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BrewYour Own

JANUARY-FEBRUARY 2005, VOL.11, NO.1

THE HOW-TO HOMEBREW MAGAZINE



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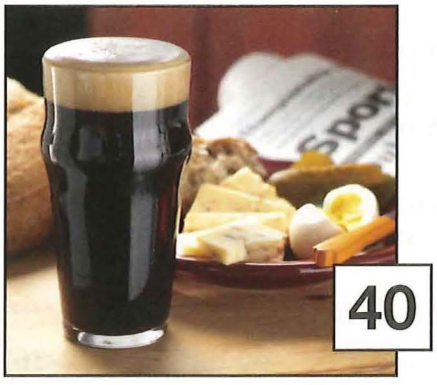
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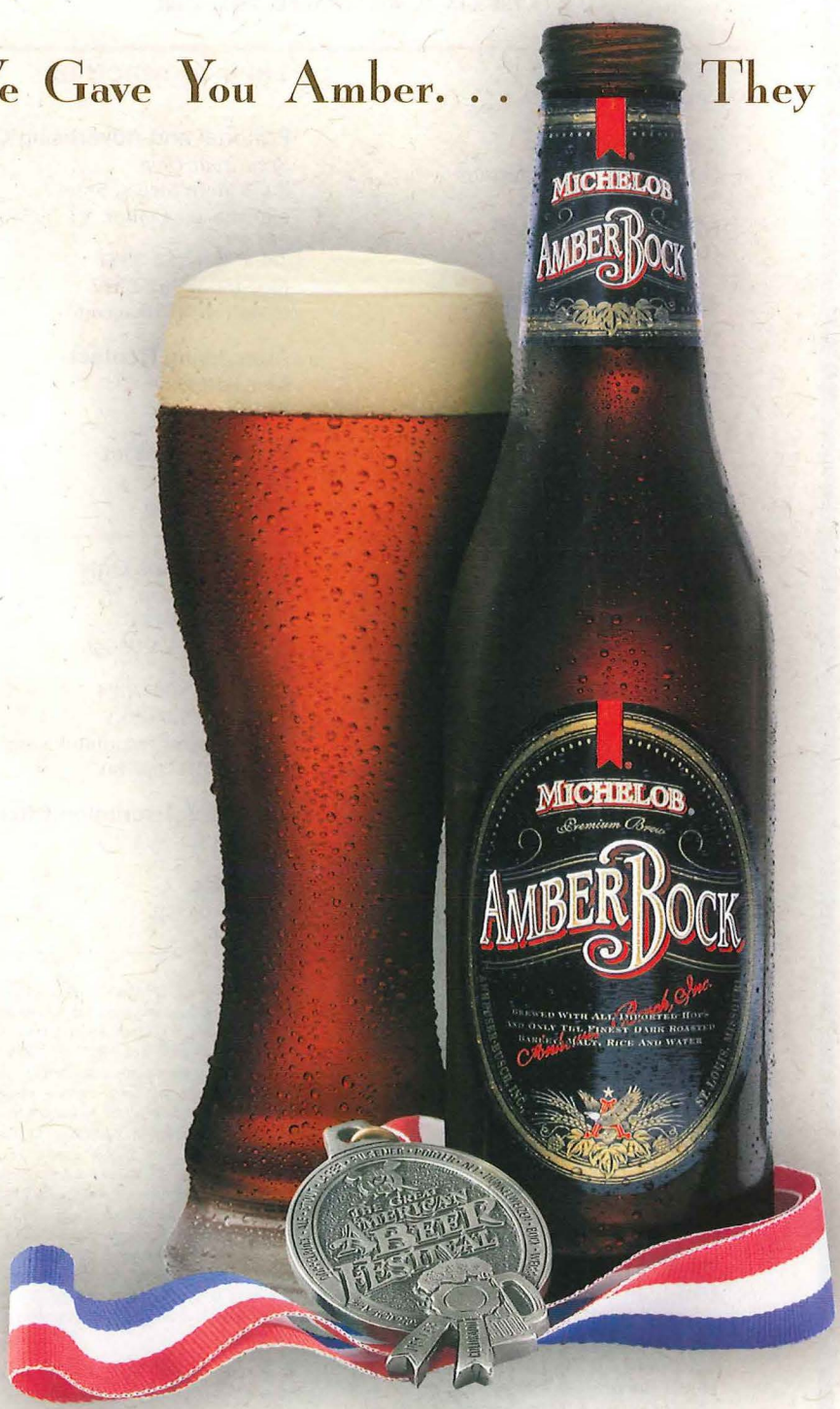
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Brew Your Own's 10th Annual Homebrew LABEL Contest

WIN GREAT HOMEBREW PRIZES!

Send us your best homebrew labels and you could win some great brewing prizes from **BYO** advertisers! Enter as often as you like, but you can only win one prize. Winners will see their artwork featured in the July-August issue of the magazine. **Deadline to enter is April 15, 2005.**



Rules: Entrants can send labels or labels already stuck to bottles. The bottles can be full of beer. No digital or electronic files will be accepted. All other rules are made up by the editors of *BYO* as we go along. Labels are judged in one category, open to graphic artists and amateurs alike, so ultimate bragging rights are on the line. When submitting your labels, tell us a bit about the artwork and its inspiration. Is it hand-drawn? Created on a computer? Send us your best labels, tell us how you made them, and good luck!

BYO Label Contest Entry Form

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THE HOW-TO HOMEBREW BEER MAGAZINE

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Daytime Phone _____

All original artwork? Y or N (circle one)

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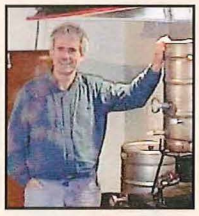


A homebrewer for 15 years now, **MARLON LANG**'S greatest asset to *BYO*, other than his good looks and charm, is his mechanical abilities. He's got a degree in electrical engineering from LSU, and is a specialist in computer control systems and process instrumentation. He holds some patents and has published several technical papers regarding the control of chemical processes.

His other accomplishments are just as impressive. He's rebuilt automobile engines, flown airplanes and brews 10-gallon batches on his homemade HERMS rig every other weekend.

Oh yeah, he's even raised two children with his wife of 40 years. The two of them have travelled to and drank beer in England, Belgium, Germany, Austria and Finland.

He started brewing with his neighbor back in 1990 and has been an all-grain brewer since 1995. When he's away from his kegs, kettles and carboys, Marlon finds time to review stories for the Projects department. His story on keg maintenance begins on page 35.



BILL PIERCE'S reaction to his first taste of homebrew as a college student in the 1970s: "I believe your horse has diabetes," he said.

Nearly 20 years later, in 1994, he brewed his own first batch - an extract brown ale from a kit - and, in his own words, "was hooked."

After completeing the Craft Brewer's Certification Program at the Siebel Institute of Technology in Chicago, he had a brief stint as a brewpub brewer.

"Professional craft brewing was a real eye-opener," he says of the experience. "It's a true labor of love for those who do it."

Now the BJCP-certified judge helps moderate the Brews and Views internet forum sponsored by the online Home Brew Digest. His other various careers have included college teaching, newspaper writing and computer consulting.

In addition to being our Advanced Homebrewing columnist, Bill contributed his nitrogen knowledge to the "Keg-O-Rama" story on page 33 of this issue.



BYO review board memeber **CRAIG HARTINGER** first became interested in what he calls "good beer" as a student at the University of Washington in the mid-1980s. At the time, his girlfriend's father (who is now his father-in-law) began teaching him about the hobby, and he brewed his first batch from a kit he got as a gift a few years later. He was hooked immediately, and in 1993 he started to brew about one or two batches per month.

In 1995, thoroughly enjoying himself, Craig became the manager of Liberty Malt Supply in Seattle. The BJCP-qualified judge is now the marketing manager of its sister company, Merchant du Vin. He teaches a beer class at Bellevue Community College Extension, he attends Washington Brewers Guild events and even gives tours of the Pike Brewery for industry groups. And although he doesn't brew as often as he used to, he still reads, discusses and drinks beer constantly. We put his knowledge to good use as a review board member of *Brew Your Own*.

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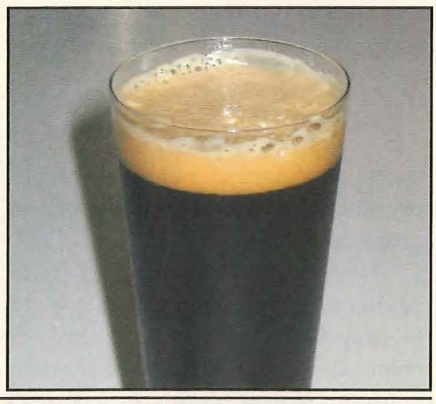
BYO RECIPE STANDARDIZATION

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 IBU's based on 25% hop utilization for a one hour boil of hop pellets at specific gravities less than 1.050.





The Essence of Chocolate

I enjoyed the article in *BYO* about chocolate in beer ("Chocobräu," November 2004). I have been trying different ways to incorporate that great taste in a porter and have tried cocoa powder and chocolate chips, both of which really don't work that well. My last batch, I brewed sort of a clone of Old Leghumper, Fred Garn's award-winning porter from Thirsty Dog in Akron, Ohio. To this I added 3 teaspoons of Noirot Cacao-Cocoa Essence in the bottling bucket. (Noirot is used to make chocolate liqueur).

This is one chocolatey-tasting porter! Pretty close to what I wanted all along. Pretty much the main problem I had [with the previous beers] was that they were not chocolatey enough, although the one where I added 3 pounds of Ghirardelli's chocolate chips near the end of the boil had head retention problems and a lot of chocolate "sludge" in the bottom of the fermenters. That's why I decided to go with the essence at bottling time. The cocoa powder recipe was OK, but I knew I needed to sweeten the finished beer up some, so that's why I added lactose to the end of the boil.

Dave Szakacs
Niles, Ohio

Article author and BYO editor Chris Colby responds: "Thanks for the info, Dave. As I mentioned in my article, adding chocolate extract is one way to get chocolate flavor in your beer. (See also the Replicator's clone of O'Fallon's Cherry Chocolate Beer in that issue.) Of all the options, this is one of the easiest — just add the extract or essence to your finished beer. Personally, I like the taste that cocoa imparts to beer, although I'll admit I've never used the extract.

"It's not surprizing that your beer with 3 lbs. (1.4 kg) of chocolate chips had little head retention; there's a lot of fat in chocolate chips.

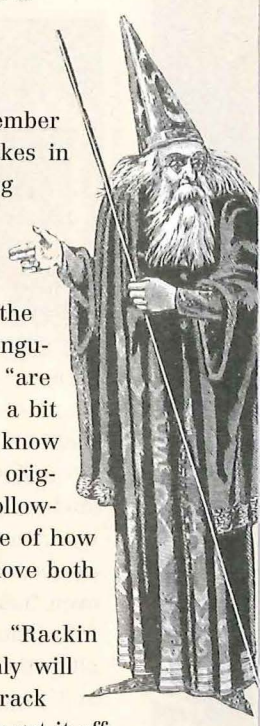
"Finally, keep in mind that chocolate itself is not sweet; it's bitter. Chocolate candy tastes sweet because sugar has been added to it. You can add lactose, as you did, to sweeten a chocobeer, but don't expect the chocolate itself to sweeten the beer."

Low Fat or No Fat?

I read with interest the article on chocolate, but there was one part I couldn't swallow. The author says that we need to minimize the amount of fat added to the beer. I find it hard to believe any amount of fat is acceptable in a beer. Heads collapse when lips touch them. Just a hint of "dirt" on a glass kills head. How can you add even a speck of fat to a beer and get a decent head? I just don't understand.

Bob Nelson
Omaha, Nebraska

Chris Colby responds: "This is a good question. It makes me wish I had a good answer. Unfortunately, the best I can do is to say, 'you just can.' Lots of homebrewers have used cocoa or baker's chocolate in their beers and not had a problem with head retention. As an example, at left is a photo of my "Choctoberfest" chocolate lager made with 20 oz. (566 g) of cocoa added. I don't know how it can have a decent head, it just does."



In Need of "Nots"

I am reading the November *BYO* and noticed two mistakes in my column. In the fining answer, the fourth paragraph begins with "Finings remove compounds from beer and wine and the compounds removed are singular." This should have read "are *not* singular." This was also a bit vague if the reader does not know what I meant by singular. My original answer had a sentence following this one with an example of how PVPP is used in wine to remove both tannins and yeast.

In the letter entitled, "Rackin Tactics," I wrote "It certainly will hurt the finished beer [to rack early] ... but if the point is to get it off the yeast, you don't want to rack too soon". This sentence should have begun as "It certainly will *not* hurt."

Mr. Wizard
undisclosed location

Extracting Information

As an avid extract brewer I found the information in your October 2004 issue invaluable. I have already employed several of the techniques with superior results. Thank you! There were, however, several technical terms used that I am unfamiliar with. Could you please explain "whirlpool" and "knockout?"

Michael Frenn
Placerville, California

The whirlpool is the name of the stage (and the vessel) where hot wort is pumped after the boil and allowed to sit so that solids can settle out of the wort. Knockout is the time when the boil has ended.

brewer PROFILE

Evolution of a Brewer • James Green • Macungie, Pennsylvania



photo courtesy of James Green

After eight years of waiting, James Green finally has a place to serve his homebrew.

I started brewing about 10 years ago by making extract batches on the kitchen stove and fermenting in the basement. I experimented with steeping grains and growing my own hops. I even built my own immersion chiller. After about three years, I moved on to all-grain with a 10-gallon (38-L) cooler and a converted keg brewkettle. Life was good and the brewing was easy. Then my wife and I decided to buy a new home, which gave me the opportunity to find a house with the perfect brew space and room for my own pub!

By this time I had already moved on to kegging beer and had dreams of standing behind a bar and tapping out my own beer. I wasted no time fulfilling my dream, as I hosted the first Big Brew in the garage the day after we bought the house! We had four brewers and three systems going that day. After that, I didn't brew as often, but I worked on perfecting my techniques and upgrading my equipment.

Somehow, I managed to talk my way into a brew session at a local brewpub to get a feel for how a professional brewing system operates. This provided me with a mental blueprint of how I would like my system to work. Over a few years, I bought a better brew kettle, an electric hot liquor tank, an all-stainless steel lauter tun and a counterflow chiller. All were rescued from brewers who were getting out of the hobby or were not using the equipment. I even badgered my brother into welding up a brew cart and got a friend to scavenge stainless steel parts from his job. When I finished the gas manifold and installed the recirculating pump, my system was complete.

In the winter of 2000, I began to put up the walls. I already had the shelving, counter tops and storage space that I needed. I turned my laundry sink into a brewing sink as per an article in *BYO*.

Even though the brewing was once again easy, I still did not have a place to properly serve my beer. This all changed in the summer of 2002 when a friend offered me his expertise in wiring and lighting if I would only get the project started. He told me, "I can't find a decent place to drink, so I am willing to build one." I was thrilled at his offer, and although the bar took me eight years to plan, it took less than six weeks to build!

The grand opening was the first of many "Pub Nights" at my house. Since then, I have continued to make upgrades to both the brewery and the pub. As I write this, I have plans to pick up a refrigerator that will only be used for controlling fermentation temperatures.

I hope my story will inspire other brewers to take the next step in homebrewing, whatever that may be. If you aren't challenging yourself and perfecting your craft, you are missing out on what I believe is the best part of the hobby.

Big Winning RECIPE:

Best of Show - The 21st Annual Dixie Cup
Comrades John Donaldson and Tim White • Houston, Texas

Comrade John & Tim's American Light
(5 gallons/19 L, all-grain)
OG = 1.042 FG = 1.007
IBU = 19 SRM = 6 ABV = 4.5%

Ingredients

4.5 lbs. (2.04 kg) German Pilsner malt
2.5 lbs. (1.13 kg) Belgian Pilsner malt
0.75 lbs. (0.34 kg) rice flakes
1.0 lb. (0.46 kg) maize flakes
1.9 AAU U.K. First Gold hops (50 minutes) (0.25 oz./7.8 g of 7.5% alpha acids)
1.9 AAU U.K. First Gold pellet hops (40 minutes) (0.25 oz./7.8 g of 7.5% alpha acids)
1.4 AAU English Kent Goldings hops (30 minutes) (0.25 oz/7.8 g of 5.6% alpha acids)
1.4 AAU English Kent Goldings hops (20 minutes) (0.25 oz/7.8 g of 5.6% alpha acids)
2.6 AAU Mount Hood hops (15 minutes) (0.5 oz/14.17 g of 5.1% alpha acids)
0.5 AAU Hallertauer hops (5 minutes) (0.15 oz./4.25 g of 3.3% alpha acids)
Wyeast 2007 (Pilsen Lager) yeast (2 qt./2L starter)
8.0 gallons (30.3 L) very soft water (1/2 distilled and 1/2 preboiled tap)
0.5 tsp. Irish moss (30 minutes)
0.5 tsp. gypsum
0.25 tsp. calcium chloride
15 drops phosphoric acid

Step by Step:

Collect five gallons pre-boiled tap water. Remaining balance of water used was bottled distilled. Simple infusion mash 153 °F (67 °F) to 158 (70 °C) over 90 minutes. Mash pH corrected to 5.3 with mineral salts and phosphoric acid. Sparge 70 minutes corrected to pH 5.7. Boil for 25 minutes before first addition of hops. Total boil time is 75 minutes. Rapid chill using whatever chilling equipment you have or an ice bath then pour into a 6.5-gallon (24.7-L) carboy. Add yeast and shake vigorously.

Primary fermentation occurred at 53 °F (12 °C) for 7 days. Secondary fermentation was at 53 °F (12 °C) for 14 days. Beer was kegged, forced carbonated and counter-pressure bottle filled for entry in the contest.

homebrew CLUB

Brewers East End Revival (Means B.E.E.R.) • Long Island, New York

B.E.E.R. is the result of a merger of two homebrewing clubs, the Paumanouk United Brewers and the East End Brew Crew. Established in 1996, the club is committed to finding ways to spark interest in homebrewing. In our quest to keep things interesting, our homebrew club gets pretty crazy. Here are some questions you might want to ask yourself to tell whether you'd be a good B.E.E.R. club member:

-Have you ever made a Steinbier where you started with 12 gallons but finished with just five after a slight boil over?

-Have you ever been lost in Manhattan with 15 other pub-crawlers?

-Did you get into homebrewing to be creative or to make new oddball friends?

-Do you believe that drinking barleywine before brewing increases your learning power?

Now that you've been able to tell if B.E.E.R. is your kind of club, here's some information about us:

Since renaming ourselves B.E.E.R. in 1996, we have been meeting at two local brewpubs. For a membership fee of $20, we provide a monthly newsletter, entrance into an A.H.A. sanctioned homebrew competition, club-only discounts, guest lectures, entrance to our parties and beer tastings throughout the year. Our club gives members benefits that exceed the cost of membership and spend plenty of money throughout the year to keep everyone happy.



Would you be a good fit with the oddballs in the Brewer's East End Revival? The answer may depend on how you look in Western attire, or how far you can throw a keg.

The year's highlight is our annual Octoberfest, which, to keep things interesting, is held every September. Our members and their families come for at least 12 on-tap homebrews and up to four bands. Day activities include keg tossing, coaster tossing (for the kids), and whatever else we can do to encourage participation by all attendees.

Other B.E.E.R. staples include brewing a different club brew from a recipe each year. Another tradition has been the annual pub-crawl, where we rent a keg-equipped luxury bus to take around to New York pubs.

The club encourages members to brew together whenever possible. We have brewfests which take place at different homes. These events give members the chance to learn how others brew, how they compose recipes and the opportunity to learn new techniques. There is always a barbeque and plenty of tasty homebrew on tap.

We have quite a diverse membership, over 80 brewers strong. While we are notorious for being crazy, we have managed not to serve any jail time.

Our club helps unleash the great homebrewer in each of us through involvement, humor and just plain fun. There are lots of stories to tell, but we don't want to embarrass any of our members. At one time or another, we have each been the one that "mooned" the cameraman!

we want you

Do you have a system or some unique brewing gadgets that will make our readers drool? Email a description and some photos to **edit@byo.com** and you too may have a claim to fame in your brewing circle!

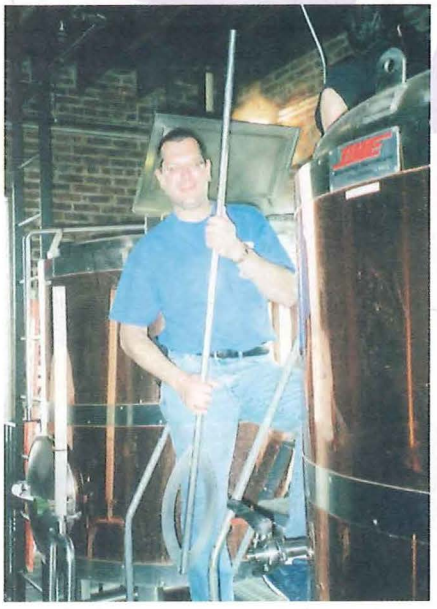
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BYO

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brewer PROFILE

Divorce Court Labs Brewery • Kenny Schrader • Edison, New Jersey



Don't be fooled by the name, Kenny's been happily married for over 20 years and brewing for the past 10.

My home brewery is called Divorce Court Labs Brewery, (or DC Brew Labs for short) established 1995. The brewery does not get its name from an ugly divorce. On the contrary, my wife and I have been happily married for over two decades now and are still going strong! She has tolerated a multitude of boilovers, blowoffs, spills, broken glass, and other major messes (including some requiring first aid) that could result from homebrewing. I am always jokingly teased by her that my next batch will be my last!

I brew in 5-gallon (19-L) batches on the kitchen stove at least 12 times a year. My 10-gallon (38-L) stainless steel brew pot (purchased at a yard sale for $4) fits perfectly over two gas burners. I prefer all-grain but if time is limited, I will do a full volume extract and grain recipe instead. I have had success with both methods. I crack all of my grain by hand with a Phil Mill. The mash occurs in a bottling bucket that is insulated with Styrofoam (2 Omaha Steaks cooler bottoms). I love to play with yeast and will harvest it from secondary to brew several batches. To cool the wort I made a 100-foot copper immersion chiller. Attached to that is a 50-foot pre-chiller which is basically a flexible hose in a large pickle jar that I fill with ice water and connect between the tap and immersion system. I can chill six gallons of hot wort down to yeast pitching temperature in about 15 minutes. Beers made to age are bottled with oxygen absorbing caps, while beers made to drink fresh are conditioned in 5-liter mini-kegs.

Fortunately, there is a terrific homebrew club in my area, the Woodbridge Homebrewers Ale and Lager Enthusiasts Society. I have been with the club since its inception and although I've tasted tons of commercial beers in my life, some of the best beers in the world have been poured by the homebrewers of this club, no doubt!

I have been lucky enough to win many awards for my brews. Over the years I've won AHA gold medals for imperial stout, American barleywine, Eisbock, American amber, Scottish ale, doppelbock, and traditional bock. The bock beers were lagered in my garage by Mother Nature over the winters. The nature of fermentation is totally intriguing to me. My passion is high gravity beer. This brewery has experienced some extremely violent primary fermentations, and we have no shortage of blow-off hoses. I also like to experiment with ALL things fermentable! I've made micro batches of Kumiss (fermented milk) and variations incorporating honey, brown sugar and chocolate. I've also made a few attempts at Kvass, which is fermented rye bread.

What I love most about brewing is teaching others. I've had some horrendous mistakes happen in this brewery and have learned everything the hard way. Usually the results of homebrewing aren't too painful, and after all these years, I'm still brewing and improving.

homebrew calendar

January 27 - 29
2005 Upper Mississippi Mash Out
Minneapolis, Minnesota

The judging for this year's Mash Out will be held at The Holiday Inn Metrodome on January 27–29. Entries are $7 and are to include three bottles. Ship to Northern Brewer c/o 2005 UMMO, 1150 Grand Avenue, St. Paul, Minnesota 55105 between Jan. 8–21. For more information on how to win either the coveted Beer Mash Out Chalice or the Mead/Cider Chalice, visit mnbrewers.com/mashout or call (800) 681-2739.

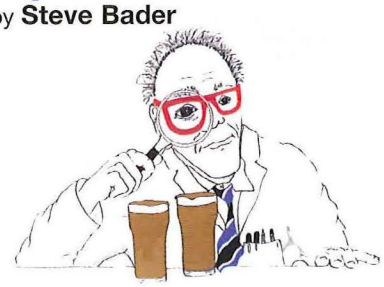
February 21
War of the Worts IX
Springhouse, Pennsylvania

Judging for this competition is held at The Drafting Room in Springhouse, PA at 9 a.m., and winners will be announced at 4:30 p.m. Mailed entries will be accepted at Keystone Homebrew Supply, 779 Bethlehem Pike, Route 309 and North Wales Rd, Montgomeryville, PA 18936. Each entry must consist of two bottles and costs $6 for the first entry and $5 for every subsequent one. For more info visit www.keystonehops.org/wotw or by contacting Jason Harris at (215) 855-0100 or jason@keystonehomebrew.com.

