a beer's carbonation is retained when it is counter-pressure bottled. Likewise, with a little practice, the beer can be transferred with minimal exposure to oxygen. Oxygen speeds staling reactions in beer. So, the less oxygen your beer encounters, the longer it will taste fresh.

Advantages

There are several benefits to counter-pressure bottling beyond the ones I have mentioned. The yeast in homebrew bottles is a minor inconvenience for homebrew served at home, but it can become a major problem when you try to transport or ship homebrew. Yeast gets disturbed and it takes time, sometimes a couple of days, to settle back down. And even then, the beer may take on some off-flavors from the roused yeast. Many homebrewers buy a counter-pressure filler just for shipping beer to contests. With counter-pressure bottling, you can also bottle the last few beers from a keg (the "keg dregs") to make room in the fridge for fresh kegs.

Disadvantages

One drawback to counter-pressure bottling is the initial cost. Counter-pressure fillers cost around fifty dollars, and you need to have a kegging system. In addition, counter-pressure fillers have interior spaces that can't be seen by the homebrewer. Unless you clean the filler thoroughly after each use, deposits can build up inside the unit. Like the crud that forms in tap lines, you don't want this stuff touching your beer. Soaking the filler in TSP or PBW immediately after use, then rinsing thoroughly with hot water, should keep everything clean.

Bottling beer with a counter-pressure filler takes a little more effort, especially with regard to set-up, than standard homebrew bottling. However, few homebrewers with counter-pressure fillers bottle the entire keg, as this would be time-consuming. Instead, only a few bottles — usually for bringing to a party or shipping to a contest — are filled. The rest of the beer is dispensed from the keg.

Connecting the system

To set up your counter-pressure system, you'll need your counter-pressure filler, a keg of beer, a CO_2 tank and the required connecting tubing. (Your filler should have all the necessary tubing supplied when you buy it.) To begin set-up, take the filler and close all the valves. Likewise, turn the gas off on your CO_2 tank. Unless you like the sight of beer spraying or the sound of CO_2 hissing, don't connect the filler to anything until you're sure all the valves are closed. Connect the CO_2 tank to both the keg and the filler. This is usually done by splitting the gas-out line with a "T" connector. One line goes from the CO_2 tank to the "in" connector on your keg (as usual); the other connects to the filler. Finally, connect the beer-out line from the keg to the filler. (Some counter-pressure fillers require the beer to flow downhill into the bottles. If this is the case with your bottle filler, elevate the keg above your bottling station.)

The keg of beer should be cold, carbonated and conditioned. The colder the beer, the better. Carbon dioxide (CO_2) dissolves more readily in cold beer, so you will have fewer problems with foaming (from CO_2 breakout) in cold beer. Ideally, your keg should be around 32 °F (0 °C), but it is fine if it is around serving temperature. (The freezing point of normal-strength beers is slightly lower than this. Stronger and sweeter beers have a freezing point significantly below this.) Since some carbonation is inevitably lost during the process, your beer should be fully carbonated. You may, in fact, want to slightly overcarbonate your beer prior to counter-pressure bottling to compensate for this loss. To do this, simply increase

the gas pressure by two to three PSI overnight. Don't go nuts with the carbonation, however, unless wrestling with wildly foaming beer bottles is your idea of a good time.

You'll need clean, sanitized bottles for counter-pressure filling, and you can help keep excessive foaming down if you cool the bottles down to the same temperature as the beer. Do not, however, freeze your bottles as ice crystals will serve as nucleation points for dissolved carbon dioxide in the beer.

It's always good to have a couple hand towels or a roll of paper towels on hand, as it's relatively easy to spill a little beer while counter-pressure bottling. You'll also need your bottle capper, caps and — of course — clean and sanitized bottles.

Bottling the beer

Once the filler is connected, check again that all the filler valves are closed and then open the valve on the gas cylinder. Opinions differ on how much pressure should be applied for counter-pressure bottling. I've seen pressures from 3–15 PSI recommended. Lower pressures allow you to fill the bottles slowly, but CO_2 can break out of solution fairly easily when beer enters the bottle and is exposed to a lower pressure than the level at which it had been conditioned. Higher pressures move the beer faster, but the filler is more likely to pop off the bottle while filling. Also, the beer can suddenly start foaming when the filler is pulled off and the beer experiences a large pressure drop. I usually just leave the pressure at the level at which the keg was conditioned, usually somewhere between 8–12 PSI, depending on the beer style.

