conquer the 10 HARDEST BEER STYLES

BrewYour Own®

DECEMBER 2005, VOL.11, NO.8

THE HOW-TO HOMEBREW BEER MAGAZINE

POURING PACIFIC NORTHWEST

regional microbrew clone recipes and brewing tips

do barley varieties matter?

black in the U.S.S.R. with RUSSIAN IMPERIAL STOUT

EXTRACT BREW HOPPING

www.byo.com
U.S. $4.99 • CAN. $6.99

$4.99US $6.99CAN

12>

0 74470 02485 9

10 YEAR BrewYour Own ANNIVERSARY

Stick with Muntons!

Made from naturally grown, GM free English malted barley, Muntons malt extract doesn't come any better or purer. And it's that purity which translates to trouble-free brewing and flavoursome beer with character.

Inferior malts often include lower grade barley extract or, worse still, barley or maize syrup. When you brew with Muntons 100% pure premium malt extract, you can be confident you are brewing with the world's finest.

Don't let your retailer sell you anything less. Insist on the extract that guarantees results. Stick with Muntons.

Muntons PLC

WORLD CLASS MALT

Muntons, Cedars Maltings,
Stowmarket, Suffolk, IP14 2AG, England

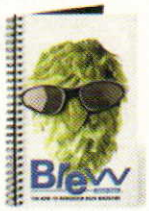
Tel (+44) (0) 1449 618300
Fax (+44) (0) 1449 618332
email sales@muntons.com
www.muntons.com

NEW Brew Your Own® wear!

Shirts, Sweats, Hats & Lots More!

GREAT Gifts For You Or Your Brewing Buddies

Go to
www.cafepress.com/brewyourown
and order your Brew Gear today!

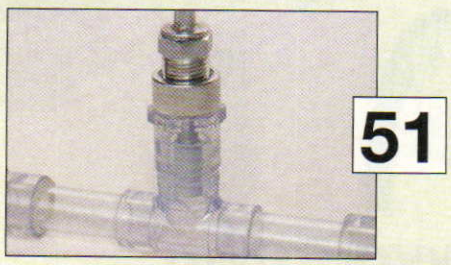


www.cafepress.com/brewyourown

SHOW THE WORLD YOU'RE A HOMEBREWER!

DECEMBER 2005
Volume 11 Number 8

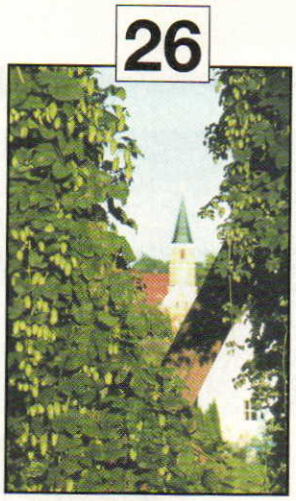
Departments



COVER ILLUSTRATION: DON MARTIN

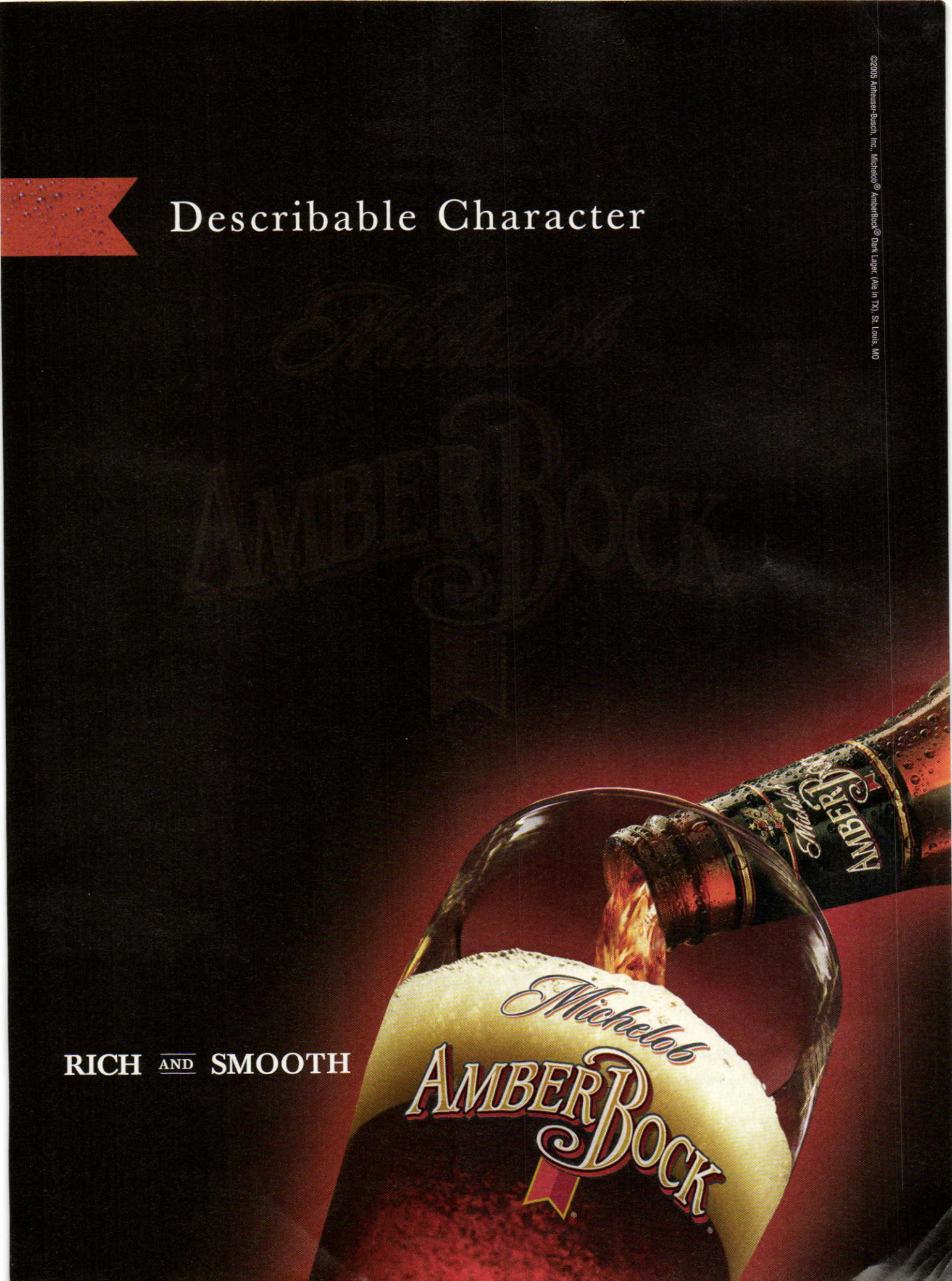
BREW YOUR OWN®
THE HOW-TO HOMEBREW BEER MAGAZINE

Features



Where to find it

Describable Character



Brew Your Own

THE HOW-TO HOMEBREW BEER MAGAZINE

How to reach us

Editorial and Advertising Office
Brew Your Own
5053 Main Street, Suite A
Manchester Center, VT 05255

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

Advertising Contact
Kiev Rattee
kiev@byo.com

Editorial Contact
Chris Colby
chris@byo.com

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

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

Special Subscription Offer
8 issues for $24.95

Web Site
www.byo.com

Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for $24.95 per year by Battenkill Communications, 5053 Main Street, Suite A, Manchester Center, VT 05255; tel: (802) 362-3981; fax: (802) 362-2377; e-mail: BYO@byo.com. Periodicals postage rate paid at Manchester Center, VT and additional mailing offices. Canada Post International Publications Mail Agreement No. 40025970. Return undeliverable Canadian addresses to Express Messenger International, P.O. Box 25058, London BC, Ontario, Canada N6C6A8. POSTMASTER: Send address changes to *Brew Your Own*, P.O. Box 469121, Escondido, CA 92046-9121. Customer Service: For subscription orders call 1-800-900-7594. For subscription inquiries or address changes, write *Brew Your Own*, P.O. Box 469121, Escondido, CA 92046-9121. Tel: (800) 900-7594. Fax: (760) 738-4805. Foreign and Canadian orders must be payable in U.S. dollars plus postage. The subscription rate to Canada and Mexico is $30; for all other countries the subscription rate is $40.