March 12
Big Bend Brew Off
Tallahassee, Florida

This year's Brew Off will be accepting entries from Feb. 18 until Mar. 4. If you're interested in participating, mail your entries ($6 each) to Big Bend Brew Off c/o The Homebrew Dean, 1350 E. Tennessee St. #B-3, Tallahassee, FL 32308. The judging will be held at 9:30 am at Beef O'Brady's Restaurant in Tallahassee. To learn more about the competition, please e-mail organizers Joel Tedder and Wendy Gregory at Jandw1112@aol.com or call Joel at (850) 251-9550.

replicator
by **Steve Bader**



OTTER CREEK MUD BOCK SPRING ALE

Dear Replicator,

I was wondering if you had a clone recipe for Otter Creek Brewing's Mud Bock Spring Ale. I grew up in Boston and couldn't drink enough of it. Since my job moved me to LA, I can't find it when it's in season or anywhere else for that matter. Any information you could get for me about this style would be greatly appreciated. Love your magazine, thanks!

Dominic Siewko
Los Angeles

I recently visited Vermont and found out that the locals refer to spring as "mud season," because they go from the snow of winter to the mud of the spring, then to summer! Mud Bock Spring Ale is Otter Creek Brewing's spring seasonal beer that "celebrates the arrival of Vermont's sloppy spring."

I spoke to head brewer Steve Parkes, who has been brewing at Otter Creek for about the past 18 months. Steve said that Mud Bock does not really fit any recognized beer styles, and he described the Mud Bock Spring Ale as a "caramelly brown ale," with a rich, warming, sweet caramel flavor. Generous amounts of crystal and dextrin malts are used, which contribute non-fermentable malt sugars to the beer, giving Mud Bock its sweetness and caramel profile.

A small amount of chocolate malt is added to give the Mud Bock some additional color and flavor. Steve said hop bitterness is subdued in this beer, and is used as a background complement. Otter Creek also foregoes the use of aroma hops in Mud Bock, which allows the maltiness to come through better.

Steve uses German alt yeast, and ferments at 68 °F (20 °C). The German alt yeast flavor profile depends on the temperature that you ferment the beer. At cooler temperatures (56–66 °F/13–19 °C) you get more of a lager characteristic. At 68 °F (20 °C) and above, you get some fruity, herbal and floral characteristics.

This being said, you will want to monitor your fermenting temperature to make sure you are warm enough to get the fruity characteristics that Otter Creek gets when they make this beer. For more information you can visit the Otter Creek Brewery Website at: www.ottercreekbrewing.com or call them at (800) 473-0727.

Otter Creek Mud Bock Spring Ale

(5 gallons/19 L, extract with grains)
OG = 1.058 FG = 1.019
IBU = 28 SRM= 19.2 ABV = 5.5%

Ingredients

3.3 lbs. (1.5 kg) Muntons Light malt extract syrup
1.5 lbs. (.7 kg) Muntons Light dried malt extract
2.25 Lbs. (1 kg) Munich Malt (10 °L)
12 oz. (340 g) crystal malt (40 °L)
10 oz. (280 g) crystal malt (20 °L)
10 oz. (280 g) dextrin malt
6 oz. (170 g) chocolate malt
6 oz. (113 g) wheat barley
9.0 AAU Cascade hops (bittering hop, 60 min.) (2.0 oz./57 g of 4.5% alpha acid)
White Labs WLP029 (German Ale) or Wyeast 1007 (German Ale) yeast
0.75 cup of corn sugar (for priming)

Step by step

Steep the six crushed malts in 3 gallons (13.5 L) of water at 150° (66 °C) for 30 minutes. Remove grains from wort, add the malt syrup and dry malt extract and bring to a boil. Add the Cascade hops and boil for 60 minutes. There are no finishing hops in this recipe.

Now add wort to 2 gallons (9 L) of cool water in a sanitary fermenter, and top off with cool water to 5.5 gallons (25 L). Cool the wort to 75 °F (24 °C), aerate the beer and pitch your yeast. Allow the beer to cool over the next few hours to 68 °F (20 °C), and hold at this temperature until the beer has finished fermenting. Otter Creek suggests that you cold age the beer at near freezing temperature for about five days, then bottle and enjoy!

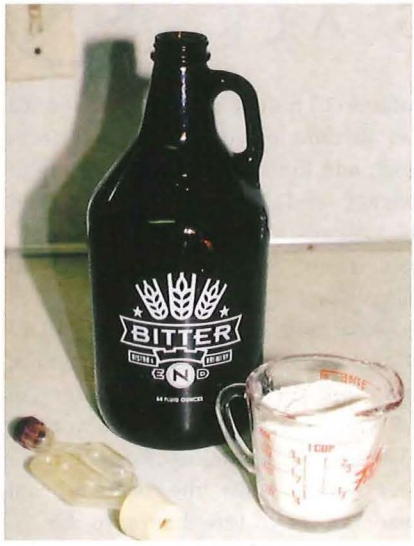
All-grain option:

This is a single step infusion mash. Substitute 6 lbs. (2.7 kg) 2-row malt for the malt extracts. Mash the 7 crushed grains together at 150 °F (66 °C) for 60 minutes. Collect approximately 7 gallons wort (32 L) to boil for 90 minutes and have a 5.5-gallon yield (25 L). Lower the amount of the Cascade hops in the boil to 1.5 ounces (42 grams) to account for higher extraction ratio of a full boil.

Add wort to 2 gallons (9 L) of cool water in a sanitary fermenter, and top off with cool water to 5.5 gallons (25 L). Cool the wort to 75 °F (24 °C), aerate the beer and pitch your yeast. Allow the beer to cool over the next few hours to 68 °F (20 °C), and hold at this temperature until the beer has finished fermenting. This brew should also be cold aged at near freezing temperature for about five days before bottling. Enjoy!

Intro to Yeast Starters

by Garrett Heaney



What's a yeast starter?

A yeast starter is a mixture of malt extract, water and yeast — a mini batch of beer that should be prepared about two days before it is added to a full batch of wort.

Why do I need a yeast starter?

Nobody needs a yeast starter, but brewers who use starters free themselves from the burdens of slow, weak or stuck fermentations. To conduct a strong fermentation in a typical 5-gallon (19-L) batch of wort, you will need a troop of approximately 250 billion yeast cells who are ready to go to work. Your typical packet of brewer's yeast contains roughly a quarter of that amount, and they're not ready to lift a finger. It takes them a while to get motivated once introduced to your wort (this is called inoculation). In fact, it usually takes several hours, sometimes days, for the yeast to warm up to their new environment and start converting sugar to alcohol.

How does a yeast starter help?

Yeast starters help in two major ways. In addition to eating sugar and producing alcohol, yeast reproduce during fermentation. Thus, the most obvious way a yeast starter helps is by increasing the count of active yeast cells. As previously mentioned, a typical packet of yeast only contains about 25% of the necessary yeast cells to efficiently ferment a batch of wort, so giving them a few days to multiply in a starter environment is key.

The second major thing a yeast starter does is give your yeast time to "exercise" and get active. While hard at work in the starter and eating all the sugar provided by the malt, the yeast get a good anaerobic workout and are much stronger. At the height of your starter's fermentation (known as high kraeusen), your yeast are in tiptop shape and high in vitality. This is the point when you turn them loose in your full batch of wort.

The difference between simply pitching a packet of yeast in your wort and making a starter and adding it to your wort is like hiring a small group of novice carpenters to build a house or hiring a certified construction company with all the right tools and equipment. The latter is going to build you a much better house and do so more efficiently, just as a yeast starter will ferment you a better beer . . . and do so more efficiently.

So how do I make a yeast starter?

Yeast starters are fairly simple to make. To prepare enough for a typical 5-gallon (19-L) batch of average-strength ale (with a specific gravity of about 1.048), all you need is a 2-liter soda bottle, or equal sized container of food-grade plastic or glass, about half a pound of dried malt extract, a packet of yeast and a pot. Once you have these items gathered and sanitary (be sure to keep everything clean and sanitized), follow the steps below:

Bring two liters of water to a boil in the pot on your stove and turn off the heat. Stir in the half pound of dried malt extract, making sure that it fully dissolves (be ready for some foam). Turn your stove temperature back to high and boil the starter for 15 minutes. To keep from splashing, it's a good idea to keep the pot partially covered with the lid.

After the boil is complete, it is important to cool the solution (wort) to room temperature. The easiest way to do this is to fill your sink with ice water and lower the pot into it. It is important to keep the lid on the pot to keep out microorganisms and to swirl the wort every so often to help it cool evenly.

Once you have brought your wort down to room temperature pour it into a sanitized 2-L container and shake it vigorously. This will cause some foaming and you will have to wait for it to subside before pitching your yeast. Once you pitch the yeast, it's best to keep the fermentation at room temperature or slightly warmer. If you do this, the concentrated starter should be ready to pitch in 48 hours.

So how do I use my starter?

Once your starter is at high kraeusen, you have two options. You can either pitch the entire starter to your wort or you can siphon off the liquid and pitch only the yeast sediment. Pitching the entire yeast starter is preferable as this ensures that your yeast are active and hungry to work as soon as they hit the wort. Once you pitch the starter, your fermentation ought to start in as few as six hours or as long as a full day. Once it does start, you will have a strong fermentation that will push your beer to completion.

Force Carbonation

Get the bubbles in your beer the fast way

by Thomas J. Miller

After years of collecting bottles, cleaning them and suffering through the hassle of filling and capping, have you ever had that batch where the bottle-conditioning just didn't take? Maybe you went too light on the sugar or maybe the yeast went dormant in your cold basement. Well, no matter what the cause, it is time to give forced carbonation a try.



Dave Colt has been the head brewer of the Ram Brewery and Bighorn Brewing Company in Indianapolis, Indiana for the last two-and-a-half years.

Force carbonating gives the homebrewer a peculiar sense of accomplishment and professionalism. It is a jump that requires new equipment, new skills and faith in your ability to do things right. It is also a heck of a lot faster than bottle-conditioning. You can turn around a force-carbonated beer in 24–48 hours. Compare that duration to one to three weeks for bottle-conditioning.

Rather than filling 50-plus bottles for each 5-gallon (19-L) batch, you can simply fill up one Cornelius keg. And rather than having to clean all those bottles, you just have to clean and sanitize a single container.

If you need to bottle your beer for certain functions where a keg is not a practical container, you can force carbonate in a keg, then counter-pressure fill into your bottles. Basically you will use the "laws of partial pressure" to move pressurized beer from the keg to the bottle — you will need a special tool to get the job done.

This tool is pretty much nothing more than a rubber stopper with a stainless steel tube through the center — there are three different inlets and outlets in the tool. Carbon dioxide flows from one, beer comes out of another, and the last one is for releasing pressure.

Quite simply you put CO_2 in, beer in and let the gas out. This process allows you to fill bottles without excess foaming. You need to make sure you bleed off the pressure slowly. The faster you go raises the chances of degassing and foaming all over the place.

When you pull the whole thing out, it will cause some foam to rise. This is due to a mini-burst of CO_2 and while it is a bit messy, it actually helps to purge oxygen from the bottle. The key is to cap on top of the foam, immediately. If the foam doesn't come up the neck of the bottle there is a good chance that oxygen is still trapped inside the bottle.

But let me give a word of warning here: there is a significant danger of stressing the bottle if you inject too much carbon dioxide. This could cause the bottle to merely break, shatter or even explode. And again, I return to the fact that it is a time-consuming process to fill bottles. Personally, I would stick with the keg and only counter-pressure fill bottles that you plan to use for beer contests or tasting events.

A Cornelius keg, by contrast, can handle up to 100 PSI. That makes it a lot safer to work with. Aside from the keg, all you really need in terms of equipment is a regulator, carbon dioxide and an extra fitting for the keg that will allow you to push CO_2 through the keg's draw tube. This fitting should be available at your homebrewing store.

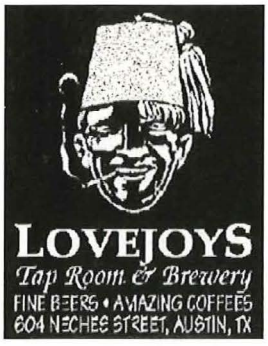
The keys to successful carbonation are really simple: temperature and pressure. I would also recommend any literature that provides guidelines for beer styles, including carbonation levels. Carbonation levels are measured in terms of atmospheres of CO_2 dissolved into solution. Homebrewers need to rack their beer into Cornelius kegs, then cool the beer to an appropriate cold temperature — the rule of thumb when carbonating is that colder is better (as cold as 28–32 °F or around 0 °C). The low temperatures promote CO_2 absorption. Once it is cold enough, you are ready to inject the CO_2.

The regulator is important here because you set the PSI and push the CO_2 down the draw tube. This method allows you to inject the CO_2 into the beer, rather than putting the gas on top of the beer. I think you get better results with the carbon dioxide bubbling up through the liquid rather than pushing down through it.

If the regulator is set at 7 PSI and you have a beer temperature of 33 °F (1 °C), you can again refer to charts and determine that your atmospheres should be 2.4 in about two days. Since you probably will not have the equipment to make the final measurement of temperature and pressure, you will have to trust the formula from the grids. At least this will bring you close to a proper target. Ultimately, understanding carbonation is as simple as the following equation: atmosphere = pressure + temperature. If you can remember this, the rest is just a question of equipment and proper execution.

Carbonation is really an important component of your final product. Flat beer, after all, is unpleasant to drink (unless a certain style such as a mild or cream ale calls for low carbonation). I think carbonation impacts flavor because it carries bitterness and accelerates the effervescence. Carbonation is critical in bringing out hop characteristics as well — this is especially true with dry-hopped brews. I also think the prickly character of the bubbles adds a degree of bitterness.

Russell Hall is the brewer at Lovejoy's Tap Room & Brewery in Austin, Texas. Lovejoy's dispenses most of its beer from Cornelius kegs and utilizes the practice of force carbonation on a regular basis.



Due to our lack of pressurized fermenters, here at Lovejoy's we force carbonate our beer in the keg. I should start by saying that our house beer comes out of the fermenter and directly into the keg. Unlike most brewpubs these days, we use Cornelius kegs to store our beer. Keeping these kegs clean can be problematic and you must be diligent to avoid build up of beer stone.

As far as carbonating these kegs, the amount of carbonation that will be absorbed into the beer is dependent on temperature. If the beer is too warm, it will not absorb any CO_2. It must be cold in order to be properly carbonated. Anywhere below 50 °F (10 °C) should be sufficient. The amount of carbonation in the beer is also dependent on the pressure at which you are forcing the gas into the keg.

At Lovejoy's, I set my regulator to about 40 PSI. I have a 200-pound (90-kg) bulk CO_2 tank with an additional line dedicated to carbonating exclusively. I will carbonate the 5-gallon (19-L) keg for about 2 minutes and this seems to be a good rate to get a nice foamy head and that CO_2 bite. The beer is served immediately and pours quite well. The length of your draught system's beer lines and gas lines are two key factors to be considered when deciding how long to carbonate. Carbonation does indeed lend character to the beer and brings out hop and malt flavor. It's important not to over-carbonate as well.

If a keg is over-carbonated, the pressure must be released from the keg and it must be allowed to sit unsealed for a long enough time for the carbonation to settle. On a larger scale, the CO_2 level can be dropped by blasting the vessel with a sizable amount of high pressure CO_2. This sounds a little crazy, but it does work. The vessel must be vented however to release the excess gas.

Nitrogen may also be used to drop the CO_2 level. This can be accomplished quite easily but a flow rate must be established for the system that you are using. The vessel also must be vented to release excess gas. If you are filtering your beer, you need to carbonate after filtration. Here at Lovejoy's, none of our beer is filtered, so the carbonation takes place right after kegging. To get the best carbonation level in your beer, a trial and error period of time and gas-flow rate is suggested.

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Corkology Casestudy

"Help Me, Mr. Wizard"

Style comparisons, hops in the bag and wort in the icebox

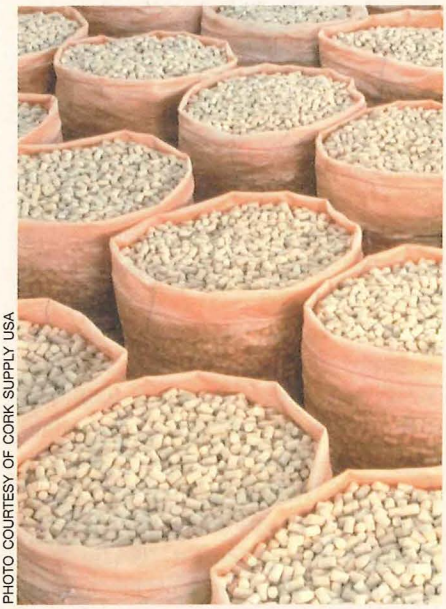


PHOTO COURTESY OF CORK SUPPLY USA

A quirk for corks

I have tried (quite unsuccessfully) to make Belgian-style ales reusing Chimay and Ommegang bottles at packaging time. I can't seem to find the right cork for them. I have tried the plastic champagne tops and wine tasting corks to no avail. Some bottles are flat and a few were even contaminated. The portion of the same batch put in regular 12-oz. bottles and capped turned out fine. I really want to recork these Belgian styles for my dubbels and tripels. Any suggestions?

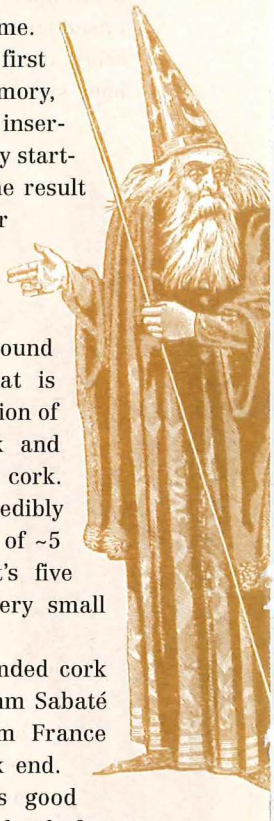
Dan Friedman
Commack, New York

Your attempt to recreate the entire package at home is admirable and more challenging than using crown caps on normal beer bottles. Fortunately, the challenge has more to do with finding the proper tool for the job than honing a delicate technique. The type of cork used to seal bottle-conditioned beer bottles is virtually identical to a champagne cork — the market for the cork is the only thing that really differs! The making of this type of cork begins by forming high-quality granulated cork into a high-density composite with uniform mechanical properties. Often, two to three discs of fine natural cork are then laminated to the end of the cork that ends up on the inside of the bottle. Their mushroomed tops make beer and champagne corks easily recognized and this shape forms when the cork is inserted into the neck of the bottle with a special type of corker. The wire cage covering the cork is very important because it holds the cork in place and prevents the bottle pressure from ejecting the seal.

Pretty simple . . . if you want to create the ultimate in package presentation for your Belgian-style ales, you need to purchase the proper tools for the job. A quick web search will yield numerous suppliers of champagne corkers as well as the special corks and required wire cages. Your past failures are almost certainly related to the types of closures you used. The wine corks you describe sound like the type used to loosely close opened bottles. These will not seal tight enough for this challenge. Plastic corks should work quite well unless you are using recycled tops or are mismatching the cork with the bottleneck diameter.

I wish Mr. Wizard could claim to be omnipotent, but I am a mere mortal. I do have some pretty handy contacts, however, and do like to research answers to my questions. I contacted a kindred secretive brewer regarding the ins and outs of corking beer bottles. The first thing I learned is that keeping the cork in the bottle is just as important as getting it out. My anonymous reference told me his brewery once used a 30 mm composite cork to seal their bottle-conditioned ales. This cork worked great except it was extremely hard to remove the cork at the appropriate time.

Not all corks for beer and champagne have the same diameter before cramming them into the neck of the bottle and the cork diameter was changed to 27 mm. This cork worked well at first, but cork is natural and seems to morph over time. The corks that worked at first began to change. Their memory, or ability to flex out after insertion began to falter and they started shrinking over time. The result was flat beer. The other occasional problem that began to surface was the dreaded "corked" off-flavor caused by the compound trichloroanisole (TCA) that is associated with a combination of mold growth in the cork and bleach used to sanitize the cork. This compound has an incredibly low threshold of detection of ~5 parts per trillion — that's five nanograms per liter. A very small concentration indeed!



Anyhow, the recommended cork for your mission is a 27 mm Sabaté Altec composite cork from France equipped with a solid disk end. This cork reportedly has good memory and will seal your bottle for a long time and will free itself when beckoned. You do need to buy the special corking tool to get this bad boy into its temporary home. The basic solution to your quest is to begin by sealing your bottles and I do not believe you are currently doing that.

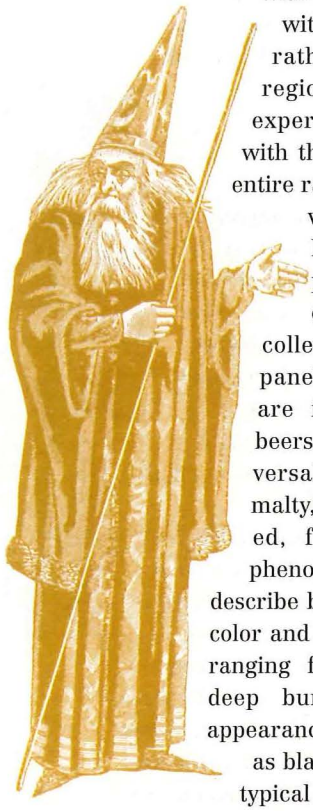
Is Oktoberfest in style?

On a trip to Germany, I recently tried a Kilkenny red ale and really liked it (I know it's an Irish beer). Since then, I have been trying different Irish style red ales. Recently, I was in a brew pub and ordered one, but they didn't have any red ales. Instead, the bartender recommended an Oktoberfest. I thought that was odd, but tried one anyway and it reminded me of the Irish red. Today I purchased a Sam Adams Oktoberfest and it too reminded me of the red ale. Are my taste buds wrong or are there similarities between these two styles?

Robert Bonetti
Leonard, Michigan

"Help Me, Mr. Wizard"

I wish I could travel to a different place in time when beer styles were truly tied to geographical regions, a time before globalization of brewing techniques and brewing ingredients. Based on what I know and what I have read about brewing, the concept of beer style often has much more to do with differentiating beers within a given region rather than between regions. Your sensory experience goes along with this notion. When the entire range of beer flavor is viewed graphically, like on a spider web plot used to display quantitative data collected from sensory panels, commonalities are found among most beers. Brewers use universal descriptors like malty, hoppy, bitter, roasted, fruity, acidic, sour, phenolic and the likes to describe beer flavor. Throw in color and we have a spectrum ranging from pale straw to deep burgundy, the latter appearance usually described as black when viewed in a typical beer glass.



It goes to reason that within a region brewers used the local ingredients and brewing practices to offer a range of beers to their customers. Bavarian brewers formulated beers including helles, Pils, weizen, dunkels, Märzen, doppelbock and schwarzbier to cover a wide range of colors and flavors. Beers emerged in the British Isles somewhat independently of what was happening in Bavaria — I say somewhat because the history of regional brewing centers did not develop in total isolation — and these styles included brown ale, porter, stout, amber ale, barleywine and old ale. Meanwhile, the Belgian brewers were off doing their own thing and developed beers that tend to fall outside the norm. The number of traditional beer styles is quite large, as is the palate of colors and flavors.

Within this huge assortment of styles is considerable overlap and the key flavor notes found in a Bavarian dunkels brewed in the 1800's, for example, may have also been found in a brown ale brewed somewhere in England. There were certainly differences due to yeast strain, fermentation temperature, malt type, mash technique and so on, but both of these beers occupy a slot in the regional beer menu of the day. After all, there is a limit to the range of color and flavor brewers can obtain from our chosen raw materials.

In today's world, brewers all over the globe typically have a pretty good idea of what goes on in other breweries — and if they don't, the information is readily available. This fact has certainly led to a melting pot of beer style. I have no idea what Irish red ales tasted like 150 years ago. If I apply historical stereotypes, I would assume these beers to be low in hop bitterness, full in malt flavor and perhaps contain detectable levels of diacetyl. Since these beers were fermented cool for ales (it gets pretty chilly in Ireland) I would also guess the Irish Ales of yesteryear were low in esters, similar to the cool-fermented lager family. Who knows, but it really doesn't matter because Kilkenny Irish Ale did not exist until 1990 when it was developed by the Smithwick Brewery (part of Guinness since the 1980's) to be exported for the global market. According to Michael Jackson, most Irish Ales, including Kilkenny, use a portion of caramel malt and roasted barley to provide a toffee-like malt backbone with roasted overtones.

The bartender at your local brewpub did a good job matching their selection with the general flavor profile of your request. Oktoberfest/Märzen, a relative of Vienna lager, is a style known for its full malty flavor, amber color and judicious use of hops. German brewers rely on Munich malts for flavor and color and do not use crystal malt or roasted barley. I describe the malt character in these beers as nutty, toasty and rich. The Oktoberfest style has become a mainstay for many domestic craft breweries and is one of the more common lager styles found in brewpubs.

When it comes to brewing technique, we craft brewers in the U.S. pick and choose our ingredients in an attempt to replicate beer flavors. We sometimes take liberties when it comes to adhering to the traditions of certain styles. Many craft brewers use crystal malt in addition to Munich malt when brewing Oktoberfest beers. This is certainly not traditional, but the result is pretty darn tasty. A quick search for Oktoberfest recipes on the net yields a boatload of recipes and almost all contain crystal malt.