Purging the bottle

The first step in counter-pressure bottling is to fill the bottle with CO_2, displacing the air that was formerly there. Filling the bottle with CO_2 first will minimize the amount of oxygen the beer encounters during the transfer.

To fill the bottle with CO_2, place the filler on the bottle and make sure the stopper is securely positioned in the opening of the bottle. Next, open the gas-in valve and then crack open the "bleeder" valve. Once the bleeder valve is open, you'll hear the gas hissing and the bottle will begin filling with CO_2. Gas from the cylinder is flowing through the filler tube to the bottom of the bottle. Since CO_2 is heavier than air, it will form a "blanket" on the bottom of the bottle. As this "blanket" rises, it displaces the bottle's existing air (approximately 20 percent of which is oxygen) and forces it out of the bleeder valve. After 10 or 12 seconds, the bottle should be full (depending on how far open you cracked the bleeder valve).

You can't see CO_2, so you'll just have to estimate how much CO_2 is enough. I try to think of how much gas escaping the bleeder valve it would take to fill a balloon the size of the bottle I'm filling. Once the bottle is "gassed," close the bleeder valve first, then close the gas valve on the filler. (The valve on the gas cylinder remains on throughout filling.) Now you're ready to start moving the beer.

Transferring the beer

The second step in counter-pressure bottling is to fill the bottle with beer. The filler's tube extends almost to the bottom of the bottle. So during the transfer, the bottle is filled from the bottom, under the blanket of CO_2. This minimizes foaming and aeration, because there's always bound to be some stray oxygen in the bottle, even after it's purged with CO_2.

To fill the bottle, open the beer-in valve. Beer will not start flowing yet because the pressure in the bottle is equal to the pressure pushing the beer. Counter-pressure bottling is named for the opposing pressures at this stage. To get the beer to flow, crack the bleeder valve. Once the bleeder valve is opened, the pressure in the bottle will decrease and the beer will start to flow. The farther you open the bleeder valve, the faster the beer will flow. You should aim to fill the bottle slowly enough that foaming is controlled. A little foam on top of the beer is OK, good even, but the bottle shouldn't quickly fill with foam. Once the bottle is filled, close the bleeder valve first, then close the beer valve on the filler.

If you are using a gravity-flow counter-pressure system, the beer will start flowing (downhill) immediately after opening the beer-in valve.

The pressure difference between the keg and the counter-pressure relief valve should ideally be about 3 PSI. With this pressure differential, you can fill a bottle in 5–10 seconds. Of course, in the absence of modifying your bottler with a gauge, you'll just have to estimate this differential from your fill rate. Try opening the beer-in valve until the beer just foams, then close the valve a bit and aim to fill the bottle within 5–10 seconds. You can fill the bottles to the level of commercial beers, or you can go a little higher. Either way gives good results.

Capping

The final step in counter-pressure bottling is capping. Capping should be done as quickly as is feasible. Cap each bottle right after filling it rather than filling several bottles, then capping them all. While the bottle is uncapped, carbonation is being lost and the beer is being exposed to oxygen. The loss of carbonation is relatively slow, of course. Think about opening a bottle of beer. The carbonation dissipates over time, but your beer doesn't instantly go flat. So move quickly during this step, but don't worry overly much about it.

You will need a keg as well as a carbon-dioxide cylinder to connect to your counter-pressure bottler.

To begin capping, check that all the valves on the filler are closed. If any of the valves are opened, you will lose beer or CO_2 when you take the filler off the bottle. I also take the time at this point to ensure that I have a bottle cap and my capper ready. Remove the filler from the bottle and set it aside. Now quickly place a cap on the bottle and crimp it closed with your capper.

Ideally, you should try to cap over foam. When foam rises in the bottle, it displaces the gas above it. In doing so it displaces any oxygen in that gas. While filling, adjust the flow rate so a bit of foam forms on top of the beer. Once you remove the filler, the beer will likely start foaming some more. Place the cap on top of the bottle and wait for the foam to rise to the top, then cap. You may need to lightly hold the cap on with your finger to stop it from being knocked off while the foam is rising.