 Volume 11, Number 8: December 2005.

RECIPE INDEX

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.

Hurtin' Hopback

We featured these two hopbacks in our "Projects" department in the May–June 2005 issue of *BYO*.

I recently built a hop back exactly as featured in the May-June 2005 issue of *BYO*. While the construction process went without a hitch, I am troubled by its functionality. I place anywhere from 1–2 ounces of leaf hops in the hop back with a screen installed on the outlet side of the hop back. I also have a screen installed in my kettle to pre filter any trub from getting to my hopback. The problem is that the hop back unit immediately plugs and it would take at least a couple of hours to pump the wort to my carboy. When I disassemble the plugged hop back, the screen is completely blocked. This is the second failure and I'm about ready to scrap my creation. Any suggestions? Have you had any other complaints? I have too much time and money in this and I hate to toss it.

Dennis Myers
via email

If you are pumping wort through the hop back and it clogs instantly, the likely culprit is overly high pressure on the hop filter bed.

In a properly working hop back, the wet hops form a spongy filter and hot wort flows through the spaces between the hops. Although a hop jack will slow the flow of wort a little, as any filter bed would, it should not take a couple hours to empty your kettle.

Your pump may be moving your wort with such force that it simply collapses the filter bed as soon as wort begins to flow. If the clogging problem were due to the accumulation of small bits of trub in the filter bed, the wort should flow normally at first, then begin to slow.

Our advice for using the hop jack is to start slow. Let hot wort trickle into the hop jack and wet the hops. Once wort starts trickling out of the hop jack at the same rate it enters, start slowly increasing the flow rate from the kettle to the hop jack. As long as the rate of flow out of the hop jack equals the rate of flow out of the kettle, keep increasing the flow rate. When you get to the point that more flow out of the kettle results in less flow out of the hop jack, back off on the pumping speed and drain the wort.

Kettle Metal?

Does it matter what type of brew kettle — aluminum, stainless steel, copper or brass — you use to brew beer?

Richard Slagle
Austin, Texas

Yes, different metals have different characteristics and these can potentially affect your beer. However, with knowledge of the proper cleaning procedures, any of these metals are suitable for homebrewing.

Aluminum conducts heat well and is relatively inexpensive. Many homebrewers successfully use aluminum brewpots that come with "turkey fryer" propane burners to make their beer.

The downside of aluminum is that it is a soft metal and subject to corrosion from some cleaners, especially those containing chlorine.

If you use aluminum, clean it with dish soap, PBW or a percarbonate-based cleaner (such as Oxy-Clean). Remove soil from the equipment with a soft sponge, but don't scrub the aluminum until it's shiny. Let your aluminum pot turn gray over time as the gray color indicates a protective film on the metal.

In the not-too-distant past, aluminum cookware was linked to Alzheimer's disease. This has caused some homebrewers to avoid it. However, further research into the sub-

ject has led researchers to dismiss any link between aluminum and Alzheimer's.

Another complaint some have about aluminum is that highly-acidic foods (such as tomato sauce) can dissolve small amounts of aluminum from a pot and end up being ingested along with the food. However, wort is not acidic enough to dissolve enough aluminum to be detectable in beer. Still some homebrewers claim to be able to detect a metallic twang in beers made in aluminum kettles. So, depeding on the sensitivity of your palate, aluminum kettles may or may not interfere with the taste of your beer . . . as far as you can tell! Some homebrewers with aluminum kettles counter that they've entered many beers in homebrew contests and never had a judge comment on a metallic flavor. Our experience is that properly cared for aluminum does not taint beer flavor.

Stainless steel is more expensive than aluminum, but it is the metal of choice for most brewers, both amateur and professional. Stainless is a hard, corrosion-resistant metal that can be cleaned with most chemicals (although chlorine based cleaners will pit it). Stainless conducts heat less well than aluminum, but its other properties make it very desirable as a material for brewing equipment.

Stainless can be cleaned with just about any cleaner sold at homebrewing or home winemaking shops. You should not, however, use bleach. You can use a green scrubby sponge to clean stainless, but you shouldn't use anything that will scratch the metal — for example, a Brillo pad — as this will allow rust to form.

Copper has the best heat conductivity of the metals discussed and has a long history in brewing. In fact, brew kettles are still sometimes referred to as coppers. However, it is also the softest of the three metals and its expense keeps most homebrewers from brewing in it. If you obtain a copper kettle, clean it using a cleaner designed for copper. (Look for these at kitchen supply stores.)

Brass fittings are common in homebrewing, but brass brewing vessels are almost unheard of. Brass is an alloy of copper and zinc, with small amounts of lead embedded in the alloy. Treating the brass for 5 minutes with a 2:1 mixture of vinegar (5% acetic acid) and 3% hydrogen peroxide will render it safe to use in brewing. Clean as you would a copper vessel.

Really Really?

I'm interested in making the cranberry beer featured in the October 2005 issue of *BYO*. I know that it says not to sanitize the fruit in hot wort, but can you really get away with that? Really and truly?

Anthony Walker
Houston, Texas

Yes, really. That's how it's done. That's how we've done it.

Horst Dornbusch was born in Düsseldorf, Germany and came to the U.S. in 1969. A barren beer landscape was the impetus for him to try homebrewing. "If you wanted a decent beer in North America those days," he says, "you had to make it yourself." Horst has written a number of books on the subject of brewing including "Prost!: The Story of German Beer" (1997, Brewer's Publications) and two books in the Classic Beer Style Series: "Altbier" (1998) and "Bavarian Helles."(2000) On page 44 of this issue, he discusses his experiences on a tasting panel evaluating beers made from Pilsener malt from different barley varieties.

Matt Cole first became interested in brewing while working as a part-time sales rep at The Pennsylvania Brewing Co. while attending the University of Pittsburgh. After finishing school, he studied at the Siebel Institute and The University of Sunderland, in the UK.

Matt is currently the brewmaster at the Rocky River Brewing Company and has received multiple awards at the Real Ale Fest, GABF and the World Beer Cup.

Matt is a member of *Brew Your Own's* review board. He has written articles for us and helped the Replicator clone his Chocolate Jitter beer (July-August 2005).

John Weerts has been a homebrewer since 1992 and is a long-time member of the Kansas City Bier Meisters homebrewing club. John has brewed many award-winning beers and brings a wealth of practical homebrewing expertise to our review board.

From 1999 to 2001, "Weertsie" was the restaurant manager of the now defunct Molokai Brewing Company in Hawaii.