Likewise, Munich malt has become a staple specialty malt that is perfect when you want that special maltiness that isn't so pronounced in many other malts. It doesn't matter to today's brewer if we are brewing brown ale, amber ale or traditional lagers like dunkels or Oktoberfest. If the beer imagined in the mind's eye has a nutty, malt flavor, then Munich malt is the go-to malt! In closure, your palate is working just fine. Even though there are dozens of stylistic descriptors, there is considerable overlap in beer flavor and the ingredients among the styles.

Bagging hops

I just bottled a batch of IPA and an interesting thing happened to me. In the secondary, I put hop pellets in a muslin bag and weighted it down with some marbles. The bag suspended in the carboy. After a few days, I started seeing that a bubble was coming through the airlock on an ever-increasing rate (for a week it was up to once every 10 seconds). I took a closer look and noticed a tiny amount of pin bubbles rising from the bottom and some much larger bubbles coming directly out of the muslin bag. Was this caused by the hops rehydrating, expanding and releasing some trapped gas? Or were the hop pellets acting as a nucleation point to release the trapped CO_2 that was in the beer? When I bottled it, it tasted good. I will just have to verify that it does not overcarbonate in the weeks to come.

Jerry Bonnici
Macomb, Michigan

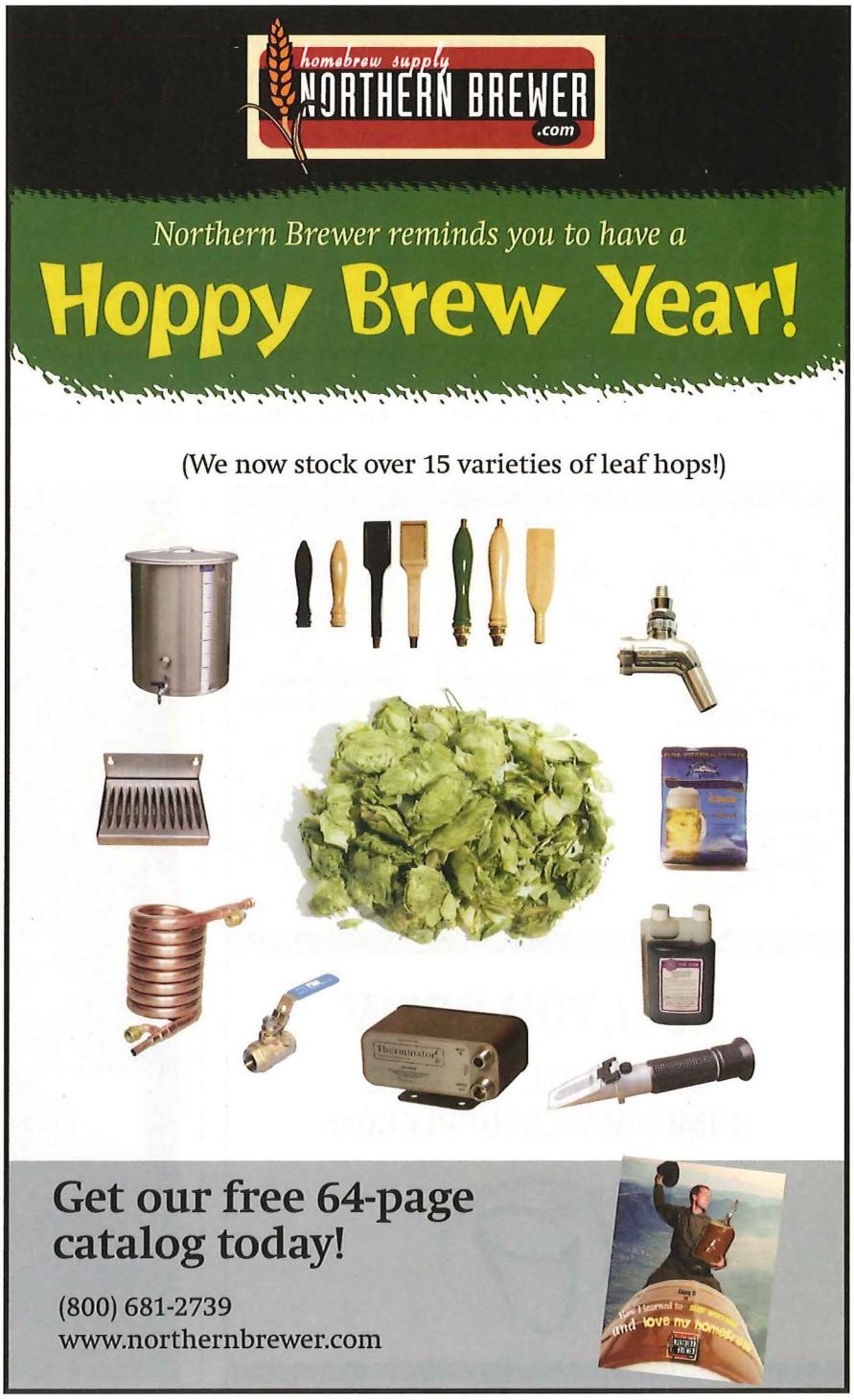
I once was a bubble watcher too, but no longer. Tracking the course of fermentation without using a hydrometer is like hiking without a map; you may end up in the right spot but a map makes things a whole lot easier. And without taking gravity checks towards the end of fermentation, you don't really know if fermentation is complete. In my experience at the brewery where I work, ale fermentations quickly drop to near-completion and then slowly cruise into their finish gravities over several days. Let's assume this fermentation was indeed complete.

My guess is that the hops you added were packed into the muslin bag a bit too tight and did not immediately hydrate. I assume they were packed in tightly because the bag had to be small enough to fit through the small hole in the carboy. The gas you observed was likely caused by a combination of slow hydration and the hops acting as nucleation sites for gas break out. Even in finished beer stored at atmospheric pressure there is dissolved carbon dioxide. Slight increases in temperature will drive the carbon dioxide out of the beer until equilibrium is re-established. So I agree with your assessment of what happened. Continued bubbling for a week does seem like a long time and some of this gas may have been from continued fermentation.

Personally, I do not see the need to place hops for dry hopping in a muslin bag. When using pellet or whole hops it is ok to put the hops into the secondary fermenter and to simply rack the beer onto the hops. Once the beer has been racked into the bottling bucket you can easily remove the spent hops from the secondary. If you choose not to use a hop bag, you probably will find a little nylon hose tied to the end of your racking cane handy. Anyhow, the nylon will prevent hop particles from being siphoned to the bottling bucket. In our brewery, we use whole hops for dry hopping and our fermenters hold 500 gallons (19 hL) of beer. We use laundry bags with nylon zippers to hold the hops because if we simply put the hops loose in the fermenter they would be very difficult to remove. This bag is weighted with a chunk of stainless steel pipe and still floats at times, depending on how much hops are added. The key with dry hopping is to allow the hops to fully hydrate and not be restrained after they swell up — this would be less effective. A friend working in larger craft brewery that dry hops in 800-barrel fermenters (nearly 25,000-gallon or 950-hL), has seen hop bags removed after being submerged in beer for several weeks that contain pockets of dry hops. My suggestion for future dry hop trials is to eliminate the muslin bag.

Is it chill to freeze?

I am an all-grain brewer and have a question about yeast starters. I have read in *BYO* about making a batch of wort like I normally do and canning it



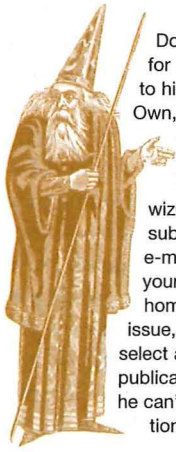
for use later as a yeast starter. I was wondering if I could do the same thing but freeze the wort instead of canning it? Would freezing it change the make-up of the sugar?

Jim Forbes
Delafield, Wisconsin

Saving wort from a brew for future use as a yeast starter is a convenient and common method used at all levels of brewing. Most brewers use heat preservation to resterilize the wort and the storage container because storing wort in liquid form is usually easier than freezing it. Other than convenience, there isn't any reason why you should not freeze wort. The sugar composition of wort is unaffected by freezing. In fact, both cider and wine are commonly made from frozen fruit juice.

It is important to keep in mind though, that freezing should not be used as a substitute for sanitation, because a certain amount of yeast and bacteria will survive freezing. This means that you should always boil your wort for at least 20 minutes prior to freezing to ensure that the bacteria are killed. Be sure that the container used is sanitized as well. When I make starters for yeast propagations beginning from a single yeast colony on a petri dish, I use 25 mL, 250 mL and 2500 mL volumes made up in Erlenmeyer flasks. I stopper all of my flasks with cotton batting and then sterilize them in a pressure cooker for easy use when required. This makes it convenient and guarantees sanitary equipment. You could do something similar for freezing and simply pull the required container size out of the ice-box when needed.

Freezing wort is also a handy method of storing yeast starters for those brewers who wish to prime their beer with the same wort that they used for fermentation. Although I personally do not believe there is anything "wrong" with using priming sugar or dry malt extract for making the priming solution, some brewers view these methods as a form of adulteration and worry that the perfection resulting from brew day may be flawed by such techniques. These paranoid zymologists find peace of mind in cryopreservation . . . so if you ever begin to get weirded out by priming sugar, your wort cubes can also be used to ease the mind!



Do you have a question for Mister Wizard? Write to him c/o Brew Your Own, 5053 Main Street, Suite A, 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 to questions personally. Sorry!

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Leipziger Gose

A salty style that made a come-back

by Horst D. Dornbusch

Gose is a 1000-year-old, top-fermented beer style that is most closely associated with Leipzig, the capital city of Saxony, one of the German states in what used to be the so-called German Democratic Republic, the former East Germany. Saxony is the ancestral home of the Saxon tribe, a branch of which joined the Angles and the Jutes in the fifth century A.D. on a migration to Britain, where they largely displaced the resident Celts.

Gose takes its name from the river Gose, which flows through the town of Goslar in the state of Lower Saxony, about 100 miles west of Leipzig. Goslar rose to prominence in the 11th century not only as one of the wealthiest and most important copper, lead, zinc, salt, and silver mining towns in the German Empire, but also as a brewing center. It is known that even Emperor Otto III, who ruled Germany between 983 and 1002, sang the praises of Gose.

The city of Leipzig quickly became the Gose's largest market. Certainly no later than 1738, it was brewed in Leipzig itself, as we know from the oldest preserved Gose license issued that year to an innkeeper named Giesecke by the Leipzig City Council. In fact, indigenous Gose brewing in Leipzig must have spread rapidly and undermined the economic viability of the Gose brewers who originated the style in Goslar. As a consequence of declining sales, in 1826 the City Council of Goslar eventually decided to abolish Gose brewing altogether and concentrate its brewing on more profitable styles of the region. In Leipzig, on the other hand, Gose had become the most popular beer by 1900, when there were more than 80 licensed Gose houses on record. This is why modern Gose has become identified more with the Saxon capital than with its city of origin. This is also cause for the popular name Leipziger Gose, which the style is often referred to these days.

GOSE by the numbers

OG	1.046 (11.5°P)
FG	1.011 (2.75°P)
SRM	7
IBU	13
ABV	4.5%

Gose Profile

On the palate, Gose comes across as an acidic mix between a Berliner Weisse and a Belgian lambic with one difference that makes it unique — Gose contains salt. It is likely that the original source of saltiness in Gose is the naturally saline water that comes out of some of the mineral-rich aquifers in and around Goslar. These aquifers were the sole suppliers of much of the brewing water for the old Goslar brew houses. We know that medieval alchemists had debated the health effects of "white salt crystals" from Goslar, which were then known by such names as *vitriolum zinci Goslariense* or *blanc de Goslar*. When these Goslar crystals were dissolved in water, the astringent and sour tincture that resulted was commonly known as "copper water."

Though difficult to find in North America, Gose beer is still available in certain specialty shops, or via mail-order from Europe. The last time I had a Gose was in March 2004 in a half-liter bottle imported by B. United International Inc., of Redding, Connecticut. The brand I tried was the Gose Leipziger Spezialität brewed by the Gosebrauerei Bayerischer Bahnhof of Leipzig, a craft brewery housed in Leipzig's oldest and now converted railroad station.

After pouring, the brew developed a tall, slightly off-white, lacey head. The brew had a medium, pétillent effervescence and a medium mouthfeel. The nose of the Gose was mild and subdued, without the slightest hint of hops. The most notable characteristic of the aroma was a whiff of spicy coriander. On the palate, there was

continued on page 21

RECIPE

Come-Back Gose

(5 gallons/19 L, all-grain)
OG = 1.046 FG = 1.011
IBU = 13 SRM = 7 ABV = 4.4%

Ingredients

5 lbs. 10 oz. (2.5 kg) pale wheat malt (1.5–2.5 °L)
1 lb. 12 oz. (0.79 kg) pale Pils malt (1.5–2 °L)
1 lbs. (0.45 kg) Munich malt (9–11 °L)
1 lbs. (0.45 kg) Weyermann Acidulated malt (1.7–2.8 °L)
1/3 cup sea salt, kosher salt or any other non-iodized salt (adjust up or down to suit your taste)
1/2 oz. (14 g) coriander seeds (freshly ground)
3.5 AAU German Hallertauer Mittelfrüh hops (45 mins) (0.88 oz./25 g of 4% alpha acid)
1.5 oz. (42 g) Perle hops (15 mins)
Wyeast 3333 (German Wheat) or White Labs WLP300 (Hefeweizen) yeast
3/4 cup DME (for priming)

Step by step

Mash in all the grains except the acidified malt at about 148–150 °F (64–66 °C) with 3 gallons (11 L) of water at around 161 °F (72 °F). Perform a two-hour (or longer) amylase rest. Use an iodine test to check for conversion every 10 minutes or so. Once the non-acidified grains mash have been converted, stir in the acidified grains and finish the mash. When the mash is over, increase the mash temperature — using a combination of hot-water infusion and direct heat — to 160 °F (71 °C) for the mash-out. Recirculate the run-off for 15–20 minutes, until it runs clear, then

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recipes continued

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start lautering and sparging until the wort reaches the target original gravity of specific gravity 1.046.

Add the sea or kosher salt to the kettle and boil the saline wort for about one hour. Add the bittering hops 15 minutes into the boil. Add the flavor hops and coriander 15 minutes before shutdown. Use a fine-mesh nylon bag on a string to hold the ground coriander seeds. This makes it easy to remove the spice cleanly.

After shutdown, remove the coriander bag. Check the kettle gravity and liquor the wort down to compensate for evaporation losses, if needed. Stir the wort gently with a spatula to create a whirlpool effect. Then let the brew rest for at least 30 minutes (longer is better) to allow for sedimentation of the hot break and hop debris.

Siphon the wort off the trub and heat exchange it to the primary fermentation temperature of about 68 °F (20 °C) and pitch the yeast. Note that the preferred temperature range for the Wyeast German Wheat is 63–75 °F (17-24 °C); for the White Labs Hefeweizen, it is 68-72 °F (20-22 °C). Primary fermentation may last between three and seven days.

Rack the brew after primary fermentation and allow it to mature and clarify for three weeks. Rack again. (As an option, you may wish to pitch some *Lactobacillus* bacteria for additional souring during secondary or tertiary fermentation.) Prime the brew and bottle condition it for two weeks. (As an option, you may wish to taste the beer in your bottling bucket or keg and add lactic acid bacteria or salt to taste.) If you bottle-condition the beer, store the bottles upright. Move them to the refrigerator before opening. My bottles had about one-tenth of an inch of yeast sediment after two weeks of conditioning. Unlike the practice with hefeweizen, it is not customary to dislodge the lees in the bottle and add them to the beer in the glass. If you condition your brew in a Cornelius keg, expect the first few glasses to be uncharacteristically cloudy because the stem reaches into the sediment.

Come-Back Gose

(5 gallons, extract w/ grain)
OG = 1.046 FG = 1.011
IBU = 13 SRM = 8 ABV = 4.4%

Ingredients

4.25 lbs. (1.9 kg) German-style unhopped pale liquid wheat malt extract
1 lb. 12 oz. (0.79 kg) pale Pils malt (1.5–2 °L)
1 lbs. (0.45 kg) Munich malt (9–11 °L)
1 lbs. (0.45 kg) Weyermann Acidulated malt (1.7–2.8 °L)
1/3 cup sea or kosher salt (adjust up or down to suit your taste)
1/2 oz. (14 grams) coriander seeds (freshly ground)
3 AAU German Hallertauer Mittelfrüh hops (bittering) (0.75 oz./20 g of 4% alpha acid)
1.5 oz. (42 grams) Perle hops (aroma)
Wyeast 3333 (German Wheat) or White Labs WLP300 (Hefeweizen) yeast
3/4 cup DME (for priming)

Step by step

Perhaps the best liquid malt extract (LME) approximation for the Gose grain bill is Weyermann Bavarian Hefeweizen LME, which is made mostly from pale wheat malt with additions of Weyermann Pilsner malt, and Weyermann Carahell. The Carahell is mainly to improve the brew's head retention. At the Gose gravity of 1.046 (11.5°P), the Weyermann Hefeweizen LME creates a brew of approximately 8 SRM.

Place crushed Pils and Munich malts in a nylon steeping bag. Heat 1.2 gallons (4.4 L) of water to 161 °F (72 °F) and steep for 15 minutes. The temperature should fall to around 149 °F (65 °C) once the grains are added. Try to keep temperature between 148–153 °F (64–67 °C) for the duration of the steep. Remove grain bag and add crushed acid malt. Reintroduce the bag to the steeping water and steep for an additional 45 minutes. Combine "grain tea," 1.3 gallons (4.9 L) of water and about 0.75 lbs. (0.34 kg) of LME and bring to a boil. Add bittering hops and salt and boil for 45 minutes. With 15 minutes left in the boil, add remaining LME and coriander (in a small nylon bag). Stir in LME thoroughly to prevent scorching. See the all-grain recipe for cooling and fermentation instructions.



continued from page 19

next to no upfront hop bitterness either, but the middle was dominated by an almost sour spiciness overlaid by a complex array of banana, green apple, dried apricot, zest and coriander. These tastes made the little bit of hops in the brew almost imperceptible. The finish was crisp, dry, almost mouth-puckering, yet very refreshing. The brew's unique saline characteristics became more prominent the closer the brew got to the finish. There was no residual, malty sweetness at all, just saltiness. Although a delicious brew for those who prefer a little salt on the palate, this beer is obviously not recommended for people on a low-sodium diet.

Gose — A Victim of the Cold War

The division of Germany during the Cold War (since 1949) into a "workers' and farmers' paradise" in the Soviet East and a "revengist, bourgeois" in the Capitalist West caused their beers to wither. The Iron Curtain kept many traditional east European beer styles out of circulation.

In the 20th century, with its wars and dictatorships, Leipziger Gose slowly faded into oblivion. The air raids of the Second World War wreaked havoc and destruction on the brewing facilities, which the planned economy of the Communists proved incapable of rebuilding. In addition, food shortages that resulted from the forced collectivization of agriculture turned bread-making, not beer-making, into the almost sole purpose of the precious grains. Not surprisingly, all brewing suffered under the Communist regime and, by the late 1950s, the last Gose was brewed in Leipzig. After the wall came down on November 9, 1989, however, Gose experienced a renaissance, and many craft breweries in and around Leipzig are brewing it again. For these reasons, I call our recipe the Come-Back Gose. The Gosebrauerei Bayerischer Bahnhof, the brewery that made the Gose that I tasted, was part of that revival. It opened its doors in 2000.

Salinification

Different people have different tolerance levels for salt. Thus, when making Gose not with naturally saline water, as was the case originally in the brew's birthplace of Goslar, but with tap water from your local water works, we must figure out how to salinify the brewing liquor. I suggest experimenting with carefully measured, small amounts of salt, perhaps in ¼-teaspoon increments, dissolved in exactly one liter or one quart of lukewarm water (depending on whether you are a metric or non-metric homebrewer). For a more complex salt flavor, I recommend using mineral-rich sea or kosher salt rather than regular table salt — no matter what you use, it needs to be non-iodized. Taste the solution after



each addition of salt. Remember, you want the salt to be noticeable, as in salted potatoes, but you do not want to brew with brine.

Once you have adjusted the salt to your liking, multiply the amount of salt at your subjective taste threshold by 19 (metric) or 20 (English). Scoop that calculated amount of salt into a measuring cup for use with your brewing. I found my tolerance limit to be at about ⅓ cup for 5 gallons (19 L). Your threshold may be higher or lower.

I consider this variable method of determining the size of the salt addition is justified because I believe that a beer's subjective palatability is more important than its presumed objective authenticity, especially when you are brewing an ancient style that has a murky and indeterminate past.

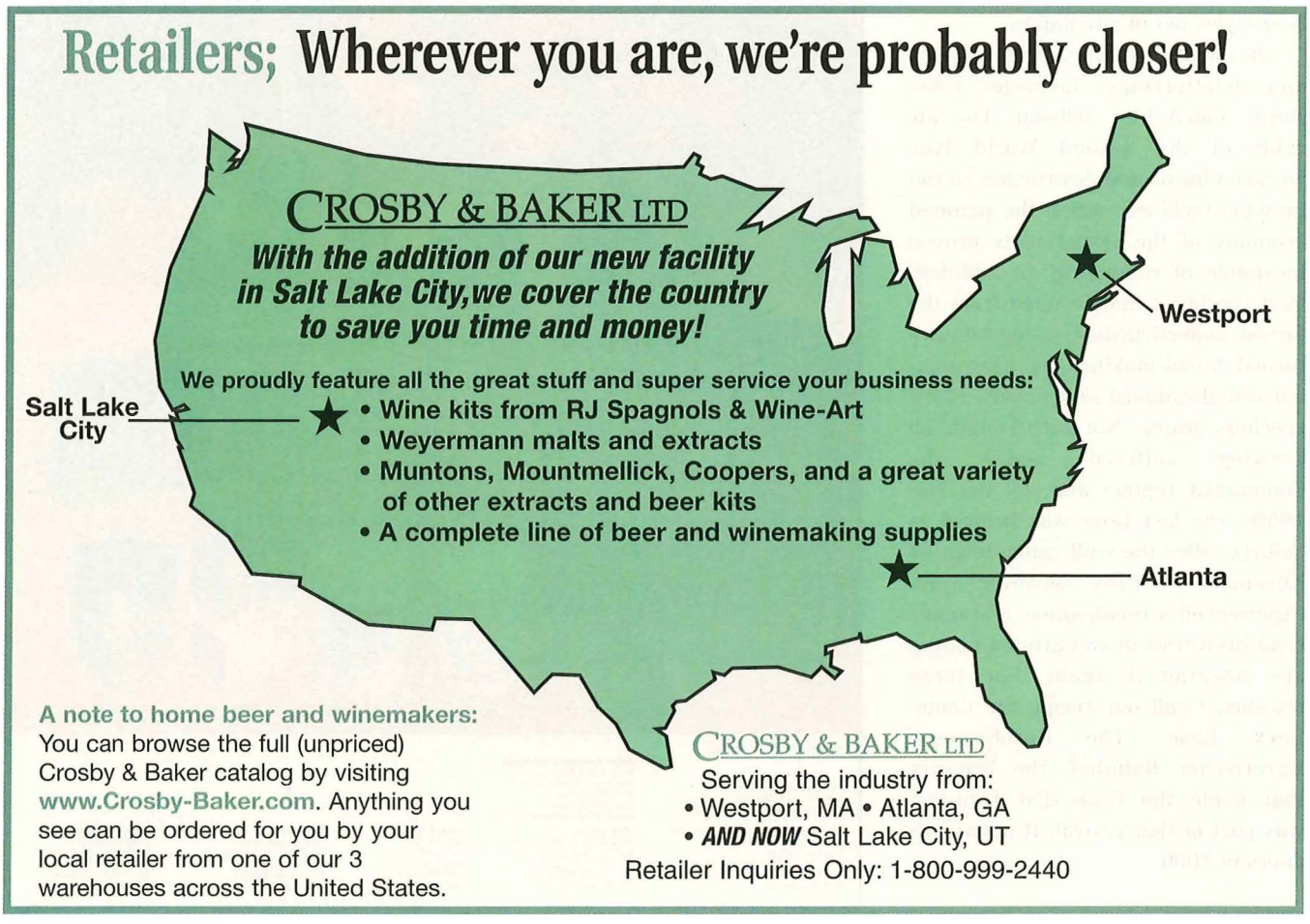
Acidification

The Gose grain bill is a mix of wheat and barley, usually at a ratio of 60/40. Like Hefeweizen, it is unfiltered, unpasteurized and bottle-conditioned. The color tends to be a dark pale to light amber. Gose, like Belgian wit, is only mildly hopped, but it is flavored with ground coriander seeds — a practice which made the beer run afoul of the German Reinheitsgebot (Beer Purity Law) after reunification. Because of lobbying efforts by the Saxon state government, the Gose has since been granted the only exemption from the otherwise immutable Purity Law.

The Gose grain bill is a mix of wheat and barley, usually at a ratio of 60/40.

Originally, Gose, like lambic, was fermented spontaneously with both yeast and *Lactobacillus*. Today, Gose is pitched with pure brewers yeast (often Weissbier yeast), and the acidity usually stems from the injection of lactic bacteria in the fermenter. But there are also reports of brewers adding straight, biologically produced, lactic acid to the brew.