If the beer is not foaming, you can either just cap the beer or try to induce foaming. To induce foaming, take another beer bottle and lightly tap the top of the just-filled bottle. Be careful, though — if you hit the bottle too hard it will foam uncontrollably. (If you're like me, you've probably seen this performed as a prank, turning the victim's beer into a geyser.) This takes a bit of practice. Don't try it unless you are willing to risk losing some beer and having a mess to clean up.

Conditioning

Counter-pressure bottled beer can be served immediately. You will notice, however, that newly-bottled beers won't make the "phsst" sound of escaping gas when opened. Initially, the gas pressure in the bottle's headspace is equal to the atmospheric pressure at the time the beer was bottled. Over time, CO_2 from the beer will diffuse out of solution and pressurize the headspace. This is why some homebrewers feel that it is best to minimize the amount of headspace in the bottles. The smaller the headspace, the less carbonation is lost from the beer to pressurize the headspace.

At first, counter-pressure bottling can seem complicated. There's tubing running all over the place and four valves (counting the main valve on the CO_2 tank) to keep track of while filling. (A new filler, Blichmann's Beer Gun, simplifies the process, but works under the same principles of a "regular" counter-pressure filler.)

Just keep in mind that, any time you're unsure of how to proceed, you can turn all the valves off and figure it out or look it up. Also keep in mind that all the valves should be closed whenever you hook up the system and whenever you take the filler off a bottle. (If you're like me, you'll make the mistake of leaving the beer or gas valve open once, and the resulting cleanup will help you remember in subsequent bottlings.) Although counter-pressure bottling initially seems complicated, it will seem like second nature once you've done it a few times.

Like the bottles described here, Brew Your Own *Editor Chris Colby is frequently full of beer and gas.*

Go Nitro

Add a stout tap to your kegerator

Story and photos by Forrest Whitesides

So you've got a kegerator, and you're loving life now that you don't have to bottle every batch of homebrew anymore. You also are the envy of family and friends because you serve finely crafted beer on draft in the comfort of your own home. But something is still missing: the ability to serve stouts, porters and pub ales with that same full mouthfeel, thick head, and gorgeous cascading bubble effect that your favorite brewpub or tavern offers with their fancy draft setup. With very little time and about $200 (if you are frugal, that is), you can serve up "nitro" beers at home without having to do any permanent modifications to your kegerator.

How does it work?

So where does that creamy mouthfeel, thick head and shimmering/cascading visual effect in a nitro beer come from? It's a combination of two critical elements: a specially designed faucet and a special mixture of gas.

The faucet, which is often called a "stout" or "Guinness" faucet, sports an elongated vertical design and at its core has a restrictor plate that both slows down the speed of the pour and also agitates the beer as it is poured (which helps to create that big head). The restrictor plate, or "sparkler" as it is sometimes called, functions very similar to the aerator disc in a kitchen or bathroom sink faucet. It can also be removed from the faucet for a standard pour in cases where the faucet must serve double duty as both a stout and standard tap.

The other half of the equation is the gas pushing the beer, which is referred to as "beer gas," "Guinness gas," or even "beverage gas," depending on the supplier. Nitrogen and CO_2 blends are sold in a few different ways and it's critical that you get the right blend for the below procedures to work. The blend you'll want will have 70–75% N_2 and 25–30% CO_2. Avoid the common high pressure draft system 60/40 blend, which is actually 60% CO_2 and 40% Nitrogen. Nitrogen does not dissolve very well in beer, and much of it comes out of solution almost immediately after pouring. This is a big part of what causes the visual cascading effect (the other part being the agitation from the restrictor plate in the faucet). Additionally, nitrogen tends to form smaller bubbles than CO_2, and this is why a nitro-poured stout or pub ale has a dense, persistent head.