John recently moved to a very beer-friendly small mountain town in northwestern North Carolina. Although he hasn't lived there in years, he is still serving as the webmaster for the Bier Meisters (see the site at www.kcbiermeisters.org).

homebrew systems that will MAKE YOU DROOL

Steve Daly • Cape Carteret, North Carolina

I started off like most home brewers, a couple of plastic buckets and a kit. I told my wife, "this is all that I will ever need to make beer with." Well, thousands of dollars later I have the system that I am really proud of.

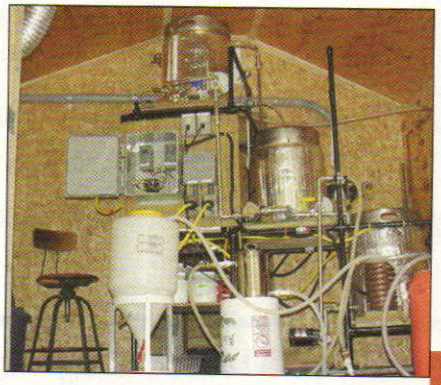
My brewery is housed in a 10-foot x 16-foot building next to my house. The brewing system is a three tier 10-gallon (38-L) all stainless steel piped system (an electric heat exchange recirculating mash system or "EHERMS"). The electric part of this system is one 4500-watt heating element in my liquor tank and two 3500-watt elements in my kettle. These heat elements are controlled by two Johnson Control A-419 controllers. Each element requires 230 volts. My liquor tank has a 40-foot copper coil immersed in 180 °F (82 °C) water. My mash tun has a false bottom to hold my grain from being sucked into the piping and pump.

When I need to raise the temperature of the wort in the mash tun, I open a couple of valves and start a high temperature magnetic drive pump to recirculate the wort through the copper coil in the liquor tank. This draws the heat off the 180 °F (82 °C) water and raises the temperature of the wort being pumped through the coil. I use a manifold to disperse the heated wort over the grain bed in my mash tun. I use an Extech digital temperature thermometer to control the temperature of the mash.

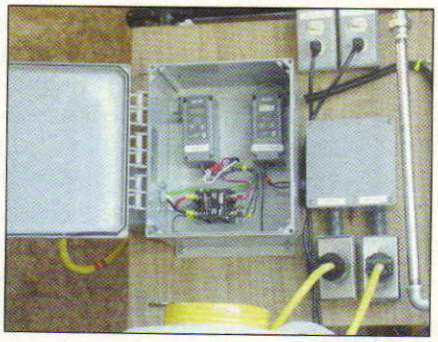
My kettle has two elements that are powered separately. After the boil starts, I have the option to shut down one of the elements. With one shut down, I am able to maintain a vigorous boil. After the boil, I pump the hot wort into a counterflow chiller that is chilled by a super chiller system. The super chiller consists of a Rubbermaid 10-gallon (19-L) cooler that houses a 56-foot copper coil that is immersed in ice. Water runs through the coil and draws cold off the ice and super cools the water on its way to the counterflow chiller. This drops the temperature of the boiling wort to 60–65 °F (~17 °C) as it flows into the fermenter.

I also have a hopback that I can install ahead of the counterflow chiller if I want to use leaf hops to hop up my brews. I enjoy high hopped IPAs and pale ales with a fresh hopped taste.

The best part of building this system was the planning and the tweaking. It never seems to end. I am also a member of the Alcohol Through Fermentation (ATF) Homebrew club in New Bern, North Carolina and we make some great brews!

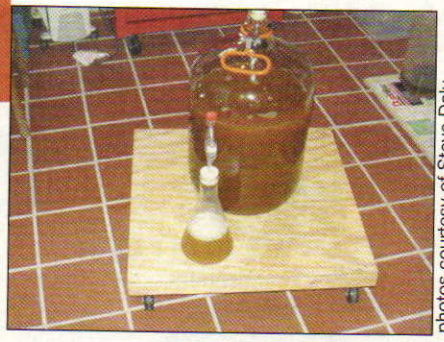


Steve Daly's brewing set up has some juice. It is an electric heat exchange recirculating mash system (EHERMS).



Steve added two electric temperature control elements for accurate and precise heating of his liquor tank and kettle.

This kettle is dually heated with separate heating elements, giving it the capability to bring wort to a boil, then shut one down.



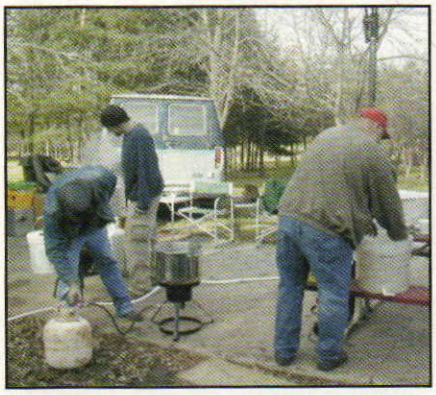
Here the "super chilled" wort is at 60 °F (16 °C) and ready to be inoculated with the lively yeast starter.

photos courtesy of Steve Daly

homebrew CLUB

Lincoln Lagers • Lincoln, Nebraska

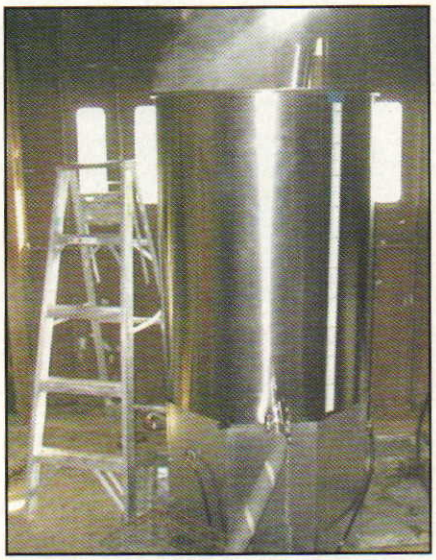
The Lincoln Lagers homebrew club has been in existence since 1991. Most of our members have been involved in the club for at least 5 years, but some about 10. We are an eclectic group of guys who get together monthly to celebrate the tastes of great homebrew and have a good time. We have multiple events throughout the year including big brews, interclub competitions and a friendly rivalry with clubs such as the Omahops from Omaha, Nebraska.



The Lincoln Lagers of Nebraska like to brew together to share their knowledge. They find this makes for tastier brew.

At our 2004 Big Brew, our club brewed 100 gallons (380 L) of a Two Hearted Ale (Kalamazoo Brewing Company) clone in our "big" kettle. The club mashed the grain in a large custom-made stainless steel mash/lauter tun. The run off from the mash was directed into the 100-gallon (380-L) kettle and mixed well to evenly distribute all the sugars. Each club member was then invited to take 6 gallons (23 L) of wort to boil and add whatever ingredients they wanted to the base wort. At the end of the evening all the brewers dined on fried fish and craw dads cooked up by Lincoln Lagers Treasurer Doug Finke. All the food was washed back with a few homebrews of course.

The club had one of its newest contraptions on display and in working order at our annual picnic — we collectively own a British beer engine. For more information visit our Website at www.lincolnlagers.com.