Homebrewers have a variety of methods they can employ to sour their Gose. One method is the liberal use in the mash of acidified malt. Perhaps the most readily available acidified malt in a homebrew shop is Weyermann acidulated malt, which contains about 1–2% lactic acid. It can lower mash, wort and beer pH. A 10% addition of this acidified malt to the grain bill reduces the pH-value by approximately 1 unit. Although this is quite sufficient for the degree of acidity needed in a Gose, this reduction in pH takes amylases way out of their optimal range. If you use acidulated malt, you may wish to stir it into the mash after conversion had taken place. (Keep in mind, though, that acidulated malt contains starch and — once the pH is



low enough — this starch may not be converted. Acidulated malt adds not only lactic acid, but a well-rounded, complex flavor peculiar to that malt.

A second option is to add *Lactobacillus* to the fermenter and let the beer sour through the action of the bacteria. (See the October 2004 issue of *BYO* for how to sour a beer with lacitc acid.) Wyeast sells pure cultures of *Lactobacillus delbrückii*. The simplest method would be to add liquid, food-grade lactic acid (sold at homebrew shops) to the beer when you bottle or keg. This way, you can add the acid to taste. Obviously, you could also employ a mixed strategy. You could add a bit of acidulated malt to the mash (but not enough to drop the pH below 2.5) and also add some lactic acid bacteria after primary fermentation has finished. I have found that the juice of up to five lemons, strained off its pulp and pits and added to the primary fermenter, is a flavor-enhancing (though certainly not authentic!) way of supplying the beer with additional, mellow sourness.

Gose Brewing Peculiarities

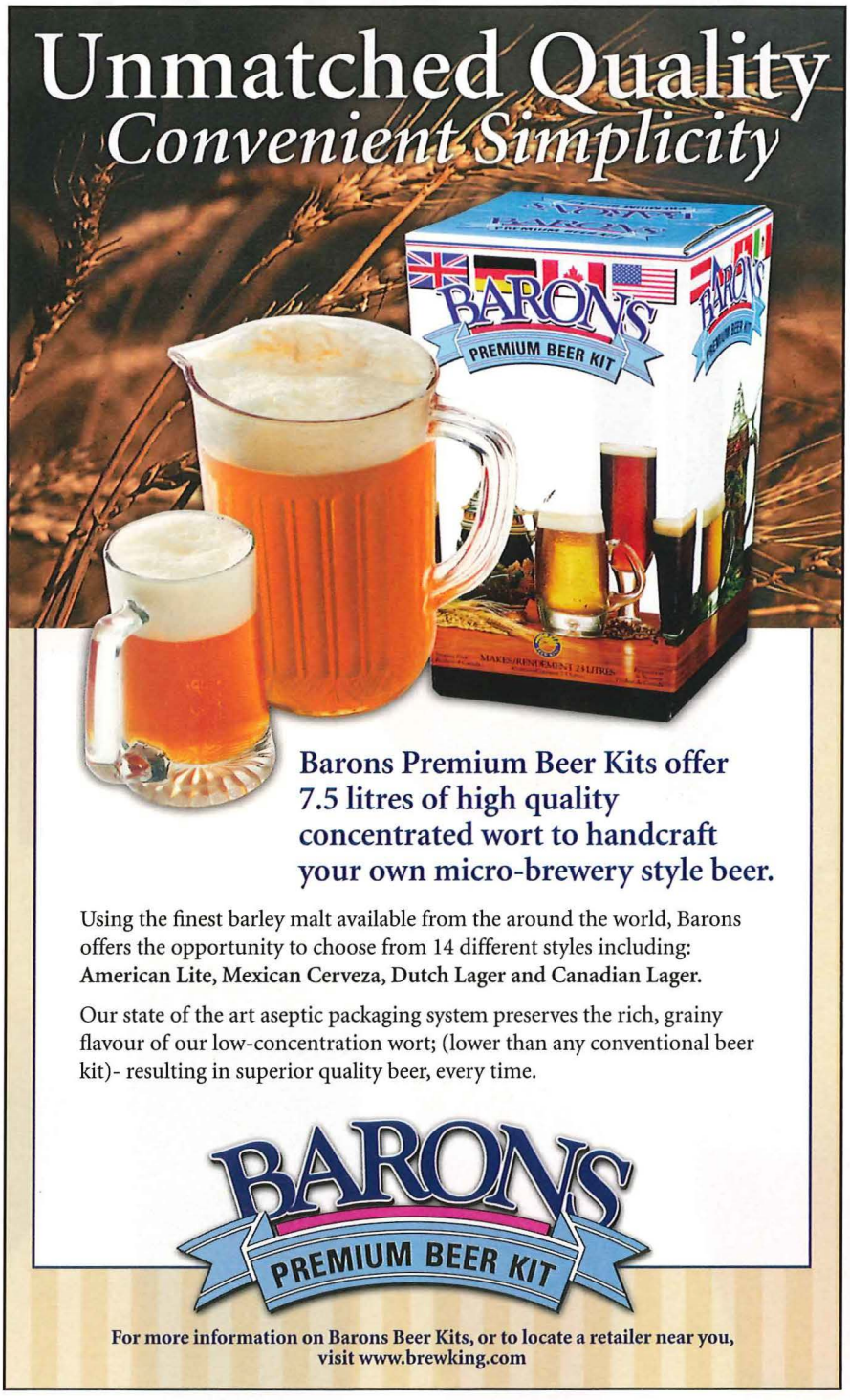
For the exceptionally dry taste of Gose, use at least a two-hour single-infusion mash at 148–150 °F (64–66 °C). The longer the better. At this temperature, starches are converted mostly into fermentable sugars. The long diastatic rest is mostly a function of the large percentage of enzyme-poor wheat in the grain bill. Extending the mashing time hydrates the grain bed thoroughly and gives the barley enzymes extra opportunities to go to work on the wheat starches. Because of the large proportion of husk-poor wheat, and depending on the width-to-depth ratio of your grain bed, expect the runoff to be slower than normal. Because there is no pure Gose or acidified LME on the market, there is no extract-only recipe for Gose ale, only an all-grain and an extract-plus-grain recipe.

Serving Gose

Gose is usually drunk straight in a cylindrical glass beer mug, but it may also be served, like Berliner Weisse, with a shot of raspberry or woodruff-flavored syrup. Because of the lack of residual sweetness and the strong salinity in the finish, the sugary syrup clearly gives the beer a much smoother aftertaste.

In the last century, Gose was also often fortified with a shot of clear caraway schnapps, a custom that has since fallen out of favor. Fortifying a pint (about half a liter) of Gose with a shot of modern aquavit, for instance, turns the beer into a splendid drink for washing down assertively-flavored foods. Try it with seafood, for instance, such as a filet of blue fish, a morsel of smoked salmon, or a plate of oysters on the half-shell.

Horst Dornbusch is the author of "Prost! The Story of German Beers," and BYO's *Style Profile column.*



10th anniversary

10 easiest beer styles

10 YEAR BrewYour Own ANNIVERSARY





photos by **CHARLES A. PARKER/IMAGES PLUS**

This year, we here at *Brew Your Own* are in love with the number 10. "Why?" you might ask: Because it's the 10th anniversary of our existence as a magazine! In celebration of this feat, we are happy to bring you a series of top-10 lists that will appear all year long. The first is a collection of the 10 easiest beer styles for homebrewers. Please keep in mind that "easy," does not equal "bad." We chose these classic styles because they represent the beers that have the best chance for success among homebrewers. Also, this list, and the lists to come, reflect the opinion of the *Brew Your Own* staff — we anticipate sparking some discussion among our readership and welcome any feedback you may have. Finally, we would like to thank the 10 homebrew shop owners who partook in this collection and offered us their brewing expertise and recipes for these easily brewed beer styles. Thanks to all. Cheers!

– Garrett Heaney

ALTBIER



A genuine altbier is a difficult to find style outside of Northern Germany. For most homebrewers, making their own is a more attractive option than airfare. One way of looking at this style is that altbier is the opposite of steam beer. While steam beers are lagers fermented at ale temperatures, an altbier is most often an ale fermented at low temperatures and then cold conditioned like a lager. This conditioning period imparts brilliant clarity in the orange-copper to light brown beer and smoothes out to a full flavored medium bodied brew. The head will be thick and creamy with good retention.

– Jeff Schultz
Austin Homebrew Supply
Austin, Texas

AHS Altbier

(5 gallons/19 L, extract with grains)
OG = 1.052 FG = 1.013
IBU = 30 ABV = 5.0%

Ingredients

12 oz. (336 grams) Caramunich malt
4 oz. (112 grams) chocolate malt
4 oz. (112 grams) black patent malt
4 lbs. (1.8 kg) Munich liquid malt extract
2 lbs. (0.9 kg) pale liquid malt extract
1 lb. (0.45 kg) wheat liquid malt extract
1 oz. (28 grams) Perle hops
1 oz. (28 grams) Spalt hops
1 tsp. Irish Moss or one Whirlfloc tablet
Use one of the following yeasts based on your preference: Wyeast 1007 (German Ale), White Labs WLP029 (German Ale/Kölsch) or White Labs WLP036 (Düsseldorf Alt)

Step by step

Place the grains in a grain bag and steep in 155 °F (68 °C) water for 15 minutes. Remove the bag and allow to drain, then discard the grains. Bring water to boil, turn off heat and add the extracts, stirring until dissolved. Bring to a boil and add 1 oz. (28 grams) Perle bittering hops. After 45 minutes add ½ oz. (14 grams) Spalt hops for flavor and the Irish moss or a Whirlfloc tablet. After 55 minutes have elapsed, add ½ oz. (14 grams) Spalt hops for aroma.

Wyeast 1007 (German Ale) yeast will ferment at temperatures as low as 55 °F (13 °C), producing an exceptionally clean beer normally only found with lagers. White Labs WLP029 (German Ale/Kölsch) ferments down to 62 °F (17 °C), finishes clean and brings out hop flavors. For a sweeter finish with less hop flavor try WLP036 (Düsseldorf Alt).

After primary fermentation is complete, drop the temperature down to 32–40 °F (0–4 °C) and cold condition for 2–6 weeks. Bottle or keg with a goal of medium-high carbonation and enjoy!

AMERICAN AMBER



Given the fact that American amber ales got their start here in the west, it's no wonder that our Outback Amber is by far one of the most popular recipes that we have. Amber ales are known for their malty, caramel profiles with low to moderate hop levels. To achieve this in Outback Amber, the use of dry malt is used in combination with liquid malt for added body and maltiness. In addition to using dry malt extract, the use of darker roasted crystal malts lends the caramel and toffee notes and reddish color so desired in this beer style.

Although a relative to the American pale ale, amber ales should not have a high level of hop aroma. Rather, they should be hopped in a way that balances and compliments the malty profile. Most of the bitterness levels for this style of beer are achieved in the early hop additions. Late kettle additions for flavor and aroma are acceptable, but should be done in a way that doesn't add a lot of citrus character. The use of low alpha acid American hops are typically used for this purpose. We use Willamette hops in the latter part of the boil to lend a subtle hop flavor and aroma in Outback Amber.

American amber ales are very easy beers to brew and the combinations one can use to brew them are endless. Experiment with different malts. Try some new hop varieties and have fun brewing your very own amber ales!

– John Mendrick
Mountain Homebrew and Wine Supply
Kirkland, Washington

Outback Amber Ale

(5 gallons/19 L, extract with grains)
OG = 1.052 FG = 1.013
IBU = 39 ABV = 5.0%

Ingredients

3.3 lbs. (1.5 kg) Coopers light malt extract
3 lbs. (1.4 kg) amber dry malt extract
8oz. (224 grams) crystal 40 °L
2oz. (56 grams) crystal 135–165 °L
½. oz. (14 grams) Chinook hops (60 minutes)
1 oz. (28 grams) Willamette hops (30 minutes)
1 oz. (28 grams) Willamette hops (5 minutes)
White Labs WLP001 (California Ale) yeast
1 tsp. Irish moss at 45 minutes
¾ cup priming sugar

Step-by-step:

Fill brew pot with at least 3 gallons (11.4 L) of cold fresh water. Bring water temperature up to 150 °F (66 °C). Add steeping grains to a muslin bag. Tie up the end of the bag and add to the brewing pot. Steep grains for 15–20 minutes then remove. Stir in the liquid and dry malt extracts until completely dissolved. Bring the wort to a boil making sure to watch carefully to prevent a boil over. Once a nice gentle rolling boil is achieved, add the first addition of Chinook hops. The total boiling time will be 60 minutes. At 30 minutes into the boil, add the first addition of Willamette Hops. At 45 minutes into the boil, add the Irish Moss. At 55 minutes into the boil, add the second addition of Willamette Hops. After 60 minutes, turn off stove and remove brewing pot from heat.

Remove hops. Cool the wort down as quickly as possible by using a wort chiller or by placing brewing pot into a cold water bath in your sink. Once wort has reached 75–80 °F (~25 °C), add it to your fermenter. Top the fermenter up to 5 gallons (19 L) with fresh cold water. Mix well to aerate the wort and add the yeast. Allow the beer to ferment at 65–70 °F (~19 °C) until complete (typically 7–10 days) and then either rack to a secondary, keg or bottle the beer. Wait 10–14 days and enjoy your beer!

AMERICAN PALE ALE



We start most new homebrewers with an American Pale Ale because of its simple nature and great flavor. The style of American pale ale for the AHA is characterized by American-variety hops used to produce high hop bitterness, flavor and aroma. This bold hop flavor balances out with smooth low to medium maltiness. Good pale ale starts with light extract or pale malt and crystal malt for color and sweetness.

After this, the all important component is hops, hops and hops. We say it like that because you do need three hop additions. First for bitterness use a fairly high alpha pellet hops; using pellets leads to less possible oxidation of the hops. Seven percent alpha acid (AA) or higher should be used and boiled for at least 1 hour — a longer boil will give you a higher bitterness. The second addition of hops is for flavor. This hop can be lower in AA since it is for flavor.

Cascade is a great flavor hop because of its flowery and citrus-like flavor. The flavor hops should be added in the last 15 minutes of the boil. This will give you a flavor of the hop but very little bitterness. The third and final hop addition takes place in either the last five minutes of the boil or during the second fermentation stage. Just add the hop to the secondary and siphon your wort on top of the hops. This will take a little longer to clear, but will give an excellent nose of hops to

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your pale ale. You may become a "hop head" like some of us, experimenting with hop additions more and more.

– Gary Wilder
Brew Your Own Brew
Tucson, Arizona

High Sierra Pale Ale

(5 gallons/19 L, extract with grains)
OG = 1.060 FG = 1.014
IBUs = 51 ABV = 5.9%

Ingredients

6 lbs. (2.7 kg) light dry malt extract
1 lb. (0.45 kg) crystal malt (10 °L)
4 oz. (112 grams) crystal malt (40 °L)
1 oz. (28 grams) Chinook hops (bittering)
1 oz. (28 grams) Cascade hops (flavor)
1 oz. (28 grams) Cascade hops (aroma)
5 oz. (140 grams) priming sugar
1 pkg. brewers yeast
1 grain steeping bag
1 hop bag (for flavor hops)

Step by step

Add 3 gallons (11.4 L) of water to your pot. Empty grains into the steeping bag. Tie bag and place into pot. Bring temperature of water and grains to 155 °F (68 °C) and steep for 30 minutes. Remove the grain bag from the steeping water and squeeze excess water and discard bag and grains. Bring this to a boil. Remove from heat and add all malt extract. Bring this mixture to a boil and add bittering hops directly into the pot. Allow the wort to boil for 45 minutes. Add the flavoring hops. Boil for an additional 15 minutes. Put 2.5 gallons (9.5 L) of cold water in a 6.5-gallon (24.7-L) primary fermenter and add the hot wort. Put on the lid and airlock. Fill airlock half way with water. Allow the wort to cool to 75 °F (24 °C) or below. When the temperature reaches 75 °F (24 °C) it is time to pitch your yeast. Before the yeast is pitched take your original gravity reading.

Never drop the hydrometer directly into the wort, but pull some wort out and test in a tube or large glass. Follow the directions on the package of yeast before pitching. Put the lid and airlock back on fermenter. Keep the fermenter in an area, which will maintain a constant temperature of below 75 °F (24 °C), but no lower than 60 °F (16 °C). Fermentation should start in 8 to 48 hours. Between 3 and 5 days the fermentation will slow or appear to stop. This is a good time to use your hydrometer to test your specific gravity. After 5 days transfer to your secondary if you are using one. Add the aroma hops now. This is called dry hopping. Condition your beer for 7 to 10 days or until it clears. It is now time to bottle your beer. Wash all bottles in hot soapy water and rinse. Use the sanitizer of your choice to sanitize your bottles. Dissolve 5 oz. (140 grams) of priming sugar in 1 cup of water and bring to a boil. Allow to cool to room temperature.

Place this in your sanitized bottling bucket. Using the siphon equipment transfer your beer to the bottling bucket. Attach your tubing to the spigot on your bottling bucket and fill your sanitized bottles. Leave at least 1" of air space in each bottle. Cap all bottles immediately. Store your beer at 70–75 °F (23 °F) to carbonate and age in the bottle for at least 10 days. Aging time varies from type and style of beer. Chill and enjoy!

AMERICAN WHEAT



American Wheat beers have grown from the basis of the German Hefeweizen. While they can be crystal clear, most retain the cloudy appearance of their forefathers. Typically the American hefeweizen is a light to medium body beer that is made of over 50% wheat. The wheat flavor and "fluffyness" should dominate the malt side of the brew.

In contrast to the German style the hop presence can range from subtle to rather aggressive and American hops are the norm. Recipes are pretty basic. All wheat malt extract (generally 40% barley/60% wheat) can be used with no specialty grains to achieve the right maltiness.

Low hop levels mandate a single bittering addition to achieve a balanced beer. Yeast is a key factor in a successful recipe. I prefer the White Labs WLP320 (American Hefeweizen) for its inherent cloudiness from low flocculation. German Hefe yeasts can be used but the brewer should keep the temperature at the bottom end of the yeast's range to reduce the production of banana and clove esters.

– Mike Pensinger
HomeBrewUSA
Norfolk, Virginia

American Wheat Beer

(5 gallons/19 L, all-grain)
OG = 1.051 FG = 1.012
IBU = 21 ABV = 5.1%

All Grain:

5.8 lbs. (2.6 kg) wheat malt
4.6 lbs. (2.1 kg) 2 row malt
8 oz. (224 grams) rice hulls
1 oz. (28 grams) Cascade hops
White Labs WLP320 (American Hefeweizen) yeast

Step by step

Heat 3.25 gallons (12 L) of water to 161 °F (72 °C) and stir in crushed grains. Mash grains at 150 °F (66 °C) for 60 minutes. Recirculate the wort for 20 minutes, then begin running off wort. Collect wort at a rate of about 2 qts. (~2 L) every 5 minutes. Heat sparge water to about 190 °F (88 °C). Begin adding sparge water when water is about 1 inch (2.5 cm) above the grain bed. Add sparge water at the same rate as wort is being collected. Once upper grain bed temperature reaches 170 °F (77 °C), add cool water to sparge water until it reaches 170 °F (77 °C). Collect about 5.25 gallons (20 L) of wort. Add 0.5 gallons (1.9 L) of water. Boil wort for 60 minutes, adding hops at beginning of boil. Ferment at 70 °F (21 °C).

BROWN ALE



Brown ale is a very old style of beer that was brewed long before it was formally named. Many of the earliest of English ales were what we would today define as a brown ale. Today the BJCP defines a

brown ale as follows: "A beer with an OG falling between 1.060 and 1.040, IBU between 24 and 30 and SRM between 15 and 35." Grains that predominate this style are pale ale, crystal and chocolate. Common hops are East Kent Goldings, Tettnanger, Cascade, Perle, Fuggle and Willamette. The style is commonly split into English and American varieties today and depending on which you are brewing your hop and yeast selections should be made appropriately. Also differing between the styles is the BU:GU ratio (A ratio of bitterness in IBU to specific gravity). A standard range for this ratio in an English version is 0.50 to 0.70 while it is higher at 0.90 to 1.0 in an American variety. This difference is seen primarily because of a difference in bitterness while gravity stays relatively constant between the two varieties. American versions also typically use more hop additions late in the boil for flavor and aroma contributions as well as occasional dry hopping which would never appear in the English versions.

– Bill Wiedmer
House of Homebrew
Green Bay, Wisconsin

House of Homebrew Brown Ale

(5.5 gallon/20.9 L, all-grain)
OG = 1.046 FG = 1.010
IBU = 29 ABV = 5.0%

Ingredients

9.25 lbs. (4.2 kg) 2 row pale ale malt
8 oz. (224 g) crystal malt (80 °L)
4 oz. (112 g) CaraPils dextrin malt
0.5 oz. (14 g) Target pellet hops 10.6% AA
1 oz. (28 g) East Kent Goldings pellet hops 4.75% AA
0.05 oz. (1.4 grams) Irish moss
0.75 cups corn sugar
Wyeast 1098 (British Ale) yeast

Step by step

Mash all grains at 150 °F (66 °C) for 60 minutes or until full starch conversion has been accomplished. Boil until formation of hot break is seen then add 0.5 oz. (14 grams) Target and boil 45 minutes. Add 0.05 oz. (1.4 grams) Irish Moss and 1 oz. (28 grams) East Kent Golding and boil 15 minutes. Cool to 70 °F (21 °C) and pitch Wyeast 1098 (British Ale) yeast. Ferment in primary until specific gravity falls to 1.023 then rack to secondary. Continue in secondary until fermentation ceases and beer clears adequately. Add 0.75 cups corn sugar and bottle.

DUNKELWEIZEN



We frequently have customers request a recipe that is both different and easy to brew. The next time you find yourself in this situation, consider making a Dunkelweizen. When you combine the rich malty character of a Munich Dunkel with the fluffy, fruity, banana and clove-like esters of a traditional Hefeweizen you get a great classic style easy to duplicate at home.

Malt: A rich melanoidin character from Munich and Vienna malts should combine with the somewhat grainy wheat for a flavorful, medium bodied beer. A very small amount of de-bittered black malt or German Carafa can be added in order to achieve the desired light amber to mahogany color. An ambitious all-grain brewer should consider a decoction mash with 50–60% wheat combined with Munich and/or Vienna malts.

Hops: Go light on the hops! Use just enough noble bittering hops to keep the beer from being cloyingly sweet. The flavor and aroma should come from the malt and yeast so no other hops are needed.

Yeast: Embrace your yeast! Good German hefeweizen ale yeast should be used to produce the banana and clove-like esters appropriate in a Dunkelweizen. You can control the amount of esters produced (to a certain extent) by watching your fermentation temperature. Ferment a little warmer and you'll get more esters, a little cooler and you'll get less.

The key when devising a recipe for a Dunkelweizen (or any other beer) is to make it in a manner that you believe will live up to your personal taste. That is the main reason many people homebrew. Want a hop-head Dunkelweizen? Add more hops! An Imperial Dunkelweizen? Double the extract/base grains and the bittering hops! On the other hand, if you are one of those brewers who like to stick to a recipe, give the recipe below a try!

– Kevin DeLange
The Brew Hut
Aurora, Colorado

The Brew Hut Dunkelweizen

(5 gallons/19 L, extract with grains)
OG = 1.046 FG = 1.012
IBU = 13 ABV = 4.5%

Ingredients

6 lbs. (2.7 kg) wheat liquid malt extract
8 oz. (56 g) German Munich malt
8 oz. (56 g) German Vienna malt
8 oz. (56 g) German dark crystal malt (65 °L)
1–2 oz. (28–56 g) Weyermann Carafa II Malt (optional for slightly darker color)
3.5 HBU Hallertau Hersbrücker hops (1 oz./28 g of 3.5% AA) (bittering)
¾ corn sugar or 1 ¼ cup dry malt extract (for priming)
White Labs WLP300 (Hefeweizen Ale) yeast or Wyeast 3068 (Weihenstephan) yeast

Step by Step

Steep the grains in 155 °F (68 °C) water for 30 minutes. Remove and rinse grains with 165 °F (74 °C) water. Add and stir in wheat malt extract. Bring to a boil and add hops. Boil for 60 minutes and then chill to 70–75 °F (~23 °C). Ferment for about 7–10 days or until all fermentation is complete. There is no need for a secondary fermentation.

DUBBEL



For a healthy fermentation, aerate very well before pitching yeast. This is a high gravity beer and the yeast needs extra oxygen to get a good start. Choosing the raw sugar is very important —

plain white highly refined table sugar will not get good results and brown sugar has too much flavor. Candi sugar can be used but is not commercially available all organic. It is possible to make your own candy sugar by following a recipe for hard candy but using just organic sugar and a small amount of citric acid as the only ingredients. This Belgian Dubbel will benefit from a longer than usual aging time and should be aged at least one month for the best flavor development.