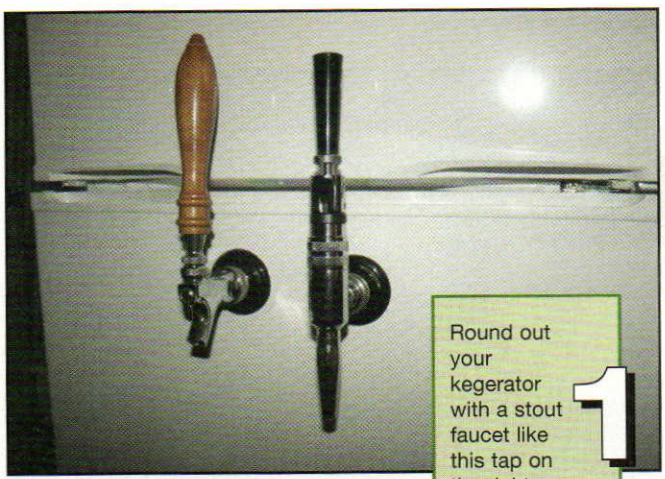
Once the pour is complete and the undissolved nitrogen has escaped, what's left is a beer that's approximately one-third as carbonated as a typical draft beer. In a nutshell, it's similar to a cask ale but without the concerns of flavor degradation (oxidation) from pumping air into the keg. The lower carbonation also gives the beer a fuller mouthfeel as compared to beers served at higher carbonation levels.

Sourcing beer gas

Your current supplier of CO_2 likely carries the nitrogen/CO_2 gas mixture as well. If they do not, check with local bars and restaurants to find out where they get their gas. For various reasons, commercial draft systems frequently use a nitrogen/CO_2 mixture to push all of the beers on tap—so if there is a place near you that serves draft beer, they're getting the gas from somewhere. A polite inquiry with the manager will likely lead to a good supplier of beer gas. Also be aware that beer gas is sold in cubic feet and not in pounds as CO_2 is sold.

Get the gear

Luckily, stout faucets use the same fittings as any other faucet, so there is no need for you to buy any additional shanks or draft tower fittings (unless, of course, you're adding the stout faucet as an additional, permanent tap in your lineup). Stout faucets cost anywhere from about $75 up to about $150. I bought one of the cheaper models from www.beveragefactory.com, and it looks great and performs superbly. Most vendors that carry general kegging equipment will also stock stout faucets, so they should be easy to find.



Round out your kegerator with a stout faucet like this tap on the right. 1

As mentioned earlier, the restrictor plate can be removed, allowing you to use the stout faucet as a standard faucet. This makes things easier if you don't plan to have a nitro-appropriate beer on tap at all times. Swapping out faucets when you switch kegs isn't that big of a deal, but it's one more thing to do and one more piece of gear to clean and put away. I had initially planned to change my faucet heads as I changed beers, but I've found that it's much less of a hassle to just remove or reinsert the restrictor plate as needed.

Nitrogen is stored at a much higher pressure than CO_2 and requires a different type of cylinder. In most cases it also has a female threaded connection, as opposed to a CO_2 clyinder's male connection. Check with your supplier as to the type of connection their cylinders have. Because of the higher pressure and different

2 You can remove the restrictor plate in your stout tap to make it work like a standard tap.

connection, you'll also need a different regulator for the beer gas cylinder. An exception to this is if you already have a CO_2 regulator that is rated up to the max PSI of the gas in your cylinder (generally about 3000 PSI), in which case you can use an inexpensive adapter to convert the gender of the regulator's connection fitting. If you are not 100% certain about the regulator's safety rating, buy a new regulator that meets the safety specs (which are usually stamped into the cylinder). You cannot make assumptions here. It's not worth the risk of serious injury and/or major property damage to save a few bucks.

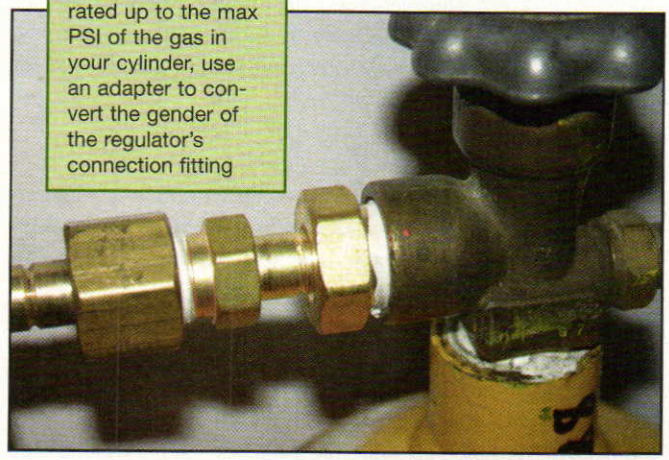
3 A nitrogen tank (left) is different than typical CO_2 tank (right) because nitrogen is stored at a higher pressure.