The Lincoln Lagers do an annual "Big Brew" using this huge kettle, capable of making 100-gallon (380-L) batches.

homebrew CALENDAR

November 22
Palmetto State Brewers Open
Columbia, South Carolina

The entry deadline for the 7th Annual Palmetto State Brewers Open is fast approaching. Entries should be sent no later than November 22 and arrive no later than November 28. If you are delivering your beers by hand to the event site, the deadline is December 2. The event itself will be held on December 3. For more information visit www.sagecat.com/psb.htm.

December 3
St. Louis Brews Happy Holidays Homebrew Competition
St. Louis, Missouri

The entry deadline for this year's competition is December 3. The entry fee is $5.00 per entry. This is a qualifying event for the Masters Championship of Amateur Brewing (MCAB). For more information visit www.stlbrews.org.

December 3
11th Annual Humpy's Big Fish Homebrew Competition
Anchorage, Alaska

The entry deadline for this year's Big Fish Homebrew Competition is December 2. There is no entry fee. The best beer will be brewed by the Midnight Sun Brewing Company. Visit www.mosquitonet.com/~stihlerunits/ScottsDen/Beer/Events/Events.html for more information.

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!

If we publish your article, recipe, photos, club news or tip in Homebrew Nation, you'll get a cool t-shirt (courtesy of White Labs) and a *BYO* Euro sticker.

reader RECIPE

Marty Cowart
New Market, England

Cowart's Leprechaun Stout

(5.5 gallons/ ~21 L, all-grain)
OG = 1.060 FG = 1.029 ABV = 4.0%

Ingredients

8 lbs. (3.6 kg) two-row pale malt
1 lb. (0.45 kg) crystal malt (60° Lovibond)
1 lb. (0.45 kg) roasted barley
0.50 lb. (0.23 kg) German wheat malt
0.50 lb. (0.23 kg) chocolate malt
0.50 lb. (0.23 kg) carapils malt
0.25 lb. (112 g) black patent malt
9 AAU Northern Brewer (1 oz. of 9% alpha acid) 60 minutes
2.4 AAU East Kent Goldings (0.50 oz. of 4.75% alpha acid) 30 minutes
2.5 AAU Fuggles (0.50 oz. of 5% alpha acid) 15 minutes
1 pkg. American Ale Yeast (Wyeast 1056)
¾ cup corn sugar

Step by Step

Bring temperature to 160° F (71 °C) Dough-in grains. Mash at 145 °F (63 °C) to 150 °F (66 °C) for 90 minutes. Recirculate wort for 15 minutes or until clear. Sparge with 170 °F (77 °C) sparge water. Boil 7 gallons (26.6 L) of wort for 30 minutes, then follow above hop schedule.

Pour wort into 5-gallon (19-L) carboy and top off to the 5-gallon (19-L) mark. Pitch yeast mixture when wort is between 70 and 75 °F (~23 °C) then aerate vigorously with whatever method you have. An aeration stone works very well.

Place in a cool dark area and allow to ferment for 7 to 10 days. Rack to secondary. Let sit for an additional 7 to 14 days. Bottle with ¾ cup corn sugar boiled in 1 cup of water.

Allow bottles to carbonate at room temperature. When carbonated, condition bottles at cooler temperature if possible for three weeks before drinking. *Enjoy*!

homebrew GADGETS

Steven Smith • Troy, Ohio

Brass Malt Extract Can Holder

Here's a handy device that I created out of a piece of scrap brass that I found. It was made using pliars to twist it into shape. I got tired of holding the malt can over the brew pot to drain it. An alternative that I also didn't care for was to use a rubber spatula and scrape it out getting my fingers sticky. So I made this can holder (see photos). To operate it, 1. open the malt can, 2. slide the holder onto the brew pot, 3. slide the malt can onto the holder, 4. drink a brew while the malt slowly drops into the pot. I leave it over the boil to drain out completely but after about 15 minutes or so it's drained about as much as it's going to.

This simple device can save a brewer the hassle of getting extract into the kettle.

To make this, be sure that the long hoop is sufficient to hold the can upright but not so long that the can is in the boil. Also, ensure that the opening in the small hoop closes just enough to let the rim of the can through, holding it securely.

Be sure when making your holder that it is not so long that the can goes into the water.

Simply slide the can, upside down, onto the pin and watch the extract flow out.

replicator

by **Steve Bader**

Dear Replicator,

I was recently on a trip in Alaska and ran across a beer that I was truly impressed with — which is getting harder and harder to do as I live in a state where great beer flourishes. I was in a town called Haines and their local brewery, Haines Brewing Co., had one of the best stouts that I've ever had. The name of the beer was Lookout Stout! I've been trying to do some research on the brewery and the beer. Haines Brewing Co. is a smaller outfit and they do not ship outside of Alaska. I have never been able to find any of their beers in specialty beverage stores in and around Seattle. This leads the way to the last and best option — brewing a clone myself. I have had no success in finding any information on a recipe and thought you might be up for a challenge. I would like to see if your knowledge, or powers of persuasion, could produce such a recipe. Thanks!

Eric Byers,
Bellevue, Washington

Lookout for this stout! This truly is a homebrewer's beer, since the Haines Brewing Company is located 75 miles north of Juneau, and is distributed only in Haines and Juneau.

I spoke to Paul Wheeler, a Minnesota transplant who is the owner and brewer for Haines Brewing Company. Paul started Haines Brewing Company 6 years ago, and has been going strong ever since. Paul brews about 300 barrels of beer a year, 3 barrels at a time, so these are truly handcrafted beers.

Paul says Lookout Stout is a beer that surprises almost everyone who tries it. They look at the dark brown to black color and immediately assume a heavy, bitter beer with hints of burnt malt. But Lookout Stout is very different than what they assume. Paul describes Lookout Stout as a smooth, creamy, chocolate & coffee flavored beer, with none of the burnt flavors that can be associated with many stouts. Low amounts of hop bitterness help the smooth flavor come through.

Paul uses roasted barley to get the coffee-like flavors, and avoids the black patent malts that can give the beer a bitter flavor. He then adds some crystal malt for sweetness and flaked barley to help mellow out the coffee flavors.

Lookout Stout is the ideal cold weather beer, with coffee and chocolate flavors, warmth from the alcohol, and smoothness from the flaked barley. It's a great combination sure to please your beer drinking friends!

For more information you can e-mail Haines Brewing at: hainesbrew@yahoo.com or call the brewery at (907) 766-3823.

Haines Brewing Company Lookout Stout

(5 gallons/19 L, extract with grains)

OG = 1.059 FG = 1.018
IBU = 20 SRM = 37 ABV = 5.4%

Ingredients

6.6 lbs. (3.0 kg) Muntons Light unhopped malt extract syrup
1.0 lb. (0.45 kg) Marris Otter malt
1.0 lb. (0.45 kg) crystal malt (60 °L)
1.0 lb. (0.45 kg) flaked barley
1.0 lb. (0.45 kg) roasted barley (unmalted)
6.75 AAU Northern Brewer hops (bittering hop, boil 60 min.) (0.75 oz./21 g of 9.0% alpha acid)
4.5 AAU Northern Brewer hops (aroma hop, boil 5 min.) (0.50 oz./14 g of 9.0% alpha acid)
Wyeast 1028 (London Ale) or White Labs WLP013 (London Ale) yeast
0.75 cup (180 mL) of corn sugar (for priming)

Step by Step

Steep the grains and flakes in 1.5 gallons (5.7 L) of water at 150 °F (66 °C) for 30 minutes. Add water to make 3 gallons (11 L), add the malt syrup and bring to a boil.