– Amelia Slayton
Seven Bridges Organic
Homebrewing Supply
Santa Cruz, California

Organic Dubbel

(5 gallons/19 L, extract with grains)
OG = 1.068 FG = 1.015
IBU = 28 ABV = 6.9%

Ingredients

6 lbs. (2.7 kg) Briess organic pale malt extract
2 lbs. (0.9 kg) Briess organic pale 2-row malt
0.75 lbs. (0.3 kg) Weyermann organic pale Munich malt
12 oz. (336 kg) Weyermann organic Carahell malt
8 oz. (224 kg) Briess organic caramel 60 °L malt
4 oz. (112 kg) Briess organic extra special malt
1 lb. (0.45 kg) Organic raw crystal cane sugar
½ oz. (14 grams) German organic Hallertauer Tradition hop pellets (bittering) (15 IBU)
1 oz. (28 grams) German organic Spalt Select whole hops (flavor) (13 IBU)
1 oz. (28 grams) German organic Hallertauer Mittelfrüh hops (aroma)
Ale Yeast: For warmer fermentation (68–78 °F or 20–26 °C) choose Wyeast 3787 (Belgian Trappist) or White Labs WLP530 (Abbey) or WLP550 (Belgian Ale). For cooler fermentation (65–75 °F or 18–24 °C) choose Wyeast 1214 (Belgian Abbey) or White Labs WLP500 (Trappist)
For bottling: 1 ¼ cup organic dry malt extract, or ¾ cup organic corn sugar or organic cane sugar
**Optional ingredient*: ½ teaspoon Irish Moss

Step-by-step

Heat 2 gallons (7.6 L) of water to 160–165 °F (~73 °C), then turn the heat off. Add all the grains (or grain bag with grains in it) and stir well. The temperature should be 150 °F (66 °C). Adjust the temperature if necessary by adding heat, hot water or cold water. Allow the grains to soak for 40 to 60 minutes at 150 °F (66 °C). Heat 1 ½ gallons (5.7 L) of water to 170 °F (77 °C) in a separate pot. Sparge the grains with this water when the mash is complete. Add water to the liquid collected from the grains to make up to 5 ¼ gallons (20 L) (adjust volume according to your own brewing system). Heat the wort to almost boiling and then turn the heat off. Add the malt extract and organic sugar; dissolve completely. Turn the heat back on and bring to a boil. Once the wort has reached a rolling boil add ½ oz. (14 grams) German Hallertauer Tradition hop pellets (bittering) and boil for 40 minutes. Add 1 oz. (28 grams) German Spalt Select hops (flavor). If desired, add the Irish Moss flakes. Boil for 15 minutes more. Add 1 oz. (28 grams) German Hallertauer Mittelfrüh hops (aroma), boil 5 more minutes and turn the heat off. Cool the wort to 65–75 °F (18–24 °C) and into primary fermenting vessel. Aerate well, pitch the yeast and ferment in a cool dark place for 4–6 days at 60–70 °F (14–21 °C) in the primary fermenter. If you have a secondary fermenter, transfer the beer to it when fermentation activity has subsided (after 4–6 days). Ferment for an additional 7–14 days, or until fermentation is complete. Bottle the beer with the bottling sugar of your choice, or keg.

OLD ALE



Old ale has a caramel/nutty malt character with toffee-like, roasty overtones. It is full bodied with a smooth malty-sweet finish. The oats help build a creamy, mouth-filling body and hold a dense tan head atop the deep reddish-brown beer. The addition of dark candi sugar boosts the gravity, while adding a rich, rum-like dimension to the complex flavor profile. Although this old ale uses a healthy charge of English hops, the overall impression is of malty complexity rather than hoppy and bitter. English old ale is an ale of high alcoholic strength that is usually stronger than porters, but not quite as strong as barleywines. With an ABV ranging from 6–9%, this is the perfect style of beer to warm your insides on those cold winter nights. To help you know what you're shooting for, commercial examples of old ale include Gale's Prize Old Ale, Bell's Third Coast Ale, Theakston Old Peculier and Samuel Smith's Winter Welcome.

– Chris Farley
Northern Brewer, Ltd.
Saint Paul, Minnesota

Northern Brewer's New Old Ale

(5 gallons/19 L, extract with grains)
OG = 1.070 FG = 1.019
IBU = 22 ABV = 6.8%

Ingredients

6.0 lbs. (2.7 kg) gold liquid malt extract
2.0 lbs. (0.9 kg) light dry malt extract
1.0 lb. (0.45) dark candi sugar
8 oz. (224 kg) Simpsons Dark Crystal malt (75 °L)
8 oz. (224 kg) Simpsons Golden Naked Oats
6.4 AAU Target pellet hops (60 min.) (0.75 oz./21 g of 8.5% alpha acids)
2.2 AAU Fuggle pellet hops (10 min.) (0.5 oz./14 g of 4.4% alpha acids)
2.2 AAU Fuggle pellet hops (1 min.) (0.5 oz./14 g of 4.4% alpha acids)
Wyeast 1084 (Irish Ale) yeast

Step by step

Heat 5 gallons (19 L) of water in your boiling kettle. Steep specialty grains in water for 15 minutes or until the water has reached 170 °F (77 °C). Remove grains and bring water to a boil. Once a boil has been reached, remove kettle from heat and add malt extract and

candi sugar while stirring. Bring to a boil for 60 minutes, adding hops according to the hop schedule. After 60 minutes, chill and ferment between 62–72 °F (17–22 °C) for two weeks. Age for 6–12 weeks in secondary. Bottle and enjoy!

MILD ALE



Mild Ale has a somewhat murky past and still is a style that is linked closely with brown ales. The mild is one of the oldest styles of British Ale. Originally mild ales were sold in England as darker beers that were not aged as long and thus could be sold at a lower price. This appealed to the working class. Mild ale was also a lower strength beer, so a couple of pints at the pub after work in the mill wasn't enough to get them in trouble with the better half at home. Versions of mild ale are still being sold in England, primarily in northwestern England and Wales. The style has taken back seat to the more popular brown ale on both sides of the pond. Mild ales are lower in alcohol content, usually coming in at 3–3.5% by volume. Being lightly hopped, they are perfect for those who are not fans of the more bitter brown ales. This is a great beer to be served with traditional British food such as fish and chips or a good cheddar cheese. It also goes well with burgers and fries.

– Scott Law
WindRiver Brewing Co., Inc.
Eden Prairie, Minnesota

Mill Race Mild Ale

(5 gallons/19 L, extract with grains)
OG = 1.033 FG = 1.008
IBU = 11 ABV = 3.2%

Ingredients

3.3 lbs. (1.5 kg) liquid malt extract
1 lb. (0.45 kg) dry malt extract
4 oz. (112 g) crystal malt (10 °L)
2 oz. (56 g) chocolate malt
2 oz. (56 g) black patent malt
½ oz. (14 g) Fuggles hops (bittering)
½ oz. (14 g) Goldings hops (aroma)
Wyeast 1098 (British Ale) yeast
½ cup corn sugar for priming (this will give a "British" carbonation level which is much less than the American preference. If you prefer American style carbonation levels, use ¾ to 1 full cup)

Step by step

Steep the specialty grains in 3 gallons (11.4 L) of water in a grain bag for 15 minutes at 110–120 °F (43–49 °C). Remove the grain and bag. Add malt extract while bringing the wort to a boil. Stir in the malt extract to make sure it dissolves. Bring to a boil and add the bittering hops. Boil for 1 hour. Add the aroma hops at the end of the boil. Let wort cool and add to fermenter. Add enough cold water to bring the level to 5 gallons (19 L). Add yeast and stir to aerate. Ferment at 55–65 °F (13–18 °C) for 7–10 days. Rack to bottling bucket and prime with corn sugar. Bottle and let condition at 50–65 °F (10–18 °C) for one to three weeks. Open bottle, pour in glass.

PORTER



Porters are easy beers to make, partly because the style is subject to widely variant interpretations. Much might depend, for example, on whether you plan to brew an 18th century porter or a contempory version. A porter from the 1750s, for instance, might be called an "Imperial Stout" these days. Porters are slightly less full bodied than stouts (when brewed by the same brewer) but they are still very full-flavored brews. Small variations may not be easily noticed, so it's a forgiving style.

Simply stir your cracked grains slowly into one quart of hot water per pound of grain, steeping them in the oven. When finished, scoop the grain into a large strainer, rinsing with hot tap water. Collect the runoff as part of your wort to be boiled.

– Byron Burch
The Beverage People
Santa Rosa, California

Black Passion Porter

(5 gallons/19 L, extract with grains)
OG = 1.065 FG = 16
IBU = 44 ABV = 6.3%

Ingredients

5 lbs. (2.3 kg) dark dry malt extract
2 lbs. (0.9 kg) crystal malt (40 °L)
1 lb. (0.45 kg) brown malt
8 oz. (224 g) Munich malt
4 oz. (112 g) chocolate malt
4 oz. (112 g) black patent malt
4 oz. (112 g) black roasted barley
4 oz. (112 g) 100% dextrin powder
½ tsp. gypsum
¼ tsp. calcium chloride
1 tsp. chalk
1 tsp. Irish moss
¾ oz. (21 grams) Northern Brewer hop pellets (60 min.)
1 oz. (28 grams) Northern Brewer hop pellets (30 min.)
1 ½ oz. (42 grams) Cascade hop pellets (dryhopped)
¾ cup corn sugar for priming
White Labs WLP001 (California Ale) yeast or Wyeast 1056 (American Ale) yeast

Grains are mashed with 5 quarts (about 5 liters) of water and the gypsum and calcium chloride for 1 hour at 155 °F (68 °C), then rinsed in a strainer with hot water, collecting the runoff in your boiling kettle. Dissolve the dry malt extract and dextrin powder in enough water to bring the total to 7 gallons (26.6 L) of sweet wort. Thoroughly stir in calcium carbonate and boil for a solid 60 minutes, adding Northern Brewer hops to be boiled for the specified times. Cool your wort, using a wort chiller or an ice bath and place the wort into a primary fermenter. After you pitch your yeast, rouse morning and night until fermentation starts and ferment until the foam drops back to the surface. Siphon to a secondary fermenter for at least three days of settling. Siphon back to your kettle, or primary fermenter, stir in priming sugar syrup, bottle and cap. Set the beer aside at room temperature for two weeks to carbonate then enjoy!



KEG-O-RAMA

photo by **charles a parker/images plus**

CONTENTS

NITRO PG. 33 • MAINTENANCE PG. 35
CARBONATION PG. 36

achieving NITRO NIRVANA

by **BILL PIERCE**

Anyone who has ever had a Guinness Stout on tap knows the cascading off-white head surging and swirling above the nearly black liquid. The head is full of extremely fine bubbles, creamy on the tongue and an integral part of the signature of this world-famous beer. This is now emulated in cans and bottles of Guinness Draught, as well as by several other dry stouts, including Beamish and Murphys. Additional beers — such as Boddington's Pub Ale, Caffrey's Irish Ale and even Pyramid DPA in the US — have extended the concept to include other ale styles carbonated and served with nitrogen blends rather than solely with carbon dioxide.

Homebrewers need not feel left out, we can serve such distinctive beers, too. It's not that difficult to duplicate the "nitro pour" of your favorite pub draught. All it requires is some additional equipment beyond a standard keg set up and somewhat different carbonation and serving methods. In this article, I'll explain what it takes to do the job right and pour your beer proudly.

First, it's important to know what is occurring in these beers. For thousands of years, brewers have relied on the carbon dioxide (CO_2) produced during fermentation, and naturally dissolved in the beer, to provide bubbles and a tingling sensation when served and consumed. As the beer warms, the CO_2 comes out of solution as it is less soluble at higher temperatures. This is part of the flavor profile of nearly all beer styles; it's less so for some British ales, but almost no beer is entirely flat. Apart from cask ales, most tap beers are pressurized with additional carbon dioxide in order to force the beer through the lines and prevent staling due to contact with oxygen in the air.

Nitrogen gas (N_2) comprises around 78 percent of the Earth's atmosphere. Nitrogen is much less soluble in water or beer than carbon dioxide — around 80 times less at beer serving temperatures. And, it does not react with beer. In beers served with nitrogen — or, much more typically, a nitrogen-carbon dioxide blend — the nitrogen is forced along with the beer through tiny holes in the tap that create millions of nearly microscopic bubbles and a creamy, long-lasting cascading head.

American Pilsners have around 5,000 mg/L of CO_2 dissolved in them. In contrast, beers served with nitrogen typically contain around 2,400 mg/L of CO_2 and only about 20 mg/L of N_2.

The components of a mixed gas dispensing system are similar to that for regularly carbonated beer, with a few important differences. Obviously one is the gas itself. The usual blend is 75% nitrogen and 25% carbon dioxide (occasionally the percentages vary) and is sold by many gas distributors. If your supplier does not have it, look in the yellow pages under "carbonic gas" and ask for "mixed gas," "beer gas" or "Guinness gas."

Mixed gas cylinders are slightly different from those that contain carbon dioxide. The threads on mixed gas cylinders are left-handed so that a mixed gas regulator cannot acci-

Achieving a rich, creamy "nitro pour" at home requires a mixed gas cylinder (typically 75% nitrogen and 25% carbon dioxide), a mixed gas regulator, a "Corny" keg and a stout faucet.

dentally be attached to a CO_2 cylinder. Additionally, the gauges typically have higher maximum readings because both the storage and dispensing pressure of nitrogen is higher. If your homebrew supplier does not have mixed gas equipment, these items are available from many gas suppliers.

A major difference is the faucet for dispensing nitro beers, which is easy to distinguish from a typical tap because it is both taller and thinner. The key element is a small disc called a "restrictor plate" that impedes the flow of beer and gas, and forces them through tiny holes (usually five). Don't confuse a stout faucet with a creamer faucet; they are not the same thing.

The dispensing pressure for beers on mixed gas is considerably higher than for other beers, both because of the restrictor plate and the nature of nitrogen itself. Guinness recommends, and most bars push nitro beers with, about 30 PSI of gas pressure.

While nitrogen beers have a dense, creamy head, these beers are not highly carbonated. In fact, excessive carbonation may be objectionable because it adds a sharpness (from dissolved carbon dioxide that reacts with water to form carbonic acid) that is not part of the flavor profile of these beers. It also results in excessive foaming when being dispensed. Guinness Draught, for example, is carbonated only to about 1.1–1.2 volumes of CO_2. Most of this already occurs as the gas is dissolved in the beer during fermentation; little CO_2 is added later for force carbonation.

It's worth considering which beers may benefit from dispensing with mixed gas. Not all styles are appropriate for this method. For one thing, it tends to increase the perception of a beer's body or mouthfeel. This is ideal for low-gravity styles such as dry stout, but is much less desirable for beers that already have a high final gravity and considerable body. Another result of mixed gas is to decrease the perceived bittering and hop aroma. Highly hopped and bitter beers will appear less so when served this way. Lagers tend to have an odd creamy quality that seems out of place.

Beer served on nitrogen is not the same as cask ale, which shares a low carbonation level but is typically dispensed with a hand pump that mechanically uses the vacuum pressure of air to draw the beer from the cask. This mixing of air with the beer causes flavor changes over time that traditional "real ale" partisans consider the hallmark of a properly-cellared beer. Some pubs attempt to imitate cask ale by serving their regular beers through a stout faucet with mixed gas, but this is a poor substitute for real ale and produces quite different results.

Consider nitro beer as practical only if you keg your beer. While some commercial breweries have developed systems for canning and bottling such beers, this is beyond the technology of homebrewers. The "widget" in the bottom of these cans and bottles is injected with a droplet of liquid nitrogen and added during filling. When the can or bottle is opened, the change in air pressure forces the nitrogen out of a tiny hole in the widget and diffuses it throughout the beer, resulting in a cascading head when it is poured, much like the tap version. Bottling without the widget does not result in the creamy head of a "nitro pour."

To prepare a beer for mixed gas, brew and ferment an appropriate style in the normal way, but carbonate it very lightly. For example, if a dry stout is fermented at 68 °F (20 °C), it will already have nearly 0.8 volumes of dissolved CO_2. Increasing this to the recommended 1.2 volumes would require only a little force carbonation if the beer is chilled to the recommended serving temperature of 43 °F (6 °C). Force carbonating should be done with pure CO_2; trying to accomplish this with mixed gas requires much more time. If you opt for priming the keg, use less than 1 oz. (28 g) of corn sugar for 5 US gallons (19 L).

Although some brewpubs simply begin pushing carbonated beer with the nitrogen mix, others claim that you need to equilibrate the beer with the mixed gas. (Guinness kegs are shipped with nitrogen already dissolved in them.) This requires diffusing the gas into the beer. This can be accomplished by letting cold beer sit under high pressure, although — given the low solubility of nitrogen — this can take a week or more. A better way is to inject mixed gas into the beer through a stone. Turn the regulator to a pressure higher than the pressure in the headspace of your keg and bubble gas through the beer (releasing the headspace pressure occasionally). Ashton Lewis, of Springfield Brewing says, "We gas for 30 minutes, rest for 30 minutes and gas for 30 minutes."

Once the beer is ready to go, connect the gas fitting of the keg to the mixed gas regulator and cylinder, and the beer fitting to the dispensing line. Open the mixed gas cylinder fully, adjust the pressure at the regulator to a reading of 30 PSI (205 kPa) at 43 °F (6 °C) and test for a smooth pour, a cascading head and no excessive foaming of the beer. Adjust as necessary.

Guinness very carefully instructs pubs and servers in the proper dispensing technique, but it really boils down to these six steps:

1. Use a clean, dry unchilled glass.
2. Hold the glass near the faucet at a 45-degree angle.
3. Pull the handle forward to the fully open position.
4. Fill the glass approximately three-quarters full.
5. Allow the head and the beer to settle for one to two minutes.
6. Fill the glass to the top as necessary so that the cascading head just climbs above the rim.

That's all it takes for "a perfect pint" and nitro nirvana. As the Irish say, "*Slainte!*"

Bill Pierce is Brew Your Own*'s Advanced Homebrewing columnist.*

Kegging takes a lot less time than bottling, but you still need to maintain your kegs properly. And, if you buy an old keg that has not been reconditioned, you will initially need to take it apart and replace any damaged parts.

cleaning the BIG BOTTLE

MAINTAINING and RECONDITIONING Corny Kegs

by **MIKE HENIFF**

Used soda kegs (also called Cornelius kegs or "Corny" kegs, named after one of the keg manufacturers) are a great way to enjoy great homebrew without most of the manual labor of bottling. But, kegging your beer is not foolproof. To avoid time-saving kegging from turning into heartbreaking contaminated beer, proper cleaning and sanitizing is necessary. Also, a little regular keg maintenance is required to keep them in tip-top shape. But, this little amount of extra work for maintaining your kegs still makes kegging the easy choice over the labors of bottling your homebrew.

Buying a Keg

Kegs are widely available at most local and Internet homebrew shops. Checking out your local Pepsi or Coca Cola bottling company may land you a few cheap kegs as well. When buying a keg, you will pay a premium for a refurbished keg and a super-premium for a brand new keg; both options have the advantage that they will most likely be ready to use without any additional effort. Used kegs that have not been refurbished will take a little initial maintenance, but are easily the best deal.

Coke or Pepsi, Pin Lock or Ball Lock

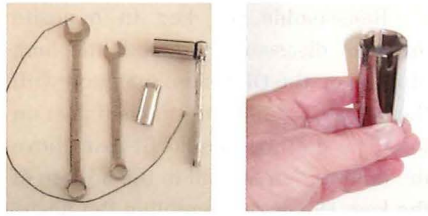
Corny kegs exist in two main styles, referring to the type of inlet and outlet connections on each type of keg: pin lock and ball lock. Pin lock kegs are ones that are used by Coca Cola and are easily identified by the "pins" on the gas and liquid posts on the keg. Ball lock kegs are identified by the absence of pins on the gas and liquid posts and are used by the other soda companies. The "ball" name is derived is from the ball bearings on the connectors that hold the connectors onto their respective posts.



Left: ball lock posts from a Pepsi keg.
Right: pin lock posts from a Coke keg.

The advantages of one style of keg over the other are minimal and most homebrewers choose by their personal preference. Ball lock fittings and gadgets seem to be more readily available than those for pin lock kegs. Also, ball lock kegs are easily disassembled using regular sockets and wrenches — a special notched socket is needed to disassemble a pin lock keg. Pin lock kegs are slightly shorter than ball lock kegs which makes them more likely to fit in tight refrigerators. Regardless of which style of keg you choose, the parts for each type of keg are not interchangeable, thus a pin lock keg cannot be converted to a ball lock keg and vice versa.

The connections and tools required vary by each manufacturer. For a pin lock keg, a 13/16" deep socket with special notches is needed (check your local or internet homebrew store or make one yourself). The gas/IN post is the one with two pins while the beer/OUT post has three pins. For a ball lock keg, a combination wrench or deep socket will work for disassembly, in either 7/8" or 11/16" size depending on the keg manufacturer. The gas/IN post has notches on the hex base and can have either a 6 point or 12 point base. (Be sure to buy tools in the 12 point style, so that they will work on both types of fittings.) The beer/OUT post has no notches along the 6 point hex base.



Left: tools for disassembling and cleaning
Right: a notched socket for a ball lock keg

Refurbishing an Old Soda Keg

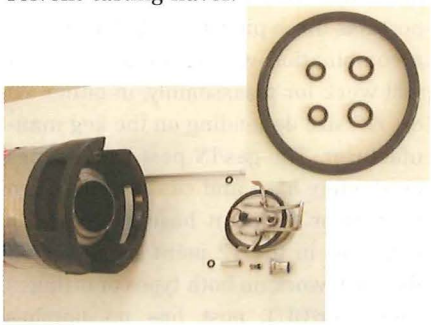
When you get that old keg home, the first thing to do is take it completely apart. Before disassembling, depressurize the keg by pulling on the lever

An old keg that has not been refurbished needs to betaken apart. You will need to replace the o-rings, which may be rotten or smell of soda. Poppets may also need to be replaced. Finally, check to see if the keg holds pressure.

or ring of the relief valve on the lid (or by depressing the poppet on the gas post). Once the keg is depressurized, pull the lid lever and remove the lid by pushing it into the keg then twisting it out.

For each of the connection posts, use either a wrench or deep socket for removal. Use a small screwdriver to press the poppets out of each post. Pull each diptube from the keg. Remove all five o-rings from the diptubes, posts, and lid and discard them.

Rinse all parts and the inside of the keg with water and scrub any rust spots with a Scotchbrite pad. (Do not use steel wool or brushes; they will leave carbon steel deposits that will rust!). Replace each of the old o-rings with new o-rings. Before using the new o-rings, however, boil them in water for 5 minutes to remove the rubbery, solvent-tasting flavor.



A disassembled keg with all its parts and (upper right) a replacement set of o-rings.

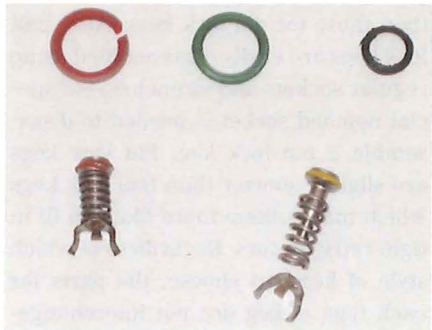
Reassemble the keg in opposite order of disassembly. Install the long diptube on the OUT side, matched with the proper 3 pin or un-notched post on top. The diptube should fit just above the indentation or well in the bottom of the keg. When reassembling the posts, be sure that the poppets are firmly in their posts — or at least secure enough that they don't fall between the posts and the diptubes — while tightening. This will help you avoid damaging the feet of the poppets. When properly installed, the posts need little effort to tighten completely down.

In some kegs, the long beer dip tube does not have a notch to hold it in place. As such, it may spin while you are tightening the post. Be sure to hold the diptube in place while tightening so that the diptube is not jammed up on one side of the keg. The small diptube for the IN side installs similarly, but goes on the notched or two pin post. Finally, place the lid inside the keg and pull down on the lever making sure that the lid is seated directly in the middle of the lid opening and is not shifted to one side.

After complete reassembly, pressurize with CO_2 to 25 PSI and check for leaks. Any bad leaks will be heard by the gas hissing out of the fittings. Using a strong iodophor and water mixture, spread over all tightened surfaces including beneath the posts, around the lid and relief valve, and on top of the posts. As an alternative, use a light soap solution or a commercial leak detector solution. For leaks around the lid or posts, either re-tighten the post or lid — or depressurize the keg, remove the leaking fitting, and reinstall it. For leaks around the poppets, reseat by pressing the poppet down with a firm object until the leak stops. Once all leaks are stopped, leave the keg pressurized for a day or two. Check the pressure with a pressure gauge or simply try to apply CO_2 at 25 PSI. If there still is a small leak, determine the leaking part and repair or replace.

Maintaining the Keg

Once your keg is in good shape, it is quite easy to maintain. Each time you disassemble the keg for thorough cleaning, inspect each of the parts. Replace any o-rings that are cut or dry-rotted to be sure that a proper seal can be maintained.



Broken and dry-rotted o-rings need to be replaced, as do broken poppets.

If, when assembling the keg, one of the posts will not hold a seal where the poppet seals against the post, first be sure that the post is properly tightened. If the poppet still won't seal, attempt to reseat the poppet by pressing the poppet down with a screwdriver or other firm object. Use a paper towel to protect yourself from the spray if there is liquid in the keg. If it still won't seal, then it's time to change that poppet. (It's likely the rubber o-ring at the head of the poppet is damaged, one of the feet are damaged, or the spring has worn to the point that it will not expand enough). Many homebrew shops carry a range of poppets for each of the different keg manufacturers. Be sure to check the manufacturer of the keg so that you can choose the proper poppet. Alternately, bring the old poppet with you for comparison when you get your new one.