If you plan to house the beer gas cylinder outside of your kegerator, it is imperative that you secure it with rope, chain, or bungee cables. A failed cylinder valve or regulator could create a serious problem that could injure bystanders and would almost certainly cause extensive damage.

Dispensing with beer gas

The most traditional way to go about serving your nitro brew is the traditional all-beer-gas method. This procedure works by simply taking your finished beer and hooking up the beer gas at about 30—35 PSI and lettting it carbonate for 7 to 14 days before serving. This is the same basic procedure you'd follow for carbonating with CO_2. In order to pour a creamy pint with a thick and rich head it is very important to have less than 1.5 volumes of carbon dioxide in the beer and roughly 20 mg/L of dissolved nitrogen. In order to have that little carbon dioxide and that much nitrogen you must gas with mixed gas at a relatively high pressure. Too little nitrogen and you don't have the nice foam and too much carbon dioxide and you end up with crazy beer when it is poured through a stout tap.

4 If you have a CO_2 regulator that is rated up to the max PSI of the gas in your cylinder, use an adapter to convert the gender of the regulator's connection fitting

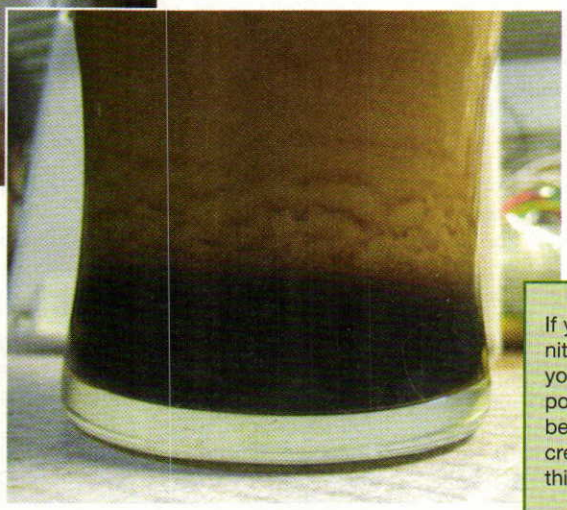


Because nitrogen does not liquefy at the pressures commonly seen in gas cylinders, it cannot be as densely packed as CO_2 (which does liquefy at lower pressures). Therefore, even very large beer gas cylinders will generally be depleted far quicker than much smaller CO_2 cylinders. And given that beer gas is more expensive than CO_2, you'll be making more trips to the gas supplier and spending more money if you decide to use this traditional method of carbonating your nitro brews.

"Faking" the nitro experience

If you don't like the added expense and hassle of an additional gas cylinder and regulator, or if space constraints make them impossible to incorporate in your kegerator, there is a way to approximate the nitro pour experience without all of the additional equipment. You will still need, however, a tap faucet with a restrictor plate. Here is the basic procedure:

Hook up your uncarbonated (but well-conditioned) keg of homebrew to your CO_2 tank and set the pressure to 15 PSI. Disconnect the CO_2 and give the keg the decent shake for about 20 to 30 seconds. Reconnect the CO_2 and lower the pressure to 10 PSI. Begin serving after 12 to 24 hours. When not serving beer for more than a couple of hours, close the gas shutoff valve to that keg, and partially vent the keg. This helps keep the beer at similar carbonation levels that you'd get with beer gas. It's more work, and uses more CO_2, but it does not require additional equipment. The resulting pour is similar to what you'd get with beer gas, but with a less impressive head and not as "big" of a mouth-



If you install your nitrogen tap correctly, you will be able to pour a cascading beer with a thick, creamy head like this one.

feel. Still, the experience is quite a departure from the typical carbonation methods, and is a worthwhile experiment.

As a truly experimental alternative, try the above method but do not shut off the CO_2 or vent the keg while not serving. This will give you a very nitro-like pouring experience for about two weeks, and then it finishes off as a traditionally carbonated beer. The downside is that as the beer gets more carbonated, the restrictor plate starts causing excessive head and it takes much longer to pour a full pint. But I've tried this twice, and I have enjoyed sampling the beer as it progresses from nitro-like to a more typical draft experience.

As always, experiment to your heart's content, but please pay careful attention to good safety practices when working with gas under high pressure.