Add the Northern Brewer bittering hops and boil for 60 minutes. Add the Northern Brewer finishing hops for the last 5 minutes of the boil.

Now add the wort to 2 gallons (7.6 L) of cool water in a sanitary fermenter and top off with cool water to 5.5 gallons (21 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. Bottle or keg your beer and enjoy!

All-grain option:

This is a single step infusion mash. Replace the malt syrup with 10 lbs. (4.5 kg) of 2-row pale ale malt. Mash the 4 grains together at 154 °F (68 °C) for 60 minutes. Collect approximately 7 gallons wort (26.6 L) to boil for 90 minutes and have a 5.5-gallon (21-L) yield. Lower the amount of the Northern Brewer hops in the first addition of the boil to 0.60 ounces (17 g) to account for higher extraction ratio of a full boil. The remainder of the recipe is the same as the extract.

Secondary Fermentation

The myths, the methods and the meaning

by Garrett Heaney

First, to set the record straight and avoid any confusion, the term "secondary fermentation" is a misleading nomenclature to describe this phase of brewing — i.e. there is no active fermentation of any sort. Better terms would be "maturation" or "conditioning," but these terms are typically reserved for post-bottling phases (coincidentally, a handful of brewers use the term "secondary fermentation" to mean bottle conditioning). So, as misleading as it is, the term we work with is secondary fermentation, and it simply refers to the period of time you let a beer sit in a "secondary fermenter." After a beer has completed primary fermentation and the majority of yeast has fallen out of solution, it is often wise to transfer it into a fresh container, leaving the yeast sediment (a.k.a. lees or trub) behind. Lager brewers call this secondary fermenter a lagering tank.

By removing the beer from the yeast and trub, you are basically giving it a fresh, more stable environment in which to mature. Allowing the beer to sit in a secondary vessel (typically a carboy or bucket), allows the flavors of the whole batch to meld and mellow more gracefully than if separated into 50 or so separate bottles. Often in bottling, different bottles can receive varying amounts of flavor components — bottle one for instance could have a higher IBU hop content, whereas bottle 50 could have more unfiltered yeast flavor. Leaving the whole lot in a centralized container to mature is the equivalent of having a soup that tastes better from the leftover dish than it did from the cooking pot.

Many brewers choose to rack as soon as primary fermentation has completed. This is because dead yeast cells, if in prolonged contact with beer, can impart off flavors. As long as sound brewing practices are utilized, there are little if any drawbacks to secondary fermentation. There are the slight risks of oxidation and contamination during the transfer, but as mentioned, these risks can be minimized (even eliminated) with proper technique. Follow these tips when racking:

Racking

1. As in every brewing process, ensure that all equipment (i.e. carboys, buckets, transfer hoses, racking canes) are clean and sanitized.

2. Rack as gently as possible, avoiding splashing and agitation.

3. Start the racking with the cane as close as possible to the bottom of the secondary fermenter.

4. Once enough volume has been transferred, keep the racking cane immersed on both sides of the racking (i.e. don't let either end of the racking cane or siphoning hose come above the level of beer in each fermenter at any time.)

Timing

The proper duration of secondary fermentation varies per style and individual batch. As flavor is the fundamental purpose for this process, use your taste buds to decide when "enough is enough." Taste your beer every three or four days to monitor the brew's evolution. This is a good way for you to get to know your beer and you'll eventually gain a keener taste for maturation in future batches. A basic timeframe however is typically two weeks for ales and up to three months for lagers (however, most of the benefits happen within the first few weeks of secondary).

Temperature

Aside from simply allowing your beer to mature for a certain duration of time, a brewer can also control the conditions in which it matures. It is generally recommended that a brewer "cold age" his brew and keeps the temperature as consistent as possible. A secondary fermentation between 40 and 50 °F (4–10 °C) can benefit the overall balance and crispness of many styles. Lagers are more demanding and require even cooler temperatures, just above freezing. Most commercial ale brewers in the US will also cold condition ales for chill haze protection. Lagering stages (a form of secondary fermentation) should hover close to 33 °F (1 °C) and, as mentioned, should continue for an extended period of eight to twelve weeks. There are multiple ways to achieve temperature control for secondary fermentation — cool garage, cellar or refrigeration — but the more consistent the better.

"Taste your beer every three to four days to monitor the brew's evolution."

So, when the rocky waters of primary fermentation have subsided and the sands have settled, get your beer into a new home and let it mature uniformly. Secondary fermentation is an efficient and safe way to ensure that your whole batch tastes great to the last drop — Cheers!

Imperial Stouts

Brewing the big beers for a cold night

by Thomas J. Miller

Imperial stouts share the storied past of another homebrewing favorite: India pale ale. Czarist courts in Russia loved the stouts, but the beer often arrived stale and undrinkable. A little tweak here (more alcohol), a little addition there (more hops) and suddenly the beer could make the long journey from Britain to Russia. Better yet, a new style was born. With the help of this month's pros, you can delve into this beer's rich history today.

Eric Asebrook has been a professional brewer for almost five years. He has been with Thirsty Dog Brewing Company in Dayton, Ohio for more than three years, becoming brewmaster earlier this year. He is a graduate of the Siebel Institute "Short" course and "Master of Beer Styles and Evaluation" course.

The concept of an imperial stout is one of balanced complexity. The nose is rich and fruity with hints of dark fruit (raisin, plum, currant, etc.) Upfront, a dark roasty almost coffee aroma should be evident. An alcohol aroma may be present but the best examples hide their strength.

The beer should have good body and taste like its aroma — rich, dark and chocolatey. The color should be pitch black and there should be a thick, brown head that forms. The best examples of imperial stout should have a balanced complexity, with all of the above attributes playing off each other without any overpowering the others.

The most important part of brewing an imperial stout is the ingredients. I use only English Maris Otter for a base malt. We also layer our toasty and biscuity malts as well as our Cara malts. One is good but two, or three different malts in the same family are better — think complexity! Yeast is critical and you should pitch a huge amount. When I brew an imperial stout I pitch double my standard pitching rate and pitch it on a half-sized batch. I cannot say it enough — pitch a ton of yeast!

Like your biscuit malts, layer the roasted malts as well. Up to 20% of the recipe is dark malt and you want complexity from these. Use different proportions of the dark malts to get up to the total percentage for the brew. Multiple dark malts are the way to go. Then, the most critical point is patience — these beers age remarkably well and patience will be rewarded. Aging should be at cellar temperature or cooler.

Quality malts in general are best but the dark roasted grains are the most important to an imperial stout. The dark grains give the beer its chocolate and coffee flavors while the rest of the grains contribute to the final flavor. My opinion is that no less than seven malts should be used so that the complexity will not be compromised.

The mash is pretty straightforward but there is a huge amount of grain. I like to use rice hulls so that there are no problems with the runoff because I collect very slowly. Mash as much as you can and if you need to compensate with amber liquid malt extract, feel free.

A mash of 90 minutes should be enough. Vorlauf for at least 20 minutes before collecting. The brewer should be trying to achieve the complexity in the mash. That is the reason for the 152–158 °F (67–70 °F) temperature range. It depends on how chewy you want it. The sign that it is working will be when you finally start the runoff, the first runnings should look like used motor oil — pitch black and thick.