During use, sometimes it can be increasingly difficult to fit one of the connectors onto the post. When this happens, be sure you are using the proper connector for the post. If it is still difficult (or even impossible) to fit the connector over the post, wet the o-ring with water or apply a tiny amount of Keg Lube or other lubricant meant for beer fittings. The o-ring on the outside of the post may need to be changed if it is damaged or dry-rotted. If a new o-ring doesn't solve the problem, then the post or connector is damaged and will need to be replaced. Be sure to check the manufacturer of the keg so that you can choose the proper post and poppet combination.

Cleaning and Sanitizing

Cleaning and sanitizing a well maintained keg is critical to protect the beer from contamination, which can cause a myriad of off-flavors. Performing a cleaning step each time

A clean, sanitized keg — purged with CO_2 — is ready to fill with beer.

before sanitizing is highly recommended. However, periodic cleaning is usually all that is necessary.

To clean the keg, completely disassemble it and soak in a cleaning solution. Five Star PBW is a popular choice amongst homebrewers and works well. After filling the keg with cleaning solution, use the keg to hold all of the other parts including the o-rings. After cleaning, be sure to rinse the keg and all parts well. The keg can be cleaned while assembled, but it is not recommended since cleaners are generally hard to rinse and large yeast or hop



Two kegs full of sanitizing solution. The keg lids hang in the solution from their latches.

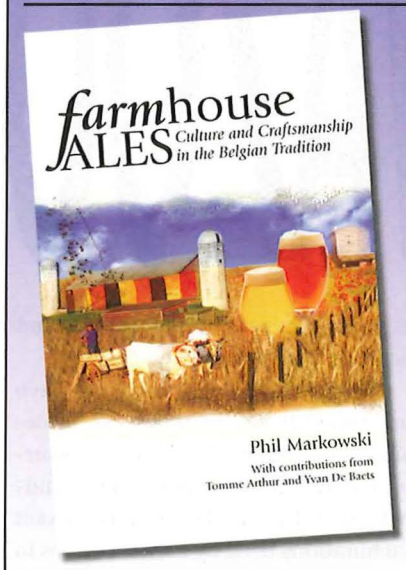
deposits can get trapped in the springs of the poppets and can be difficult or impossible to clean without disassembling the posts.

After cleaning, sanitize the keg using a good, no-rinse sanitizer such as Iodophor or Star-san. This can be done while the keg is unassembled or assembled. To sanitize unassembled, just soak each part in the sanitizer in the keg just as was done for cleaning. For sanitizing assembled, assemble the keg, fill with sanitizing solution, and soak. Be sure to press down on each poppet after filling the keg with solution so that each dip tube will release the trapped air and fill with sanitizing solution. If you sanitized the keg assembled, top off the keg if necessary, fit the lid, and push the sanitizing solution out with CO_2. The keg is now full of CO_2, with little or no oxygen present, and ready to be filled with homebrew.

Mike Heniff wrote about Baltic Porters in the December 2004 issue.

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There are many ways to force carbonate a keg. With an added piece of equipment— a rotometer — you can measure the flow of CO_2 from the tank to your beer and know exactly when you reach the right level of carbonation.

co2 out THE WAZOO

by **MARLON LANG**

All brewers know that the yeasty-beasties they pitch chew up the sugar in their wort and make carbon dioxide (CO_2) and alcohol. However, when the party is over and the sugar is gone, the amount of CO_2 dissolved in beer fermented at atmospheric pressure is usually too low for our tastes.

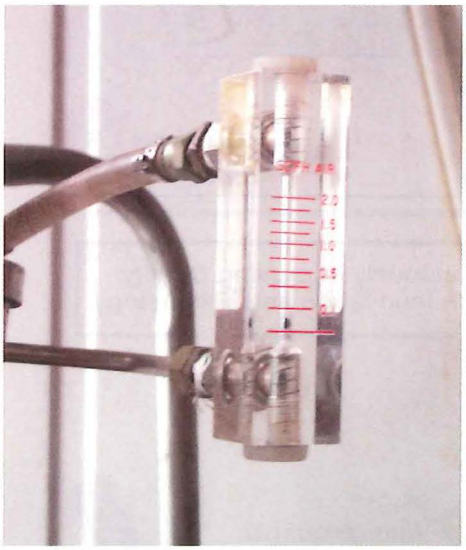


photo by marlon lang

A rotometer, which measures the flow of CO_2 through the gas/IN line to the keg.

It should be intuitive that if you put the beer in a closed container and pressurize it with CO_2, you can dissolve more CO_2 into the beer than you can without pressure. It may not be intuitive, but if you chill the beer at a given pressure, you can also dissolve more CO_2. There are many places on the Internet that have carbonation charts that show the relationship between pressure, temperature and dissolved volumes of CO_2.

Homebrewers that use kegs have had three basic methods to force-carbonating their kegs — (1) pressurize-and-wait, (2) pressurize-and-shake or (3) inject the CO_2. The exact machinations used by homebrewers to force carbonate their kegs, including hybrids of these methods, are as numerous as fleas on a dog's back. However, with the acquisition of a simple device, there is a fourth possibility — (4) pressurize-and-measure.

With the pressurize-and-wait method, you chill the keg, connect your CO_2 cylinder and set the CO_2 pressure to give the desired dissolved volume of CO_2 at the keg temperature. Then, you wait. This method will give very consistent results. But, there are some disadvantages. The waiting time is usually weeks. This is because the rate at which the CO_2 will dissolve is dependent upon the surface area of beer exposed to the CO_2 and Corny kegs are very "vertical," leaving a comparatively small surface area per volume of beer. Also, if you have even a small leak at an o-ring or fitting, you will empty your CO_2 bottle in a New York minute. The ultimate disadvantage of this method is that it takes a very long time to find out if it worked, and if so, how well. And if it didn't, you wait some more.

With the pressurize-and-shake method, you chill the keg, connect your CO_2 cylinder and set the CO_2 pressure to give the desired dissolved CO_2 volumes at the keg temperature. Then, you shake the keg. The advantage of this method over pressurize-and-wait is that the surface area exposed to CO_2 is greatly increased so the carbonation time is much shorter. Many of the homebrewer variations of this method involve the various keg shaking techniques. A common method is to roll the keg back and forth with your foot for a set amount of time — say 10 minutes. Another is to put the keg in the rocking chair and play rock-a-bye-baby.

Injecting CO_2 into the keg sometimes takes the low-tech form of attaching the gas to the "OUT" post of the keg. The idea is that the gas travels down the long dip tube and bubbles up through the beer. To do this, you need to switch your keg fittings so your regulator can be attached to the "beer/OUT" post. You can also bubble CO_2 into a keg using a carbonation stone. (See Thom Cannell's article, "Keg Lid Carbonator," March-April 2004 for one way to do this.)

The results from the shaking method will usually be quicker and more reproducible than the waiting approach. However, the pressurize-and-measure method removes all doubt. To use the pressurize-and-measure method, you need one additional piece of hardware — a rotometer. A rotometer is a small flow

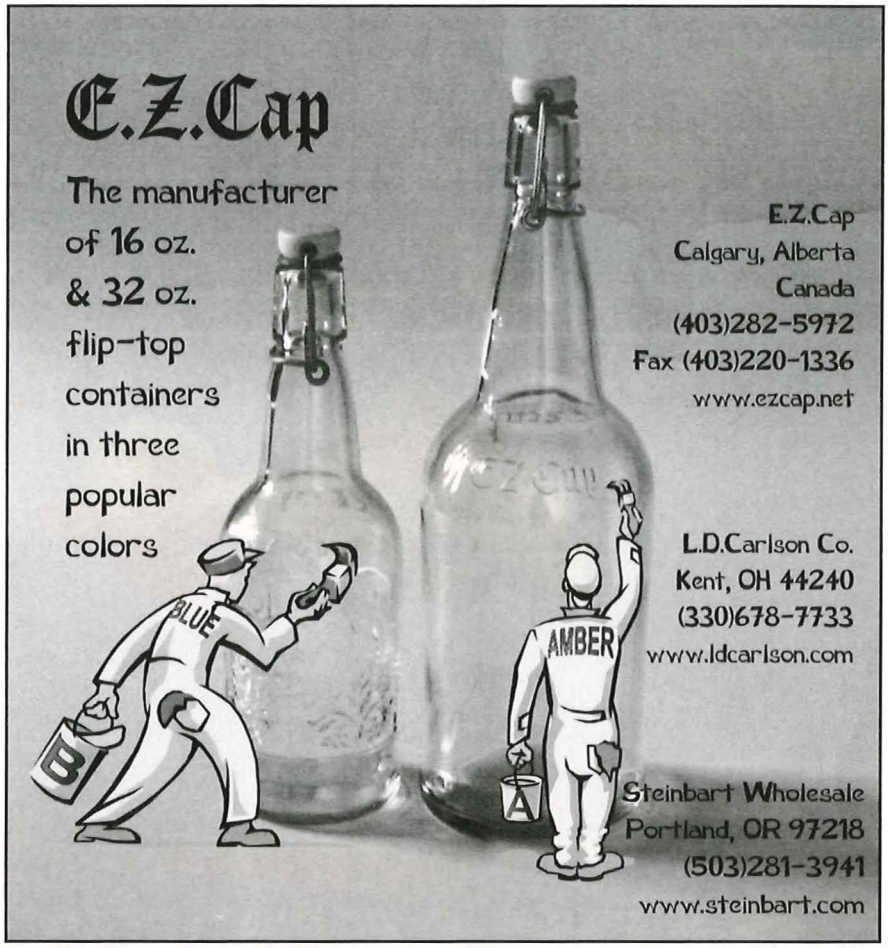
Carbonate quickly and accurately.

measuring device. The thing-uh-ma-bob that does the job is a small tube with a ball in it. The diameter of the tube gradually increases from bottom to top. Gas flows from bottom to top, lifting the ball — which is also called the float. The more gas flow, the higher the ball raises. You can find them on eBay for $15.

It doesn't matter what size you buy, although smaller is better. It doesn't matter what the calibration is, either. Standard cubic feet per hour (SCFH) is a common measure of airflow, but firkins per fortnight is just fine. Connect your rotometer to the CO_2 bottle. Select the correct pressure and temperature required to reach your desired level of carbonation. Then, start carbonating by shaking the keg. Keep shaking and watch the rotometer float. Eventually the ball will fall, indicating the flow of gas has stopped (or been reduced to below the level the rotometer can measure). When the ball falls and will not rise no matter how much you shake the keg, no more CO_2 is dissolving and the beer is carbonated. Voila! Your keg is carbonated to the correct level.

At this point, experienced "shakers" might be asking, "Why not just listen for when the gas stops hissing or the regulator stops 'groaning?'" As you shake a keg during force carbonation, you can hear all sorts of noises from your tank and regulator when the flow of CO_2 is sufficiently high. As you approach CO_2 saturation, however, the noises diminish. The reason to use a rotometer is that it is more sensitive than your ears are. The float will still show that gas is flowing beyond the point that you can hear any noise. If you want to bring your keg up to your target level of carbonation, and know when you can quit shaking, use a rotometer. Once you've carbonated the beer, you'll need to let the beer settle. Give it at least a week and it will be much better behaved.

Marlon Lang is a frequent contributor to Brew Your Own.





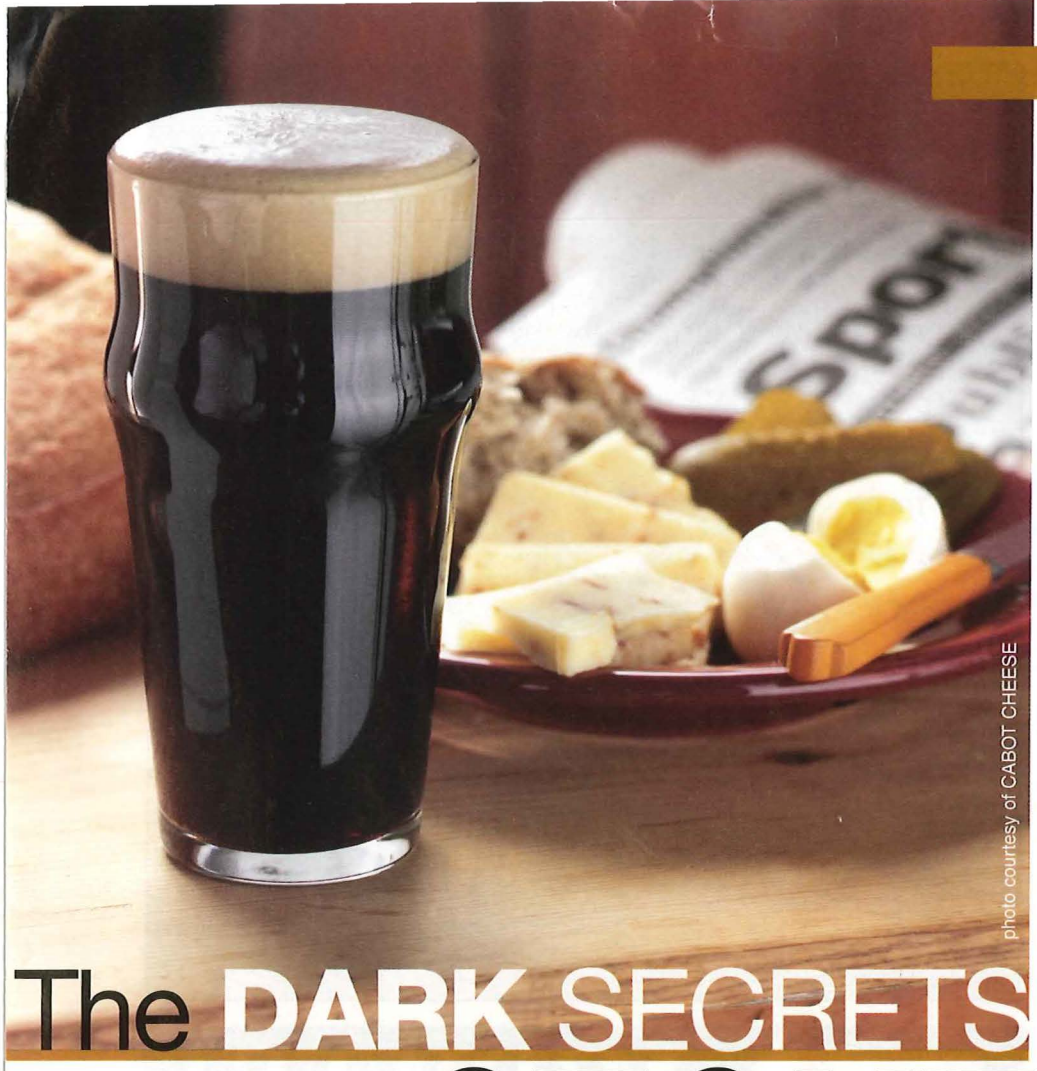


photo courtesy of CABOT CHEESE

The DARK SECRETS of STOUT

TIPS and TECHNIQUES for BREWING this DARK, ROASTY style of ALE

by **Ashton Lewis**

Offer a beer drinker a stout and you will find that most have some idea of what to expect. Many will brace in preparation for a sensory battle with a strong, bitter, black ale. Others will become warm just thinking of the full, roasted, chocolate and molasses flavors in their imaginary pint. And a few drinkers may get a little randy, anxious for the purported aphrodisiac to kick into gear!

So how can one beer style be so many different things to beer consumers? The answer is simple — "stout" is really not a beer style. This may sound blasphemous to style gurus, but my point is that stout is just the tip of the iceberg of a whole family of beers. The fascinating history of stout, not a focus topic for this article, is well documented in Michael J. Lewis' book "Stout" (1995, Brewers Publications). One of the earliest references to a "stout" beer was in a 1677 Egerton manuscript with "We will drink to your health both in stout and best wine." This reference to stout as a beer grew over the ages into what we now know as stout.

Today's beer consumer has access to a wide variety of stouts ranging from the rather low-alcohol Irish dry stout to the heavy, luscious imperial stout. At the 2004 Great American Beer Festival, the word "stout" was used in conjunction with "coffee," "foreign export," "oatmeal," "sweet," "milk" and "bourbon barrel" to describe the large stout clan of beers. I don't recall any oyster stouts this year! The one thing all of these beers have in common is color. Most stouts also have the same "blood type," usually ale, although many commercially available stouts are fermented with lager yeast. Suffice it to say, not all stouts are created equally.

It's All in the Grain!

The common denominator of stout is obviously its color. Most brewers focus on the dry Irish stout when contemplating the style. The grain of choice with this type of stout is roasted barley. Exactly why this is, I do not know, but the use of roasted barley lends certain traits to the style. Maillard reactions that occur during kilning malt are drastically reduced when barley is roasted because the necessary ingredients for the reaction — reducing sugars and free amino nitrogen from amino acids — are very low in barley. This means that roasted barley and roasted malt are quite different. Stouts brewed from roasted barley typically have a dense, white head and do not have the level of acrid, burnt, roasty flavors (many of which are Maillard reaction products) found in stouts brewed with roasted malt.

Roasted malt is a mainstay for some stouts, especially bigger ones, and imparts flavor and color attributes that are different from roasted barley. Stouts using this grain often have a darker head of foam than those brewed with roasted barley and usually have more roasted, coffee-like flavors. I have found great success using Weyermann Carafa III, a de-husked roasted malt that lacks the sharp acrid flavor of regular roasted malt. For such a broad family, it only goes to reason that more than one malt type is used for color and flavor of stouts.

Although a quick perusal of stout commentary on the web finds many

sources denouncing the use of crystal malt in the style, many commercial stouts do indeed use such malts. Crystal malts lend caramel and toffee notes to beer and are a useful ingredient when sweetness and higher finish gravity are sought. Personally, I like to use crystal malt in coffee stout and imperial stout to add depth of body.

Chocolate and other "light" roasted malts can also be part of the stout brewer's arsenal. I strive for balance in my beers and these grains fill in the middle of many stouts. A stout brewed exclusively from roasted barley or malt may lack the richness of flavor that malts such as chocolate and brown malt lend. This may be read as an attempt to morph porter and stout, yet the fact remains that many stouts have more depth of body than that obtained by using only one type of dark grain.

Whatever dark grain or combination of grains is chosen for the brew, the amount used in stout brewing hovers around 10% of the grist bill for normal gravity stouts. This percentage usually decreases in higher gravity stouts. This heavy dose of roasted grain is legendary for causing headaches during wort collection, especially when roasted barley is used. Brewers use special techniques, really just brewing tricks, to make this task easier. Brewers using infusion mash tuns often add the dark grains last so that they are top of the mash bed.

Lager brewers typically use mash mixers and lauter tuns and cannot sprinkle the dark grains on top of the mash bed because everything is mixed up in the mash mixer. Dark grains are very brittle and add a lot of fine particles to the mash, which makes wort collection troublesome. We have a mash mixer at Springfield Brewing Company and I have tried all sorts of brewing tricks to improve wort collection when using roasted grains.

One particularly effective trick is to leave the roasted grain out of the mash and to use an extract. For a while we were making our own extract from roasted barley and adding it to the mash so that the fine particles would be absent during wort collection. This worked great, but took too much time. We eventually replaced roasted barley with de-husked roasted malt and our

RECIPES

Dry Irish Stout

(5 gallons/19 L, all-grain)
OG = 1.040 FG = 1.008
IBU = 35 SRM = ~38 ABV = 4.1%

Ingredients

7.5 lbs. (3.4 kg) 2-row pale malt (preferably Maris Otter)
12 oz. (0.34 kg) roasted barley (400–500 °L)
2.0 oz. (57 kg) chocolate malt (300–400 °L)
½ tsp. baking soda (added to mash)
1 tsp. Irish moss
9.25 AAU Perle hops (bittering) (1.2 oz./33 g of 8% alpha acid)
Wyeast 1084 or White Labs WLP004
¾ cup corn sugar (for bottling)

Step by Step

Bring 9 quarts (9 L) of water to 166 °F (74 °C) and mix in the malts and baking soda. The temperature should fall between 154–156 °F (68–69 °C). Hold mash for 60 minutes before sparging. Recirculate the wort until clear and then run off wort to the kettle. Once the top of the grain bed is covered by an inch of wort, begin sparging with 176 °F (80 °C) water. Collect 6 gallons (23 L) of wort. Bring wort to a boil, add hops and boil for 60 minutes. Add Irish moss 5 minutes before the end of boil. Cool wort to 70 °F (21 °C), aerate, pitch yeast and ferment at 70 °F (21 °C). Rack after 10 days and a second time in another 14 days. Then prime, bottle and hold 7 days before drinking.

This is the classic stout to serve on mixed gas using a stout faucet. If this method is desired, skip the priming and bottling step and use the technique detailed on page 33.

Extract with grains option: An extract version of this beer can be made by substituting the pale malt for 6.0 lbs. (2.7 kg) of light liquid malt extract or 4.25 lbs. (1.9 kg) of light dry malt extract.

Microbrew-Style Stout

(5 gallons/19L, extract w/grains)
OG = 1.080 FG = 1.016
IBU = 70 SRM = 75 ABV = 8.3%

Ingredients

3.33 lbs. (1.5 kg) Breiss Light dried malt extract
6.0 lbs. (2.7 kg) Coopers Light liquid malt extract
8.0 oz. (0.23 kg) dark crystal malt (130–150 °L)
6.0 oz. (0.17 kg) medium crystal malt (45–55 °L)
6.0 oz. (0.17 kg) roasted barley (400–500 °L)
6.0 oz. (0.17 kg) chocolate malt (300–400 °L)
16 oz. (0.45 kg) Weyermann Carafa III dehusked roasted malt (450–500 °L)
1 tsp. Irish moss
18.3 AAU Nugget hops (60 min) (1.5 oz./yy g of 15% alpha acid)
6 AAU Cascade hops (20 min) (1 oz./28 g of 6% alpha acid)
8 AAU Centennial hops (5 min) (1 oz./28 g of 8% alpha acid)
Wyeast 1056 or White Labs WLP001
¾ cup corn sugar (for bottling)

Step by Step

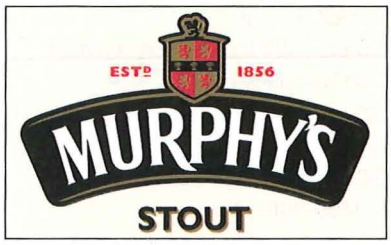
Place crushed grains in a nylon steeping bag and heat 105 fl. oz. (3.1 L) of water to 162 °F (72 °F). Steep grains in this water for 45 minutes. The temperature should be around 150 °F (66 °C) for the duration of the steep.

Combine 1.7 gallons (6.4 L) of water and dried malt extract (DME) with "grain tea" and heat to a boil. (To save time, heat water and DME while steeping the grains.) Boil wort for 60 minutes, adding Nugget hops at the beginning of the boil. With 20 minutes left in the boil, add the Cascade hops. With 15 minutes left, stir in the liquid malt extract (LME) and add Irish moss. Stir in LME thoroughly to prevent extract from sinking in kettle and scorching to the bottom. Add Centennial with hops with 5 minutes left in the boil.

After boil, cool wort down to 70 °F (21 °C), aerate, pitch yeast and ferment at 70 °F (21 °C). Rack after about 14 days and a second time in another 21 days. Then prime, bottle and hold for at least 14 days before drinking. This beer can be consumed young or can be laid down for aging.

All grain option: An all-grain version of this beer can be made by substituting 14.25 lbs. (6.5 L) of 2-row pale malt for the liquid and dried malt extracts.

STOUT clones



Murphy's Stout clone

(5 gallons/19 L, extract w/ grains)
OG = 1.038 FG = 1.007
IBU = 36 SRM = 41 ABV = 4.0%

Ingredients

2.66 lbs. (1.2 kg) Muntons Light liquid malt extract (LME)
0.66 lbs. (0.3 kg) Muntons Light dried malt extract (DME)
1.0 lb. (0.45 kg) 2-row pale ale malt.
2.0 oz. (57 g) crystal malt (90 °L)
3.0 oz. (85 g) chocolate malt
10 oz. (0.28 kg) roasted barley (500 °L)
12 oz. (0.34 kg) cane sugar
9.33 AAU Willamette hops (60 mins) (1.9 oz./53 g of 5% alpha acids)
0.25 oz. (7.1 g) East Kent Goldings (EKG) hops (15 mins)
White Labs WLP005 (Dry English Ale) yeast (1 qt./1 L yeast starter)
2/3 cup corn sugar (for priming)

Step by Step

Steep all crushed grains at 150 °F (66 °C) in 1.35 gallons (5.1 L) of water for 45 minutes. Add 1.2 gallons (4.5 L) of water and DME to "grain tea" and bring to a boil. Add Willamette hops and boil for 60 minutes. Add LME, sugar and EKG hops for final 15 minutes of the boil. Cool wort, siphon to fermenter, aerate and pitch yeast. Ferment at 70 °F (21 °C). Bottle with corn sugar.

All-grain option:

Replace first three ingredients with 5 lbs. 12 oz. (2.6 kg) 2-row pale ale malt. (Option: Treat water with $CaCO_3$ to reach 150 ppm CO_3^{2+}.) Combine pale and crystal malt with 2.1 gallons (8.0 L) of water at 161 °F (71 °C). Stir dark grains into the top half of the grain bed and the mash should settle in to a temperature of 150 °F (66 °C). Mash for 60 minutes. Boil 90 minutes, adding hops at times indicated in the recipe. Add sugar for final 15 minutes of boil. Ferment at 70 °F (21 °C). Keg (and perhaps push with nitrogen) or bottle.