Forrest Whitesides' will probably try anything brew-related at least once, including a valiant but failed attempt at incorporating jellybeans into a homewbrew recipe. He writes "Projects" for every issue of Brew Your Own.

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Statement of Ownership, Management, and Circulation. Filing Date: October 1, 2008. Brew Your Own, Publication No. 1081-826X, is published monthly except February, April, June and August, 8 times a year, at 5515 Main Street, Manchester Center, VT 05255 by Battenkill Communications, Inc. Annual subscription price is $28.00. Publisher, Brad Ring, 5515 Main Street, Manchester Center, VT 05255. Editor, Chris Colby, 5515 Main Street, Manchester Center, VT 05255. Managing Editor, Betsy Parks, 5515 Main Street, Manchester Center, VT 05255. Owner, Battenkill Communications, Inc., 5515 Main Street, Manchester Center, VT 05255, Brad Ring, 5515 Main Street, Manchester Center, VT 05255. There are no additional bondholders, mortgages, or other securities holders owning or holding more than 1 percent. Total copies: 36,371 average, 38,250 October 2008. Paid/requested outside-county mail subscriptions: 23,531 average, 24,249 October 2008. Paid in-county subscriptions: 0 average, 0 October 2008. Paid dealer sales: 5,458 average, 7,294 October 2008. Other classes mailed through the USPS: 1,037 average, 799 October 2008. Total paid/and or requested circulation: 30,026 average, 32,342 October 2008. Free distribution by mail outside-county: 173 average, 71 October 2008. Free distribution by mail inside-county: 0 average, 0 October 2008. Free distribution by other classes mailed through the USPS: 431 average, 342 October 2008. Free distribution outside the mail: 351 average, 299 October 2008. Total free distribution: 955 average, 712 October 2008. Total distribution: 30,981 average, 33,054 October 2008. Copies not distributed: 5,390 average, 5,196 October 2008. Total circulation: 36,371 average, 38,250 October 2008. Percent paid and/or requested circulation: 96.92% average, 97.85% October 2008. Submitted October 1, 2008 by Brad Ring, Publisher.

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Last Call

From Cans to Craft

A smalltown pub has a homebrewing history

Dave Blow • Glens Falls, New York

The hardwood floors of Patty Bethel's Glens Falls home still hold the stories of the Friday night beer brewing sessions of more than a decade ago. There were boil-overs, bottling mishaps and of course — some spills caused from "boys being boys," she said. Little did she know at that time, but her husband Ed's Friday night brewing club that stained her kitchen floor would eventually lead to their livelihood.

On St. Patty's Day 2009, they will be celebrating their 10th year in business as Cooper Cave Ale Company, a business that went from brewing 10-gallon batches for growlers only using makeshift equipment to making homemade ice cream, soda — and soon running a pub.

While brewing on a hot muggy July night now using a bigger "Frankenbrew" system made of stainless steel dairy equipment, Ed — with his trademark gray ponytail tucked under an 18th-century style cap — reminisced about the brew club and how it started from a routine trip to hunting camp.

He was a Genny guy until a trip to camp when a younger friend brought a bunch of homebrew he'd made. It was so good, the 56-year-old former hippie said, that the group drank his entire batch that Friday night. But the party wasn't over, so it was off to the car for some of his trademark Genesee.

"I took a big swallow and I could sense the distaste immediately," he said.

He said he looked at the can and said, "Buddy what happened to you?"

Not long after that night, the Friday night gathering where friends got together to chat and drink their Genny turned into the Friday night brew club, starting with basic brew kits and soon transforming into an all-grain operation.

"My job was to wash bottles, make pizza, spin the vinyl and keep everyone happy," 55-year-old Patty said.

When his job as a draftsman and designer for a local paper machine parts manufacturer was being eliminated in 1995, the duo wondered out loud whether beer making could be a job for them.