The boil is pretty basic. It is up to the individual brewer, but in my experience 70 to 90 minutes is sufficient. As for boil-overs, they are always a concern — just pay attention and do not rush the boil and you should be fine.

I typically do two hop infusions in an imperial stout brewing session. One at about 60 minutes left in the boil and one at one minute left in the boil. The 60 minute addition should be between ⅔ and ⅘ of all the IBUs for the beer. The one minute addition should comprise the rest. In an imperial stout, I do not think that the hops are meant to stand out. They should play a supporting role to the dark malt flavors and aromas and keep the beer from being cloying.

With that said, I am not a fan of high alpha hops being used in an imperial stout. A neutral tasting bittering hop is my personal choice. American or German Northern Brewer are good choices as well as Horizon.

As for the flavor and aroma addition, my personal opinion is to use something that will not stick out too much. Northern Brewer and East Kent Golding are both good choices. Some brewers feel that the hops should "pop" but I am of the mind that the hops are there to support the beer, not dominate it. Fifty to 60 IBUs is a lot of hops, but in this beer it is for balance.

I can only recommend one yeast and that yeast is Wyeast 1028. I am familiar with this strain so I know what it will do. In my opinion it is the best yeast for the job. The best pitching temperature is between 66–72 °F (19–22 °C). Any ale strain should produce good results in this range.

These beers are notoriously violent fermenters so hang on and enjoy a wild ride!

Dan Rogers is currently the brewer at Big Rock Chop House in Birmingham, Michigan. He started his professional career at The Holy Cow! Brewery in Las Vegas, Nevada in 1992. He has won bronze medals at the GABF in 2002 and 2005 for imperial stouts.

The flavor profile I look for in an imperial stout is a nice balance between coffee and chocolate. I like hop aroma, so, for me, dry-hopping is a must. The body will always be medium to high on a big beer like this, with the alcohol giving it a drying effect at the end. With 15% roasted barley in the grain bill, the SRM will push 200 easy. The color will be black and the head will have a buff, mocha appearance.

The key to a successful imperial stout is the grain bill. My rule of thumb is to use only roasted barley in stouts, no chocolate malt. Keep the mash thick — about 3.5 pounds per gallon (1.6 kg per 3.8 L) is good. This will allow you to sparge more and you want the first runnings no less than 25 °Plato (1.000 SG). If you can step mash it is best, but if not shoot, for 151 °F (66 °C) and give it plenty of time for conversion.

Now comes the hard part . . . being patient! Run off and sparge very slowly. While you do this, start evaporating the wort in the brew kettle. Using two pots will make this easier and keep a fan blowing over the kettles. This will enable you to extract as much from the mash as possible. If you run off slowly you should have no problem with a stuck mash. Look for a final runnings of less than 6–8 °Plato — you'll know when you're getting there because the runnings from the mash will lighten up considerably in color. Overshoot your target gravity 1 or 2 °Plato (0.004–0.008 gravity points) and boil away to evaporate down to your target. When you reach 0.5 to 1.0 °Plato (0.002–0.004 gravity points) over your target you can start the hop additions.

Kettle finings are a must. I recommend a fining agent that will also help clarify the beer later in fermentation. As far as yeast, alcohol tolerant ale strains are obviously best for this style. Nottingham and Whitbread strains work well and they floc out completely, leaving a jet-black color.

I add a lager yeast at the end of fermentation for aging purposes. Dry-hopping is optional and it only takes a small amount as the beer has a lot of alcohol and body.

The Nutrition of Brew

"Help Me, Mr. Wizard"

A brew school advisory and premonitions of hybrids

Vitamin B . . . eer

As a vegetarian, I have to hunt high and low to get non-animal-based complex B vitamins into my diet. Thing is, there aren't any. At least I didn't think so until I overheard that homebrew is an excellent source of B vitamins. Is this true? Or am I condemned to a life of chronic fatigue, muscle spasms and mental illness (which, incidentally, I've normally treated with homebrew)?

Jordan Weeks
Wimberley, Texas

Thanks for the question, Jordan. I am not an expert in nutrition but am pretty handy at digging into questions and searching out answers. It does seem that people who choose not to eat animal products do have a tough time with fulfilling certain nutritional requirements and B-vitamins are on that list. Fortunately, yeast is a great source of B-vitamins and the last time I checked, single celled, eukaryotic organisms were not classified as animals, but fungi.

If depriving yourself of B-vitamins causes fatigue and mental illness, I don't think you have to worry about this condition for the rest of your life. There are yeast products on the market specifically marketed as sources of B-vitamins, especially B12, and they have recommended doses to satisfy daily dietary needs.

The yeast swimming in the bottom of homebrew, like yeast nutrient supplements, also contain B-vitamins and some of your daily requirements may be satisfied. The problem with this idea is that B-vitamin content of beer is not constant as yeast concentration will affect the concentration of vitamins. Also, B12 is light sensitive. If you are serious about getting B-vitamins into your diet I suggest looking more into this question for hard information and perhaps consulting a physician or diet expert. With that being said, I just heard a talk on beer and health (I am in Miami at the annual Master Brewers convention) that had some data on the good stuff found in beer and the data presented indicated that most beers provide far more than the RDA given by the USDA as a dietary guideline. You choose not to eat meat and really owe it to yourself to know how to balance your diet. That being said, I don't think homebrew is the one-a-day you seek for this purpose, but we all know it's good for much more — good luck!

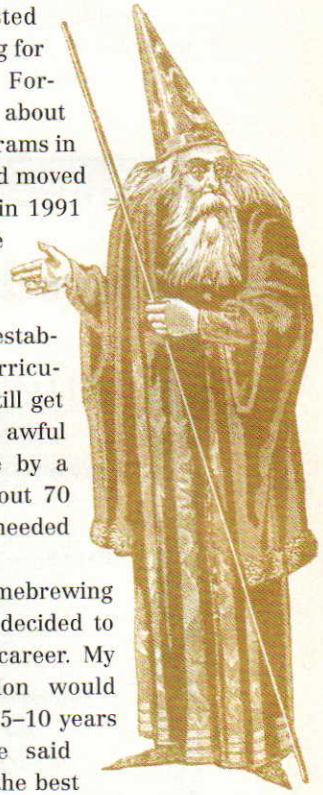
> Homebrew is not the one-a-day you seek, but we all know it's good for much more.

School me

I am an avid homebrewer who has been brewing for a couple years now. I've brewed mostly extract with specialty grains but am now starting to get into all-grain. Here is my question — What would you suggest for me as far as formal training, certification or education? What are the available programs out there throughout the country and are there any colleges out there that offer accredited degrees that could get me a leg up in the brewing world. Given the available programs, which ones look the best to prospective employers? What is the normal resume for new brewers gaining employment? Also, I've heard you mention that you attended UC-Davis, what did you study?

Casey Elstad
Dallas, Texas

I remember a night in the fall of 1989. I was a sophomore at Virginia Tech studying food science because I wanted to get into brewing and my father suggested the major as a good fit with brewing. On this autumn evening I was at a beer tasting at the famous Brickskeller in Washington DC with my best friend who also wanted to get into brewing — Tom was a biochemistry major at the University of Maryland. In any case, we were at this beer tasting at the Brickskeller and one of the brewery reps was from Anchor Brewing. At the end of the tasting there was a Q&A session and I sheepishly raised my hand and indicated my desire to become a brewer and asked if he had any suggestions about further education. To my amazement, he suggested chemical engineering for graduate school. Fortunately, I learned about actual brewing programs in the United States and moved to Davis, California in 1991 to pursue graduate studies in the only university in the states with a well-established brewing curriculum. To this day, I still get really ticked at the awful advice given to me by a brewer working about 70 miles from where I needed to be!