Guinness Foreign Extra Stout clone

(5 gallons/19 L, all-grain)
OG = 1.078 FG = 1.019
IBU = 40 SRM = 43 ABV = 7.5%

Ingredients

13 lbs. (5.9 kg) 2-row pale ale malt
2 lbs. 2 oz. (0.96 kg) flaked barley
1.0 lb. (0.45 kg) roasted barley (500 °L)
11.33 AAU Challenger hops (60 mins) (1.6 oz./46 g of 7% alpha acids)
Wyeast 1084 (Irish Ale) or White Labs WLP004 (Irish Ale) yeast (2 qt./2 L starter plus 0.5 qt/500 mL mini-starter)
2/3 cup corn sugar (for priming)

Step by Step

Brew pale base beer Mash flaked barley and 11 lbs. (5.0 kg) of pale malt for 60 minutes at 152 °F (67 °C) in 4.1 gallons (15 L) of water. Collect about 6 gallons (23 L) of wort and boil hard for 90 minutes, adding hops with 60 minutes left in boil. Shoot for a yield around 4 gallons (15 L). (Your SG should be around 1.093.) Cool wort, siphon to fermenter, aerate and pitch yeast from big starter. Ferment at 68 °F (20 °C).

Make stout coloring extract Mash roasted barley and 2.0 lbs. (0.91 kg) of pale malt at 152 °F (67 °C) in 80 oz. (2.4 L) of water. Stir in $CaCO_3$ until pH value is between 5.2 and 5.4. Mash for 45–60 minutes. Collect 1.5 gallons (5.7 L) of wort. Boil for 30 minutes to reduce volume to 1 gallon (3.8 L). Cool wort, siphon to 1 gallon (3.8 L) jug, aerate and pitch yeast. Ferment at 68–72 °F (20–22 °C).

Make stout Combine beers in keg or bottling bucket. — *Chris Colby*

major headaches were eliminated.

The most famous stout in the world uses a liquid extract, called Guinness Flavor Essence (GFE), to convert pale lagers and ales brewed by licensed Guinness producers around the world into Guinness Foreign Stout. GFE, reportedly a mixture of roasted barley extract and special beer, is only made in Dublin and is used by breweries in the Caribbean, Africa and Asia. According to a Guinness web site, all Export Stout was brewed in Dublin up until 1962, when licensing agreements were set up with local brewers in key markets.

Stouts are usually made from a base of pale, 2-row malt and often times include flaked barley as an adjunct grain. Based on personal experience, I do not feel that flaked barley is a "must" for a good stout. The reasons for its use on a commercial scale have more to do with economics than flavor. Flaked barley is one of those grains that has a high potential for causing aggravation during wort collection. Many of the higher gravity stouts incorporate liquid sugar adjuncts to help boost the initial gravity.

The Other Ingredients

Roasted grains not only add color and flavor to stout, they lower the pH of the mash. Although pH reduction is not necessarily a bad thing in brewing, roasted grains push the pH below 5.2 when low carbonate brewing water is used. Historically, stout and porter flourished around Dublin and London, respectively. Both cities have similar water chemistry with a calcium concentration around 100 mg/L and about 150 mg/L of carbonate. This type of water works great because the carbonate helps balance the acidity of the roasted grains and brings the mash pH back into the 5.2 to 5.4 range.

Water chemistry is a huge topic unto itself and adding salts to local water to mimic Dublin water can be very difficult. The recipes I give on page 41 take the easy way out and I

The most famous stout in the world uses a liquid extract, called Guinness Flavor Essence

suggest an addition of baking soda (sodium bicarbonate) to help balance the acidity of the roasted grains.

Most stouts have medium to high bittering levels but minimal hop aroma. In fact, many commercially brewed stouts only use bittering hops in the form of pellets or liquid extracts. American craft brewers, of course, do things a bit differently and many of our stouts are very hoppy from a generous dose of aroma hops in the kettle. My personal preference mandates late hopping with a variety lending earthy, piney notes. I like using varieties such as East Kent Goldings, Cascade and Centennial for certain styles of stout.

A wide range of yeast strains are used for stout fermentation. Dry stouts typically are fermented using a strain that ferments dry. Highly attenuative yeast can also be used for sweet stouts because the carbohydrates lending sweetness are typically unfermentable. Some stouts contain perceptible levels of diacetyl and this aroma note is mainly due to yeast strain and fermentation method. If you like diacetyl in your stout, choose an appropriate yeast strain and minimize warm conditioning following fermentation. Surprisingly, many commercially available stouts are fermented with lager yeast. Many of the licensed Guinness breweries use their lager strains for stout. Dragon Stout from Jamaica and Kirin Stout from Japan also use lager yeast.

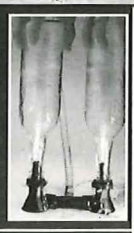
So, whether you're brewing a dry Irish, American microbrew-style or imperial stout, you've got many brewing options to consider.

Ashton Lewis is the technical editor of Brew Your Own *magazine.*

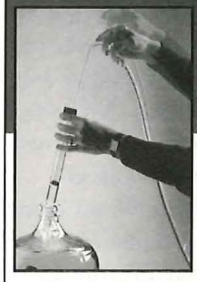
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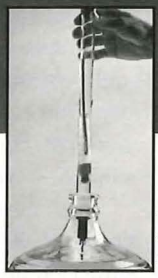




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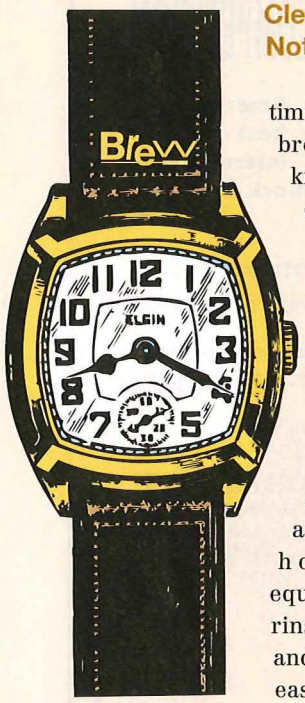
Brew Easy

Time and energy saving tips

by Chris Colby

Brewing is fun, but it also takes a lot of time and energy. It's likely that we have all allowed work or family obligations to postpone or cancel a brew day. When our schedules get cramped, our brewing plans can sometimes get brushed aside. Finding a way to shave time from our brew day can mean the difference between 5 gallons (19 L) of beer fermenting away in a carboy and a bunch of beer ingredients waiting to be used.

There are ways to save time (and energy) in homebrewing. A few actually involve ways to perform various brewing steps faster. Most, however, involve arranging things so you can perform tasks in a more leisurely fashion and not have them all fall on your actual brewing day. There are no "magic bullets" here, but hopefully you can read the suggestions in this article and make your brew day a little shorter, a bit more enjoyable or both.



Clean Now, Not Later

The biggest time saver in homebrewing is well-known and obvious, but it bears repeating. If you clean your equipment immediately after using it, you will save a ton of time. Immediately after use, most homebrewing equipment can be rinsed, scrubbed and cleaned fairly easily. On the other hand, if mash tuns, brew kettles, fermenters or beer bottles sit around for awhile, you will need to use considerably more elbow grease to clean them.

Perhaps the worst task in homebrewing is cleaning and sanitizing a couple cases of grungy beer bottles prior to bottling. When I first started, bottling day always started with a few hours of scrubbing the moldy deposits out of beer bottles, washing the bottles and soaking them in sanitizing solution. You can avoid all this, however, if you just clean — and perhaps even sanitize — your bottles as you go.

For cleaning bottles, fill an empty bottle of dishwashing liquid (or other squirt bottle) with your favorite brewery cleaning solution. Keep it and a bottle brush near your sink. Every time you open a homebrew, rinse the bottle, squirt in some cleaning solution and give it a quick once over with the bottle brush. Then, rinse the bottle and place it upside down in a case box. The next time bottling day rolls around, you've got clean bottles ready to use.

Some homebrewers go so far as to have a small bucket of sanitizing solution made up at all times. Freshly cleaned bottles go in the bucket and, once the bucket is filled, they get rinsed and stuck in the case box.

Planning

Extract Brewers Malt extract brewers have a couple options to shorten their brew day. If you realize that liquid malt extract has been boiled during its manufacture, you will also realize there is no reason to boil it for a full 60 or 90 minutes. Plan to boil your wort only as long as the longest hop addition requires. Keep in mind that you can make adjustments to this as well. Many, perhaps most, homebrew recipes specify a bittering hop addition with 60 minutes left in the boil. You can cut your boil short by 15 minutes by simply moving this addition up to 45 minutes left in the boil. To compensate for the decrease in alpha acid extraction, just multiply the amount of "60 minute" hops by 1.2 to get an appropriate amount of "45 minute" hops. This movement will not greatly effect the taste of your beer. (In fact, for moderately hoppy beers, you likely won't notice a difference. In a double IPA, you may notice a bit more hop flavor, comparatively.) Another hint for extract brewers is to use a wort chiller, if you don't already. Compared to cooling your wort in a sink (or bathtub), a wort chiller works a lot faster.

Brew Big Another obvious tack is to plan for and brew bigger batches of beer. If you have the equipment for it, it doesn't take that much more time to brew a 10-gallon (38-L) — or larger — batch of beer than it does to make a 5-gallon (19-L) batch.

Buy Big Your brewing time likely comes out of your total "free time," and part of this free time involves shopping for brewing ingredients. If you plan out your next few brewing sessions, you can pick up the necessities for several brews in a single trip to your homebrew shop, leaving more time for actual brewing. This can be especially helpful, if — like me — your "local" homebrew shop is miles away.

Before Brew Day

Measure and Crush Early In the few days leading up to brew day, you can use small chunks of free time to measure out the ingredients you need. I try to weigh out all my malts the day before, so I can proceed right to the crush on brew day. And, if I have the time, weighing out my hop additions and placing them in baggies saves some time on brew day. Of course, you can crush your grains the day before so they are ready to mash or steep on brew day.

For all-grain brewers, or extract brewers who perform full wort boils,

filling your hot liquor tank or kettle and treating your brewing water the day before your brewing session will also help. (You can also use this time to add a Campden tablet and dechlorinate the water.)

Having your water treated, malt extract and grains weighed out (and perhaps crushed), plus all your kettle additions put in separate baggies, can help you shave a big chunk of time from the start of your brewing session.

Heat Water Automatically Having your water and ingredients all set is nice, but what if you started your brew day with a mash tun or kettle full of hot water? Some brewers, especially those with "automatic" brewing rigs (RIMS, HERMS and the like), put the heater on their hot liquor tank on a timer. With this modification, an early morning brew session can start with a cup of hot coffee and a mash tun full of hot brewing liquor. Just dump in your (pre-measured and crushed) grains and go.

Quicky Yeast Starters Making a yeast starter is an important, but time-consuming, step in brewing. Yeast starters are often described as a little batch of beer that you add to your big batch of beer. And, making a yeast starter can take almost as long as making a batch of extract brew if you boil the starter on your stove, cool it in your sink and transfer it to a sanitized jug.

You can save a lot of time by getting an Erlenmeyer flask (or laboratory media bottle) and making your starter in your microwave. To make your starter, add the appropriate amount of malt extract and water to a clean flask, cover it with microwave safe plastic wrap and boil the starter wort for 15 minutes in the microwave. Flasks and media bottles are made from "laboratory glass" and won't shatter when exposed to large temperature swings. So you can fill your sink, or a bucket, with ice water and crash cool the starter. This saves you the time of washing a pot, sanitizing a jug and transferring your starter wort. The only drawback is that most microwaves can only handle 1 L flasks or bottles.

Brew Day

The Obvious Stuff A brewing session is filled with a number of steps that take quite awhile, but don't need constant attention. For the most part, you don't need to sit and watch your water heat, grains mash or your wort boil. Using the time while these steps are going on to look ahead and do miscellaneous tasks saves a bunch of time during your brew day. This, of course, is obvious and well-known and I only mention it so I don't have to answer 800 emails pointing out that I failed to mention it. There are, however, some less obvious ways to speed up your brew day, particularly near the end.

Chill Quickly If you use an immersion chiller, swirling the chiller continually will speed your cooling time greatly. I've switched from occasionally swirling my immersion chiller, then letting the kettle sit (covered) for a few minutes to taking the first 5 to 8 minutes of the cooling period to constantly swirl the chiller. (Hint: Hold the chiller by the "cold water in" side, not the "hot water out" side, unless you wear oven mitts.) The only drawback to this method is that the kettle is exposed to the environment while you stand over it, moving the chiller. I usually cool down to about 140 °F (60 °C), then cover the kettle when the temperature drops in to the wort spoiler "danger zone" (the temperature range most hospitable to airborne wort spoiling microorganisms.)

Use a Pre-Chiller A pre-chiller is an immersion chiller that sits in an ice bath and cools the water en route to your main chiller. A pre-chiller helps speed your wort cooling greatly. I begin cooling my wort without the chiller, then dunk the pre-chiller in ice water once the outside of my kettle is cool enough to touch. Initially, even 'warm" tap water is cold enough to cool just boiled wort. Dunking the pre-chiller too early is just melting ice.

Big Racking Cane I was in my local homebrew shop a couple months ago when I noticed something I hadn't seen before — racking canes with a larger



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inside diameter. A bigger tube for transferring your wort means faster transfers. And, think about how many times you need to transfer wort or beer — from the kettle to the fermenter, primary to secondary and secondary to kettle or bottling bucket.

It's In The Bag One thing I have heard of, but never actually seen, is fermenting in sterile, food-grade plastic bags. The idea is to ferment your beer with the bag lining your brew bucket. Once the beer is racked from primary, just throw away the bag. Brew on premise places sometimes use this approach to save the time of cleaning and sanitizing their fermenters. If you don't use this option, you should at least have your fermenter cleaned and sanitized before you start chilling your wort.

Wrapping Up

At the end of a brew day, it's often tempting to just set everything aside and deal with it later. However, just a little extra effort before you call it quits will save you a lot of time later.

At a bare minimum, rinse or hose off all your equipment. Better yet, as you cool your wort, save some of the hot water that exits your chiller in a couple buckets or large picnic coolers. Use one container for your cleaning solution and the hotter one as rinse water. Hot cleaning solution (I use PBW) will quickly blast through any deposits on your mash tun or kettle. And, with hot rinse water, your equipment will dry quickly. A long handled scrub brush will also make things go faster.

Packaging

Bigger Bottles Of all the tasks homebrewers perform, bottling is the one that most cite as the most tedious and time-consuming. You can save time on bottling day if you pick the biggest bottle size that will fit your needs. A 5-gallon (19-L) batch requires fifty-three 12 oz. (355 mL) bottles, forty 16 oz. (473 mL) bottles, twenty-nine 22 oz. (650 mL), nineteen liter bottles (such as brewpub "bombers") or not quite ten 2 qt. (2 L) bottles (such as brewpub "growlers" or 2 L soda bottles).

Keg It! What if you only had one "bottle" to fill? That's what homebrewers who keg face when their beer is ready. Although kegging involves an initial start up cost, it saves a ton of time. It also allows for options such as filtering your beer, counter-pressure bottling and pushing with nitrogen (see page 33). I have never heard a "kegger" say, "I've decided to go back to bottling."

In a pinch, some homebrewers even rely on the ultimate time-saver — buying commercial beer. Problem is, although there are many good breweries out there, the best beer in the world is the one you made yourself.

Chris Colby is the editor of BYO.



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Build a Beer Engine

For an authentic draw from your keg or cask

Story and photos by **Thom Cannell**

On my very first trip "back to the Old Country," the Isle of Man to see family, I was exposed to the British way of dispensing beer. The trip was traumatic. We'd missed a connection and were forced to take a seven-hour international red-eye. Late arrival necessitated racing from London, Gatwick, towards Liverpool to catch the SeaCat ferry to the Isle of Man. We missed the ferry, but found lodging for the night.

Yes, after being up for almost two days, learning to drive on the other side of the yellow line and missing the flight and the ferry, I wanted a beer! So — to the hotel pub, where beer flowed from odd-looking metal pipes with dispensing nozzles that resembled Guinness taps. It was served with low carbonation at cellar temperature, and had an unusually creamy, thin head. The beer was Theakston's as I recall. This was my first exposure to English style draft beer. Dispensing this beer is vastly different from U.S. custom. This "real ale," as CAMRA (Campaign for Real Ale) calls it, requires that the beer is dispensed from small kegs and pumped or poured from keg to glass. No CO_2 tanks for movement or carbonation, no artificial carbonation. Real ale is also served at cellar temperature, 54 °F (12 °C), like red wine.

While traditional English beer engines are readily available, international shipping costs are over $100. Why not make one? The core of a beer engine is a food grade pump. A great match was available at an RV store — the Rocket dual action pump for under $30. It is made of food grade PVC, pumps on both the push and pull strokes and holds its prime. All I would need to complete the device would be a housing box and a sparkler head for dispensing — British style!

Build a beer engine housing box

Step-by-step

I think most of us will put the beer engine on a bar. Thus, a box to hold the beer engine and a method of attaching the box to the bar are needed. The box should be open at the bottom for attaching a clamp and dropping a beer line to a keg.

1. To make a box exactly like ours, cut a top and two sides, 8" x 8". Cut the front and back 8" x 7" (8" minus two thicknesses of half-inch plywood). Lightly sand the exterior, interior and surface edges.

2. Find the center of the top and drill a large pilot hole. The pump requires a 1 7/16" hole. If you have this size hole saw, great. Otherwise enlarge a 1 ½" hole to size. It will help to use a jigsaw blade that has extra teeth (a hacksaw blade) and is thinner from front-to-back. A normal wood cutting blade is deep enough to bind when cutting such a small circle. Cut undersized and use a half-round file and sandpaper wrapped around a large dowel to work your way to the final size. Check the fit frequently, the hole itself provides most of the clamping force for the pump. Mark and drill pilot holes for the pump.



Once assembled, this beer engine and housing unit can be decorated with whatever stains or labels you desire!



A few pieces of plywood, and a hand pump is all you need to make your authentic beer engine for some "real ale."

Parts List

Beer Engine – Rocket Hand Pump	$33.00
1/2" cabinet grade plywood, 2' x 2'	$6.00
Glues and screws	$2.00
Beer line	$2.00
Tubing clamps	$1.00
C Clamp	$2
Beer line	$2
1/2" brass cap	$1.00
3/8" x 3/8" MPT brass barbed adapter	$1.80

Tools required:

Table saw or other saw
Drill and bits
Jig saw or coping saw
Hammer, screwdriver, countersink
Sander and sandpaper





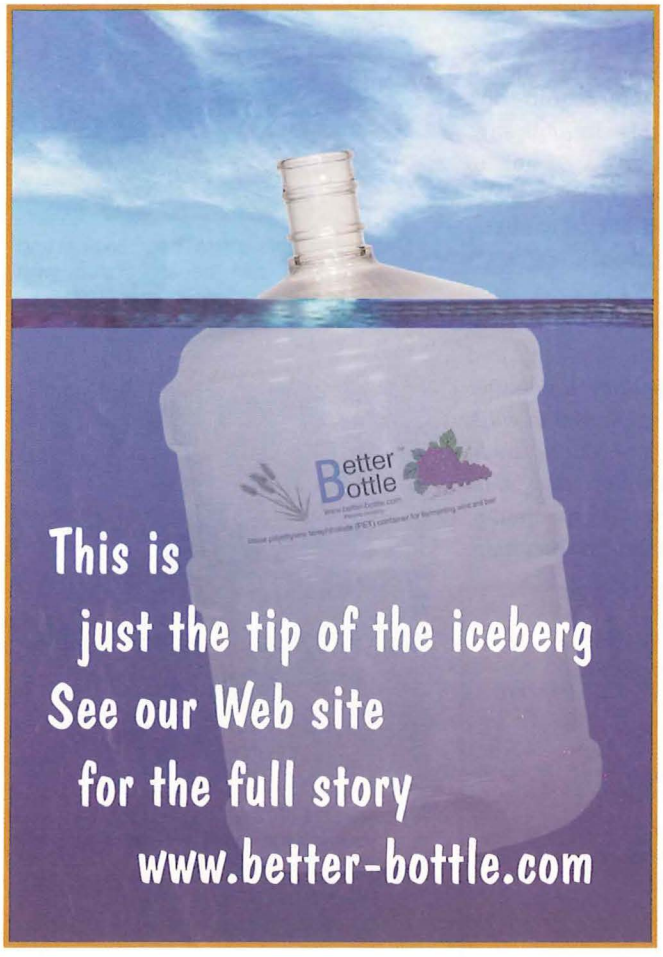
(Above): These clamps offer great throat depth (reach) and will fit almost any countertop. You do have to allow for the clamp's thickness behind the throat. Nail the bottom to offer maximum clamping surface. (Right): This is the brass compression cap, with nine drilled holes, each 1/16" in diameter. Experiment to find the best number and placement of the holes.

3. Predrill and countersink one or two pilot holes for 1 ¼" exterior grade wood screws to the front and back pieces. Measure in half the thickness of your sides and drill on this line. Then clamp the four sides of the box together and drill into the edges. This will prevent splitting the plywood. (If you don't have suitable clamps, wind some heavy twine or thin rope around the box, place a dowel or pencil beneath the twine and twist until tight. It's a great emergency clamp.) Apply glue to the mating edges and tighten screws (1½" finishing nails, countersunk are an alternative to screws). Even these should be predrilled with a very thin drill bit, one thinner than the nail itself.

4. Once the four sides are assembled, follow a similar procedure to attach the top to the sides. Glue the box sides and top at the same time; you may have to make adjustments that are impossible once the glue has set.

5. Once the glue is dry, sand the edges for perfect alignment, rounding the top's edges at sides and back.

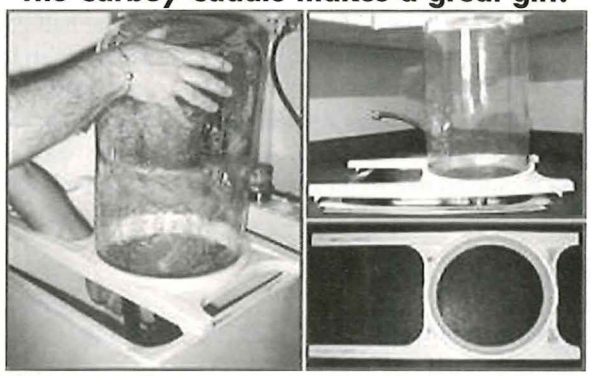
6. To provide a clamping surface, measure the thickness of your clamp front-to-back and cut a bottom piece that will leave room to insert and remove the clamp. This space will allow plenty of room to drop beer line to your keg. Attach the bottom with nails, again



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pre-drilling. Use nails that are at least 1½" long and be sure they fit tightly into the predrilled holes.

If you want a decorative frame, a place to show off your brewery's label for instance, cut the beveled pieces and attach now, before all holes and nicks are filled with putty and final sanding. It's your call whether you, or your guests see the artwork. You could even make a frame for the front and back! Apply a sanding sealer before any stain or paint is applied, sand lightly, then varnish or paint. Once dry, insert the pump and screw it tightly to the top. Your beer engine is almost complete; you only need to construct the sparkler nozzle.

Sparkler Nozzle Construction

Step-by-step

Making a sparkler nozzle is quite easy, especially if you or a friend own a drill press. To make the nozzle you'll need a barbed fitting with male MPT (⅜" x ⅜") and a compression cap (½".) While stainless steel would be ideal, brass fittings are easier to find and much easier to drill. You'll also need a small length of clear or braided (⅜") beer line to connect the pump orifice to your homemade sparkler nozzle.

Drill 5–10 holes into the end of a brass cap. Use the smallest drill bit you have, 1/16" or 3/32", and use very light pressure (I'd suggest buying two drill bits). Regardless of your drill motor, use very light pressure and slow speed, under 300 rpm. Lightly sand or file the surfaces to remove any chips.



With stainless steel clamps attach beer line to the pump spigot and your sparkler nozzle. The pump spigot tube is relatively fragile, so clamp lightly.

Some may be concerned about possible lead contamination from brass parts (lead is used in brass parts production.) John Palmer's web site has an explanation of how to clean brass in appendix B. (www.howtobrew.com/appendices/appendixB.htm) Please read the full text, but if you have no Internet connection, use a mix of vinegar and hydrogen peroxide. The vinegar should be common white distilled of 5% strength, the hydrogen peroxide a 3% solution. Soak for 5–10 minutes. Look for a color change from bright to butter, but if the parts or solution turn green, start over.

After your parts are clean, wrap

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2–3 turns of Teflon tape around the threads and tighten the cap to the barbed fitting. With a stainless steel hose clamp, attach 3–6" of beer line to the output of your "beer engine" pump and, using another clamp, attach the homemade sparkler nozzle. Note that the pump output tube is rather fragile and easily crushed; clamp with light pressure. Select a beer line length that will both clear the edge of the box and permit you to pour a pint with ease. That's it, the beer engine is complete!