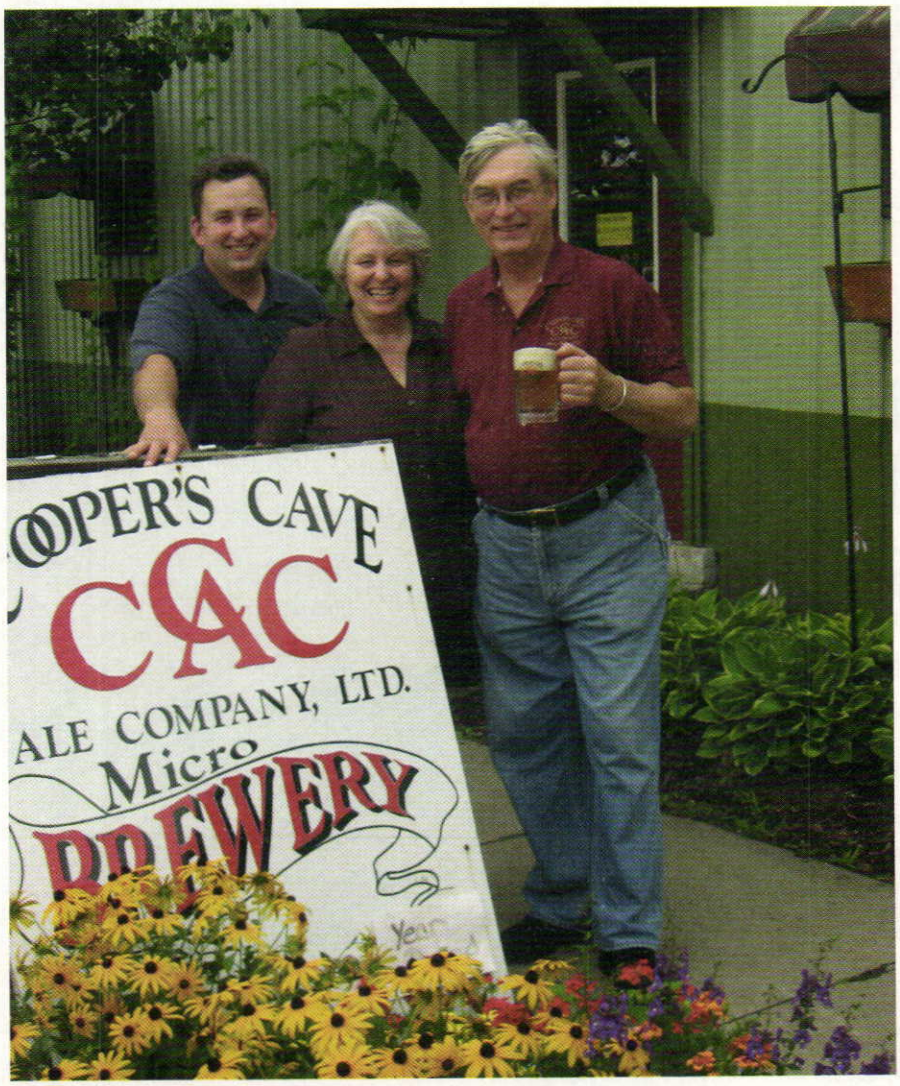
They took a business class at a local community college and began looking for a building. They found a modest, metal-sided industrial type building with no character at the corner of Sagamore Street and Dix Avenue in Glens Falls.

Through much sweat, lots of renovation, paint and plantings, they transformed it into a unique little place with an ice cream window with a local paved bike path on one side and hops growing from the ground to the roof on the other.

These days, Ed brews about 210 gallons per batch of porters, stouts, pale ales, reds and browns using the cobbled system that he looks at with pride and loves showing to other brewers who can appreciate his effort.

But what about words of advice for other homebrewers who want to follow their path?

"It takes three times the amount of money you think it will and twice the effort," Ed's son Adrian said with a smile. "The first feeling of success for me was when someone bought my beer," Ed said. "The next was when they came back."



Thanks to a taste of homebrew on a camping trip, Ed Bethel (far right, with son Adrian and wife Patty) went from drinking Genesee on Friday nights to opening his own brewery.

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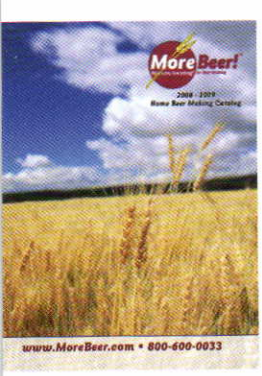

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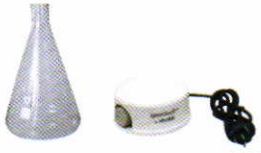

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