I started off homebrewing in high school and decided to make brewing my career. My advice on education would have been absolute 5–10 years ago. I would have said without doubt that the best education for brewing is an undergraduate and graduate degree in food science and that the places to be were UC Davis, Weihenstephan, Heriot Watt and other schools known by the brewing industry. The problem is that many small breweries, especially brewpubs, are owned or operated by people who have no clue about brewing or the

formal education of brewers. This causes two major problems: The first is that many, if not most brewpubs, pay insultingly low wages to brewers. Since there are many people out there who want nothing more than to work in a brewery, wages are kept low by the labor pool. Secondly, the other big problem is that well-educated brewers are not going to tolerate some of the bizarre ideas that some business-minded folk have about running a small brewery.

So the greatest opportunities for formally trained brewers tend to be with the breweries who actually value knowledgeable and open-minded employees. Unfortunately this usually means that the most educated brewers usually work for the biggest breweries and often work on such exciting things as eliminating flavor from beer because a higher-up with an MBA and a crystal ball sees a future in marketing low-carb beer to people gorging on steak and eggs, but no toast.

So be warned, if you take the following educational path you may find that the most exciting place to work that also offers good pay and benefits may be with a larger brewer, be it a craft brewer or US giant. And you may be stuck in the dilemma caused from breweries of this size who have the tendency to brew beer for the population with the greatest purchasing power, rather than brewing the best beer possible.

OK, so here are my recommendations. If you are in college and have the freedom to choose a major, I recommend either of two routes. If you want to be a brewer and create new beers, major in food science, brewing science, fermentation science or microbiology. Most people do not know what food science majors study and assume that a job at Burger King is the goal. Food science requires a lot of chemistry, microbiology, food analysis (physical and chemical), along with some nutrition and sensory evaluation. That's why it's such a great major for brewers. It's also why brewing programs are usually housed in food science departments.

The other track to take, especially if you want to work for a larger brewery, is engineering. The notion that beer is "hand-crafted" is fiction, even at home. Brewers do not stick their hands in anything and rely on the best tools for the job. Modern food technology processes typically involve some level of automation and always draw from the basics of heat transfer, fluid dynamics, structural calculations, rheology, metallurgy and the likes.

Large breweries have always hired engineers and the best craft brewers today also hire engineers. I work with engineers every day and really value what their educational skills have to offer. With that said, most engineers never take classes in the life sciences and have a hard time relating to many of the concerns we brewers have. If you take the engineering route, do yourself a favor and take some elective

classes in microbiology or biochemistry instead of underwater basket weaving.

My last piece of advice is to get some experience. I have seen too many resumes from students exiting a brewing program who want to be the head brewer in a craft brewery and specialize in brewing the best beers known to man with absolutely zero brewing experience. The job market in brewing is competitive and experience really does count.

Seemingly simple things like properly transferring beer using a centrifugal pump, changing a pump seal, cleaning a tank, knowing who to call about new hop varieties, filling out tax forms, re-pitching yeast, operating a beer filter and getting rid of spent grain are lessons not learned in the classroom and are daily requirements of the do-it-all small brewer. If you are serious about brewing as a career, try to get into a brewery as an unpaid apprentice. Most breweries do not want to deal with part-time labor because the time invested in training is not well spent for someone who is juggling a class schedule and limited availability. Volunteering is an easier way to get your foot in the door and can turn into a part-time job. It also helps to understand what brewers actually do on a daily basis when you are sitting in class wondering why the Bernoulli equation or Darcy's Law are being pounded into your memory.

How 'bout hybrids?

I am interested in trying to brew some "hybrid" beers . . . such as a Hefeporter or a Rauchkölsch for example. Is there a good rule of thumb to follow? Can one match a malt to a hop that would work better than other combos? What are some good rules to follow?

Thomas Grimes
via email

I haven't brewed tons of off-the-wall beers in my brewing life, but every now and then I get the urge to stray from the norm. There are no rules to follow when you depart from a well worn trail so you just have to base your choices on experience with various ingredients and be able to predict what a beer is likely to be before it is brewed. I frequently spend a long time trying to imagine the beer I am thinking of brewing before I create a recipe. I think of the aroma, color, clarity, the layers of complexity and the intermingling of flavors before my creative process begins. For odd beers I may buy different ingredients and smell and taste them to help create my mental picture of where I want to go with the idea.

When I think of hefeporter I immediately have an idea . . . use a different name. I like the oxymoronic schwarzweiss for this style. I was recently in a think-tank type meeting and one of the guys loved using the word "noodle" when spit balling ideas. OK let's noodle the schwarzweiss. Banana, chocolate, rich, dark,

semi-sweet, balance, delicious. These are the thoughts that come to mind after sampling my imaginary schwarzweiss (and no, I am not going crazy).

You tell me what hops to use and I don't think Cascade is the right answer — I didn't have any hoppy thoughts to describe the beer I just tasted. A subtle, clean hop used for bittering and just enough aroma to tickle the nose might be the ticket. As far as malt goes, I would select a couple dark grains to give a full, rich chocolate palate and a deep dark color. Chocolate malt and Weyermann Carafa III work well together to provide nice flavor and deep color. Since this is a rich, delicious dessert beer, the gravity is probably higher than normal and the fact that the beer is semi-sweet supports this idea. So, I'm thinking the OG should be somewhere in the 14–16 °Plato (1.056–1.064 SG) range. The yeast is going to be a traditional weizen strain and the approach to wort production and fermentation will be standard weizen rules. Mentally, I am finished. This is how I go about tackling beers when stepping outside of the box.

As I mentioned earlier there are really no rules when being creative and if there were, the world of beer would be rather boring. I've always wondered how the first brewer to use isinglass came up with the idea. Was it like "hmmm, I think I will throw some dried fish bladders into dilute acid and pour that tasty concoction into a cask?"

When I think of hybrid styles the notion of balance and subtlety comes to mind. If you are thinking about a rauchkösch my suggestion would be heavy on the kölsch and light on the rauch, otherwise the dominant flavor will overpower the lighter of the two styles and you really won't have a hybrid in your mug.

In Horst Dornbusch's article in this issue, he covers the Russian imperial stout style and suggests aiming high which is totally appropriate when brewing a veritable monster. I think the opposite is true with the types of beers you want to brew and I would aim low on the alcohol scale and gradually tweak the recipe up over successive brews to develop the beer you have in mind. Hope this gives you something to chew on when contemplating your hybrid brews!

BYO Technical Editor Ashton Lewis has been answering homebrew questions as his alter ego Mr. Wizard for the last ten years. Do you have a question for him? Send inquiries to *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 personally. Sorry!