Attaching the beer engine to your keg

The barbed fitting on the bottom of the pump is ⅜", so gather 2–6' of beer line and attach a clamp to one end of the pump and clamp the other to a beer-out keg body connector. Clamp the pump with light pressure to avoid crushing the ABS plastic. In a British pub, the beer will be naturally carbonated and have the correct volumes of dissolved CO_2. You may have an artificially carbonated keg of IPA or mild ale and want to use it with the beer engine. You will have to equilibrate the beer. That is, let the excess CO_2 come out of the beer. If you don't, the beer will foam excessively. You could draw off a few pints without adding CO_2, or open the blow off several times. You want a pint that appears still and uncarbonated, yet has 1.6–2.0 volumes of dissolved CO_2 at 50-54°F (~11 °C).

At this point you are ready to pump beer instead of pushing it from the keg. After several pints there will be a vacuum. In a proper real ale setup, the firkin is open to the air and poured quickly enough to prevent oxidation — though some aficionados think a touch of oxidation is authentic.

Home brewers will probably decide to deliver CO_2 into the keg to replace displaced beer. There should be enough pressure to push gas into the keg without adding carbonation or pushing the beer through the beer engine. In practice, rack from secondary into a keg and add the correct amount of priming sugar to create proper carbonation. Half of your normal amount, less than a ½ cup, for starters. Allow the beer to carbonate naturally at cellar temperature. Then, to serve, lay the keg on its side with the bottom higher than the top, to gravity feed the beer. Then, connect the keg in reverse. That is, connect a beer-out keg body connector to your CO_2 lines. This will require an extra body connector and beer line, and apply 1–2 p.s.i of pressure, just enough to replace the lost volume and keep oxygen off your wonderful beer. Connect your tap line and hose to a gas-in body connector to dispense through the short gas-in tube. If this is a temporary setup, you'll have to tickle the pressure control on your CO_2 set up to get this low of a pressure.

Thom Cannell writes "Projects," in each issue of BYO.

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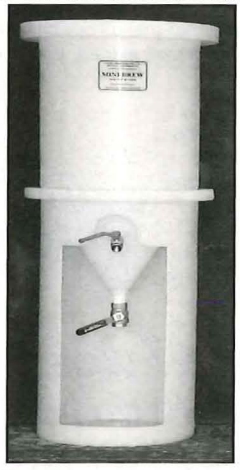
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Yeast Ranching

Long-term storage for yeast

Story by **Bill Pierce**

One of the biggest advantages commercial brewers have over homebrewers is an ample and ready supply of yeast (*Saccharomyces cerevisiae*). They routinely "harvest" yeast from a recent batch and pitch it onto a new batch of beer. It's common practice to do this multiple times and then reculture the yeast from a pure stock in order to minimize the possibility of contamination and mutations that can cause the properties of a yeast strain to "drift" and change the character of the beer.

As a homebrewer, the easiest way to reuse yeast is to time your brewing schedule so that you are brewing a new batch at about the same time you are racking the beer from a previous batch. This can be either the transfer to a secondary fermenter or for bottling or kegging. At that point, you can harvest the yeast and repitch it into the fresh wort. Furthermore, yeast sediment can be stored under beer or distilled water and refrigerated, to be revived anywhere from a day to a year later, depending on the storage technique and the health of the yeast itself. With reasonable sanitation, these methods will allow reuse of yeast at least several times before it needs to be discarded.

If you can't reuse your yeast in a timely fashion, there are a number of ways to store it, then grow it up to pitchable amounts later.

Why bother?

It's seldom worth the effort to reuse dry yeast, which is relatively inexpensive and convenient and the packages can be stored in the refrigerator for a very long time. Commercially available "liquid" yeasts have a shorter storage life, but are still relatively cheap. Conversely, if you have cultured yeast from a bottle of your favorite beer or otherwise obtained a yeast strain that is not commercially available, knowing how to store and propagate this yeast can be very valuable.

Mad science

Long-term maintenance of your stock of yeast strains demands more stringent quality control and greater involvement in the process. If you want to continue to reuse yeast over an extended period and through repeated pitchings, you need to become more scientific about it.

Current procedures for yeast culturing are adapted from the biomedical and microbiology fields, which ironically have their origins in brewing science. (Early microbiological pioneers Hansen and Pasteur studied beer and wine.)

When using these techniques, sanitation is more critical than with ordinary brewing. It's important to have a clean space in which to work, one that is relatively free of airborne contaminants. Commercial labs employ laminar flow hoods and partial vacuums. This is not necessary for the homebrewer — but, in general, avoid areas such as kitchens and basements that may have a high level of bacteria or humidity. Close nearby windows, especially during warm weather.

A very clean bench or table surface washed and rinsed with sanitizer before being allowed to dry is desirable. A flame source for sterilizing is also a good idea. This can be a small alcohol lamp, or alternately a butane lighter for a gas grill or fireplace. You can also use small propane bottles with fan-style burners. A spray bottle of alcohol or sanitizer is handy for quick tasks. Obviously, keep any alcohol sanitizer away from the flame. Some people wear surgical gloves, which may be overly compulsive, but at least wash your hands well with an antibacterial soap.

When using yeast from long-term storage, the yeast population is relatively small to begin with and increases many-fold as it grows and multiplies. Any other living microorganisms contaminating your culture — which

MATERIALS

- Pyrex flasks (500-2000 mL or 1-4 pints) or small saucepan for boiling sterile wort
- Bottles (25 oz. or 750 mL up to 2 quarts or 2 liters) or other vessels for yeast starters
- Rubber or foam stoppers for starter vessels
- Quart or pint canning jars with lids and rings
- Small (50-100 mL or 2-4 fl. oz.) vials with screw tops, or clean baby food jars and lids
- Small (15-20 mL) test tubes with screw-on caps
- Test tube rack
- Small funnel for filling jars and test tubes
- Graduated cylinder or small beaker calibrated in milliliters or fractional ounces
- Graduated pipette or eye dropper to measure and transfer small volumes of liquid
- Stainless steel or platinum inoculation loop
- Small plastic Petri dishes
- Agar for yeast growth medium
- Glycerin
- Light or extra light dry malt extract
- Distilled water
- Iodophor solution (12.5-25 parts per million) or isopropyl alcohol (70 percent) for sanitizing
- Cotton balls and/or paper towels
- Stretchable plastic wrap
- Zippered plastic storage bags
- Masking and electrical tape
- Permanent marker
- Balance or scale with a resolution of 5 grams (1/4 oz.) or less
- Pressure cooker for sterilizing small containers and utensils
- Alcohol lamp or butane torch for sterilizing
- Burner or heat source
- Refrigerator
- Freezer

can include wild yeast, molds and various bacteria — will multiply along with your yeast, and sometimes more quickly. It's not unusual to pitch a total yeast population into your wort that is hundreds or thousands of times greater than that of the initial stock. You certainly want to minimize the presence of any organisms other than pure brewing yeast.

Some of the required materials you likely already have or can improvise, but in other cases you will need laboratory equipment and supplies. (See the "materials" sidebar for a list of useful equipment.) If you're lucky, you may have contacts at a university, medical or biotech lab. If not, there are several scientific suppliers that continue to sell to individuals; among them are Fisher Scientific and Cynmar. It's a little more difficult since September 11, 2001, though, and you may be asked to explain the purpose of your order. Also check the yellow pages and Internet search engines for "laboratory equipment and supplies." Another source for certain items is your local full-service pharmacy.

A comment is in order about agar, one of the supplies you will need. This is available from scientific supply houses, but also at Asian grocery stores. It comes in small sticks or sheets. An alternative is unflavored gelatin, but gelatin begins to melt at a temperature of about 78 °F (25 °C), while agar will not do so below 122 °F (50 °C).

Going to the source

The first step in yeast culturing is to start with a relatively pure source of the yeast itself. For most homebrewers this is a vial, tube or smack pack of liquid yeast, but it may also be the yeast sediment from a bottle-conditioned beer or a container of yeast from your local brewpub. The objective is to "borrow" a small amount of this yeast for growth, storage and later use. Whether you are making a starter (recommended for larger batches and moderate to high gravity beers) a couple of days before a brewing session, or pitching the yeast directly from the package into your chilled wort, this is also the time to make a yeast culture. Save a small amount of the yeast and do the culturing very soon after pitching the rest into the starter or your batch of beer.

At this point you have two options. You can culture the yeast on agar plates for refrigerated storage for a few months, or prepare the yeast for freezing and store it for a year or longer. Plates are also preferred if your yeast source is sediment from a previous batch or a bottle-conditioned beer, commercial or homebrew. This will allow you later to isolate, select and propagate from a single yeast colony, virtually ensuring that you have an uncontaminated form of the strain.

For culturing on plates, you will have to prepare a growth medium. Start by heating 1 cup (a little less than 250 mL) of tap water in a Pyrex flask

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or saucepan on the burner. Dissolve one-quarter cup (20 g) of dried malt extract into the hot water and bring this wort to a boil for about 15 minutes (be careful about boilovers). Then turn down the heat and stir in one-half teaspoon of agar (or unflavored gelatin powder) until it is completely dissolved. Again bring to a boil, watching carefully so that it doesn't boil over, for another 15 minutes. Remove the flask from the burner and allow the flask or pan to cool in the air rather than in a cold water bath. The mixture will thicken — but not solidify — as it cools below 122 °F (50 °C).

Sterilize from three to six Petri dishes, vials or clean baby food jars and lids by steaming them in a pressure cooker for 10-12 minutes. As a less sanitized alternative, they can be immersed in boiling water for 30 minutes. Sterile, plastic Petri dishes are also available, although obviously these are single use items. When the Petri dishes (or other containers) are cool enough to touch, sterilize the mouth of the flask or lip of the saucepan with the flame source and pour the medium into each, filling it to about one-fourth of its capacity. Put the lids on the Petri dishes, or cover the container with plastic wrap, and let them cool a little longer, perhaps 30 minutes. Eventually the medium will solidify to the point where the color lightens somewhat and the plate can be tilted without running.

To save time, the covered plates can be prepared ahead of time and stored in sanitized plastic bags. (Sterile Petri dishes come in plastic sleeves.) It's best to store the plates upside down. Otherwise, condensation may form on the lids and drip into the agar. You can store poured plates in a cool, dry place for up to several weeks. If the medium turns hard and brittle it has been stored for too long and dried out. To be useful, it should remain somewhat soft and pliable.

The next step in culturing is to inoculate the agar plate with yeast. Sterilize the inoculation loop by heating it in a flame until it glows red. Then, cool the loop by dunking it in a shallow dish of alcohol. As an alternative, you can wipe it with a paper towel or cotton ball moistened in sanitizer or alcohol. Take a deep breath and draw the loop through the yeast sediment, collecting some of it on the surface. (You don't need — and in fact don't want — a visible amount of yeast on the loop. Just touch the yeast lightly and the loop will have enough yeast on it.)

While holding the loop in one hand, remove the cover from one of the agar plates with the other hand. Quickly streak the plate by lightly drawing the loop across the agar surface of the plate. Quickly close the cover when you are done and once again turn the plate upside down. Resterilize the loop and repeat the process for however many plates you plan to streak. The purpose of inoculating multiple plates is to

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avoid problems with infection or failure of the yeast to grow on one or more of them. It also provides more than a single yeast source for later reculturing.

Keep the plates covered, upside down and in a somewhat warm (70–80 °F/21–27 °C) undisturbed location. Within several days, the yeast should multiply and grow. A milky layer will develop on the surface of the medium, and you may notice trails of small "dots," which are individual yeast colonies. Contamination by molds, which can occur, will be obvious by the appearance of "fuzz" or "balls." Discard any such plates.

You now have successfully cultured the yeast on agar plates. Seal the covers or lids of the plates with electrical tape (in labs, they use the shrink wrap Parafilm), label them with masking tape and a permanent marker, and store them in a sealed plastic bag in the refrigerator. They will survive for several months or a little longer.

Baby, it's cold inside

The other method of serious yeast storage is in the freezer. Merely freezing the yeast in water, beer or wort will rupture the cells and kill them. However, if glycerin is added to the yeast in the proper proportion, it will inhibit the formation of ice crystals and minimize damage during freezing. When yeast is frozen in glycerin, a large amount of yeast is stored (relative to the amount present on the surface of a Petri dish). As a consequence, the potential for contamination is higher when yeast is stored this way. It is recommended to first prepare a plate from the frozen yeast if there have been more than a few repitchings since the last culture was performed.

Careful sanitation of the work area and all utensils, tools and materials for freezing is just as important as when preparing agar plates. The first step is to treat the yeast sediment. If you are using sediment from a previous batch or a bottle of commercial beer, it is a very good idea to wash the yeast. This is accomplished by stirring the yeast into boiled and cooled distilled water in a sterilized container, covering it with a sanitized lid or plastic wrap and letting the sediment settle before pouring off the liquid. In some cases it may be desirable to do this more than once. It is not necessary to wash the yeast from a new package.

Next prepare a 30% solution of glycerin and distilled water. Use a graduated cylinder or beaker to measure 250 mL (8.5 fl. oz.) of distilled water and 100 mL (3.5 fl. oz.) of glycerin. Stir until mixed well, then boil for about 10 minutes. Cover with sanitized plastic wrap and cool to room temperature. Pour the cooled glycerin/water solution into sterilized test tubes or small vials about one-third full. Just as when culturing on agar plates, it's best to use several tubes or vials as insurance against contamination or non-survival during storage. Then carefully add the yeast slurry, again about

continued on page 58

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American Pale Ale
July Ryes — Mar 04
My Rye — May 04
Experimental Extract Extra Pale Ale — Oct 04
Prohibition Brew — Nov 04
That 70's Brew — Nov 04
California Common — Dec 04
High Altitude Pale Ale — Dec 04

American Pilsner
Tubers for Victory — Mar 04

American Amber or Dark Lager
Dixie Blackened Voodoo Lager — Jan 04
Flatonia Bock — Jul 04

Barleywine
Gigantopithecus American-Style Barleywine — Mar 04
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Lord Big Barleywine — Mar 04

Belgian and French Ale
Rye Wit — May 04
Farmhouse Summer Ale — Jul 04

Belgian Sour Ale (& Lambic)
Piatz's Basic Lambic — Oct 04
Heuuuuuuza — Oct 04

Bitter and English Pale Ale
Lord Shrinkingbottom's Fuggling Awesome Bitter — May 04
Cook's High Sea Ale — Oct 04

Bock
Blue Danube Bavarian Bock — Jul 04
Doctor Decoctor's Doppelbock — Jul 04

Brown and Mild Ale
Abita TurboDog — Jan 04
Pterygotus Big Brown — Mar 04
Menestheus Mild Ale — Nov 04

Cider
Apple Cider — Nov 04

English and Scottish Strong Ale
Scotiae Cerevisia — Sep 04
Old Oddity — Sep 04
Old Soldier Ale — Sep 04

European Pale Lager
LaConner Pilsner — Mar 04
Rye Pilsner — May 04

Fruit Beer
Snowblind Cherry Vanilla Stout — Jan 04
Moosie's Blackberry Wheat Beer — May 04
Sour Cherry Honey Wheat — May 04

German Amber Lager
Goldschmidt's Hopeful Märzen — May 04
Sweat-of-the-Brow Dortmund Export — July 04

German Pilsner
Groll's Pilsner — Mar 04

India Pale Ale (IPA) and Double IPA
DC's Rye IPA — May 04
Ruination IPA — Sep 04
90-Minutes IPA — Sep 04
AleSmith IPA — Sep 04
Imperial IPA — Sep 04
Lagunitas IPA — Sep 04
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Dreadnaught — Sep 04
Hop Rod Rye — Sep 04
Racer 5 — Sep 04
Pliny the Elder — Sep 04
Celebration Ale — Sep 04
Two Hearted Ale — Sep 04
Spring Thaw IPA — Oct 04

Kölsch & Altbier
Cool Alt — Nov 04

Porter
Orange Rye Porter — May 04
Alder Smoked Porter — May 04
Batch #81 Baltic Porter — Dec 04
Maltic Porter — Dec 04
Any Porter in a Storm — Dec 04

Roggenbier
Wry Rye Ale — May 04
Rye Not — May 04

Scottish Ale
Highland Heather Ale — Dec 04

Specialty & Experimental Beer
God's Brew of Flanders — May 04
Cherry Chocolate Beer — Nov 04
Chocolate Raspberry Stout — Nov 04

Smoked Beer
Goldschmidt's Hopeful Märzen — May 04
Alder Smoked Porter — May 04
St. Charles Smoked Beer — Dec 04

Spice, Herb & Vegetable Beer
Ernest's Red Ginger Ale — Jan 04
Coriander Rye Ale — May 04
Yarrow Ale with Cranberry Blossom Honey — Sep 04
John's Peppered Honey Wheat — Oct 04
Wee Little Hottie — Oct 04
The Mole (Chipotle Porter) — Oct 04
Captain Cook's Spruce Beer — Oct 04
Green Chili Wheat — Nov 04

Stout
Left of Lefse Extra-Dry Potato Stout — Jan 04
Dry Cork Stout — Jan 04
Ragnarok Imperial Stout — Jan 04
Cactus Milk Stout — Jan 04
Watney's Cream Stout — Jan 04
Mackeson's XXX Stout — Jan 04
Doug Rhoades' Milk Stout — Jan 04
FUDA Stout — May 04

Wheat Beer
Double Eagle Ale — Jan 04
Rye Hefeweizen — May 04
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Steinbauer's Best of Show — Jul 04
Der Weisse Spritzer — Oct 04

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one-third of the total volume of each tube or vial, using a sterilized pipette or eyedropper. Screw the sterilized caps or lids on tightly, shake well to distribute the yeast and mark each one with a masking tape label. Once prepared in this manner, the yeast is ready to be frozen and stored.

The problem with most home freezers is that they are frost-free. A heater periodically warms the refrigerant lines to melt frost on the freezer walls. This has a minimal effect on frozen foods, but will greatly shorten the storage life of yeast. There are two methods of preventing this from occurring. The first is to find a way to disable the defrost cycle, which requires some knowledge of refrigeration and electrical expertise. The other method is to place the test tubes or vials of yeast inside a small, covered Styrofoam cooler between frozen packs of "blue ice." Store the cooler in the freezer. This will greatly minimize the temperature changes that occur during the defrost cycle and prevent damage to the frozen yeast. Set the freezer to its lowest temperature setting; most home freezers can reach temperatures of about -15 °F (-20 °C).

The frozen yeast can be stored in a home freezer for up to several years. This assumes there are no power outages that would allow it to thaw. In a laboratory freezer at -80 °C (-112 °F), frozen yeast has successfully been stored for decades.

Waking the dead

Of course, at some point in the future, you will want to revive the refrigerated or frozen yeast and use it again. For yeast that has been cultured and stored on agar plates, the procedure is to find a single colony of pure yeast and use it as the starting point, growing it up until you have a "pitchable" population for your brewing session. With frozen yeast, you may have a similar purpose, or you may wish to culture a plate from the frozen sample in order to ensure that it is pure.

If frozen, remove the test tube or vial from the freezer and first place it in the refrigerator. Allow three to five days for it to thaw. At that point, the thawed yeast is treated the same as a refrigerated agar plate. Remove from the refrigerator and keep at room temperature overnight.

Now the process is one of increasing the population by making yeast starters while maintaining good sanitation throughout. If you have experience with making a starter, you should be familiar with the instructions for preparing sterile wort. A frozen tube or vial can be stepped up first to about 70 mL (2 oz.) of wort, then to about 500 mL (one pint) and finally to as much as a gallon (3.8 L), if desired. Allow each starter to incubate for about 48 hours in a somewhat warm (70–80 °F/21–27 °C), undisturbed location between steps.

Reviving yeast from agar plates requires an additional step. In that case, start with a single colony on the surface of the plate. Select a round and relatively uniform "bump" or "dot" that is physically isolated from the others. Prepare a sterilized test tube with about 10 mL (0.33 fl. oz.) of sterile wort. Use the sterilized inoculation loop to gather the single yeast colony from the plate and immerse it in the starter wort, swirling it until the yeast is mixed well. Place the cap loosely on the tube, but do not seal it. Set it in a warm location for about 48 hours. You may see bubbles during that time, but the only definitive indication of activity will be yeast sediment at the bottom of the tube. This is used as the source for successive starters in the same manner as frozen yeast.

Yeast culturing is somewhat involved and may make you seem like a "lab rat." But, it is also the key to a ready supply of yeast at lower cost and greater flexibility. If you are a conscientious, detail-oriented brewer, you can become an experienced and committed yeast rancher and successfully maintain your own relatively pure source of this most valuable of brewing ingredients.

Bill Pierce wrote about cloning Samichlaus in the December 2004 issue of Brew Your Own *magazine.*

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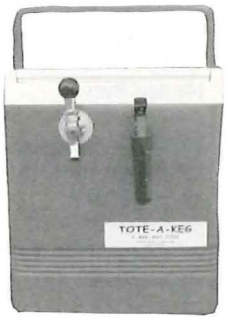
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Last Call

A Homebrew Widow

How homebrew can take over an entire house

by Claire Fleischman • Tampa, Florida

My husband, Joe, is a *BYO* subscriber and issues of the magazine can usually be found in every room of our house. Occasionally, I'll pick up a copy and read an article or two in an effort to share his interests. But I have to confess, I just don't see the attraction to brewing beer. Isn't it easier to just go to the store and buy it? It comes neatly packaged, doesn't stink up the house, doesn't leave a sticky mess on my kitchen floor and the only trash it produces is a bit of cardboard and six recyclable bottles. But still, Joe insists on brewing almost every weekend. Nothing stops him, not even a hurricane. This summer he spurned the



Claire calls herself a homebrew widow . . . Joe just loves making beer.

electric range due to lack of power and heated his sparge water outside on the porch using a turkey fryer stand and a tank of propane — he didn't seem to mind the 40 mph tail end winds of the latest storm!

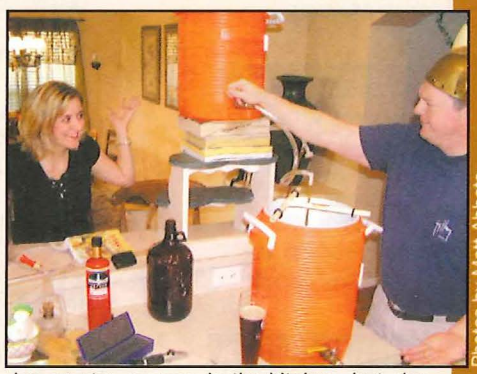
I've taken to referring to myself as a homebrew widow. I've lost most of the storage space in my house to homebrew paraphernalia and mourn it greatly. My garage has been taken over by two freezers and a refrigerator (none of which I can use for normal food storage because of the temperature overrides Joe has hooked to everything). My closet is full of huge kettles, carboys, coolers, assorted piping, filters, copper coils and a bunch of other accessories too numerous to mention. My laundry room is full of bleach and has a continuous barrage of strange items soaking in its sink. Most of all, I grieve for the lost time, as nearly every Saturday is sacrificed to what amounts to watching wort boil.

Joe's brewing obsession is well known in the neighborhood. In fact, in the darkening, early hours of the third hurricane late this summer, a contingent of neighbors showed up at our door, pint glasses in hand. They represented themselves as the "Hurricane Preparedness Team" and had come to make sure Joe had fresh beer on tap. As they explained, the team came to our house for a little relaxation due to storm-related stress and wanted to make sure there would be a source of hydration should the water supply become contaminated. They had been at my door before and I definitely recognized those glasses. Joe loves sharing his brew with such an appreciative crowd and such gatherings usually signal his disappearance to the driveway for several hours.

It has gotten to the point that I hesitate to send him to the curb with the trash, as he'll usually run into one of the guys (occupied with a similar task), and next thing you know they're in the driveway with a couple of homebrews. His most recent creation is a batch of Bavarian Helles.

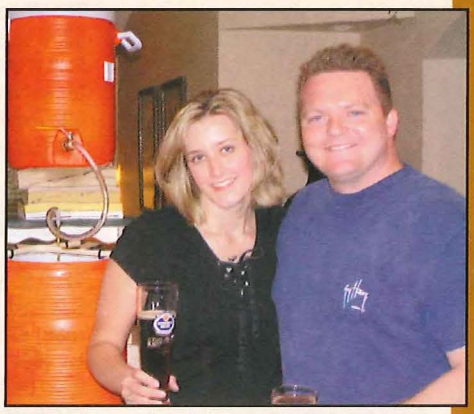
But, with all that said, it's hard to ignore the literal joy on his face when the doorbell rings and UPS brings his latest delivery of hops, barley and yeast. He immediately sets to work doing something with the yeast and then spends the next day or so enraptured by the sight of miniature bubbles popping up in the airlock. I know once those bubbles slow down that it's time to leave the house or face the destruction of my kitchen as the beer making process continues with beer paraphernalia covering every available surface.

I don't know if Joe's true interests lie in the science of making beer, the enjoyment of the finished product, sharing his brew with the neighborhood or a combination of them all. But I do know he loves the art of homebrew with an excitement and passion that few people in this world ever find. Although I sometimes feel I've lost my husband to the hobby of a lifetime, I can't think of a worthier foe — and hey, the beer actually tastes good too!



Photos by Matt Abbate

Joe creates messes in the kitchen, but also some quite delicious homebrew.



When all is said and done, a tasty homebrew can mend all wounds (and messes).





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