Russian Imperial Stout

A British brew with a Russian soul

Style profile

by Horst D. Dornbusch

People tend not to associate nuances with heavy, strongly flavored foods or beverages. Thus it is amazing that stout, the blackest of the dark ales, is able to render such subtle flavor notes. Stouts are so varied that we should think of them not as one style but, more fittingly, as a cluster of styles, each occupying its own separate spot in a multi-dimensional matrix. The coordinates of this matrix range from dry to sweet, from thin to syrupy, from astringent to smooth, from puckering to oily, from tart to mild and from gently to heavily alcoholic. No wonder there are so many stout prefixes, such as (in alphabetical order) American, Baltic, Caribbean, chocolate, coffee, cream, double, dry, English, espresso, export, foreign, heavy, imperial, Irish, milk, oatmeal, old, oyster, robust, Russian imperial, single or sweet. Change one of the stout's brewing variables and chances are it will change its first name, too!

It is amazing that stout, the blackest of dark ales, is able to render such subtle flavor notes.

Somewhere in the matrix of stouts lurks the basso of them all, the Russian imperial — mature, inscrutably black and weighty. British by birth but destined for the opulent banquets in the Czars' winter palace in Saint Petersburg, this stout variant is a harmonious marriage between the incredible finesse of British dark-ale brewing and the somber melancholy of the Russian soul, to which the brew had to appeal. If you believe in brewing as art, not just as chemistry and mechanical process, this expansive brew is as satisfying to make as it is to drink . . . but be prepared — it ain't gonna be easy!

Russian Imperial Stout by the numbers

OG	min. 1.080 (20°P)
FG	min. 1.020 (5°P); usually closer to 1.030 (7.5°P).
SRM	approx. 200
IBU	min. 50; usually closer to 80.
ABV	min. 7%; usually stronger

A rich brew for rich trade

The origins of stout are as murky as the brew's appearance. The most likely historical root of stout is porter, a brew originally created to combine the characteristics of old, brown and dark ales. Originally, stout was just the name for strong, dark ale. Starting in the 17th century, these stout brews were made with ever darker malts, first with brown malts, then with chocolate malts and finally, in the early 19th century, with black malts. One of the earliest stouts was a brew from the 1780s made by the Anchor Brewery of South London. Allegedly it had an OG exceeding 1.100 (25 °P). As the porter beer style began its gradual decline towards the end of the 19th century, porter drinkers moved firmly into the pale ale (most did) or stout columns.

By the late 19th century, stout brewers started to distinguish their black beers by gravity into single, double and imperial brews. Single stouts tended to be within a gravity range from the mid-1.060s to mid-1.070s (~16 to 19 °P), a value that was not uncommon for the average quaffing ales of the time. The doubles tended to be in an OG-range from the mid-1.070s to the low 1.080s (perhaps 19 to 21 °P). Imperial stouts usually came in well above OG 1.080 (20 °P), while the Russian imperials hovered around the

RECIPE

Romanov Imperial Stout

(5 gallons/19 L, all-grain)
OG = 1.100 FG = 1.030
IBU = 80 SRM = 200 ABV = 11%

Ingredients

13.5 lbs. (6.1 kg) Muntons Pale Ale malt or Simpsons Best Pale Ale malt
3.0 lbs. (1.4 kg) UK crystal malt (60 °L) (such as Simpons or Crisp)
0.50 lb. (0.23 kg) Briess roasted barley (~300 °L)
0.50 lb. (0.23 kg) Muntons or Simpsons chocolate malt
1.5 lb. (0.68 kg) Briess flaked barley
1.0 lb. (0.45 kg) UK black malt (such as Simpsons or Crisp)
1.0 lb. (0.45 kg) corn sugar for the boil
1 tsp Irish moss
21.5 AAU Kent Golding hops (bittering) (4 oz./112 g of 5.5% alpha acid)
4 oz. (112 g) Kent Goldings hops (flavor/aroma)
Wyeast 1028 (London Ale) or White Labs WLP005 (British Ale) yeast
1 cup DME or corn sugar (for conditioning)

Like a typical English ale, Russian Imperial stout can be made with just a single-infusion mash. The best procedure is to go for a 90-minute saccharification rest at 153 °F (67 °C). Depending on the size of your mash tun, it might be necessary to divide the massive grain bill into two portions and mash each of them separately.

continued on page 20

recipe continued

continued from page 19

This is really the only sane way to conduct such a high gravity mash at home and some professional brewers operate this way as well.

For further recommendations on the mashing regimen, see the main text of the story. For sparging, infuse the grain bed with water at about 170 °F (77 °C). Sparge to a kettle gravity of approximately 1.090 (22.5 °P) and boil for about 90 minutes. Evaporation losses should increase the gravity to an original gravity at the end of the boil of 1.100 (25 °P).

Add the corn sugar at the beginning of the boil, the bittering hops 30 minutes into the boil and the Irish moss and aroma hops about 80 minutes into the boil. After the boil, allow the trub to settle in the kettle for about 30 minutes.

Then heat ex-change the wort to about 60 °F (16 °C) and pitch the two packages of yeast or the starter. Hold the brew at that temperature throughout the entire fermentation period, which may last about four to five weeks. This slow fermentation keeps the diacetyl level low. Rack the brew once, after about three weeks. Then rack again before priming and packaging in bottles or a Cornelius keg.

Allow for a minimum of six months maturation time. The brew gets much better after about two years and even better after about five years. Legendary conditioning times for Russian Imperial stout have exceeded two decades. I cannot comment on the taste of such well-aged brews, because mine have never lasted that long!

OG-1.100 mark (around 25 °P).

In the 1800s, stouts (and porters), not unlike India pale ales, quickly became an important export commodity for the British Empire. Like IPA, stout was sent to the far reaches of the Empire, including the Caribbean and the tropics. Perhaps the best known trading of these stouts was the Guinness Foreign Extra Stout, usually just called FES, with an OG-value in the mid-1.070s (about 17 °P).

Unlike IPA, however, stouts and porters also became significant articles of commerce for the Baltic and Russian trades, mostly for furs and wood. One of the more famous trading beers for the northern markets was the Russian imperial stout brewed by the Courage Brewery of London. It apparently had an incredible OG of 1.104 (26 °P) and could be aged in the bottle for about a quarter century without ill effect.

These heavy stouts needed to be conditioned for several months before they had sufficiently mellowed to be palatable. Consider six months of bottle-conditioning the minimum and several years desirable. These stouts found particular favor with the Russian imperial court, which is how this style acquired its name. I call my recipe Romanov Imperial Stout after the dynasty that supplied the Russian Czars until the 1917 Bolshevik Revolution.

One of the closest modern remnants from the glory period of trading-stout brewing is the Imperial Extra Double Stout, a cork-stoppered, thick, 9%-abv brew made by Harvey & Son of Sussex, England, under the supervision of the board of trustees of the A. Le Coq and Tartu Brewery of the Baltic country of Estonia.

The anatomy of Russian imperial stout

Russian imperial stout clearly ranks among extreme beers. Similar to such brews as barleywine and doppelbock, the brewing parameters of this darkest and most flavorful of all stouts seem to have only a floor but no ceiling — and I like to push the numbers as high as the art of brewing allows. The flavor of a Russian imperial is complex, yet surprisingly clean — carried by dominant notes of chocolate-caramel and roasty maltiness overlaid with typically English floral and citrus hop aromatics. Though there are craft-brewed imperial stouts available with an assertive Northwest hops character, as a traditionalist, I would label these American rather than Russian imperial stouts.

At one end of the spectrum, the driest draught stouts may have an original gravity as low as 1.038 (9.5 °P) — the Russian imperial is at the other end of the spectrum. The original gravity of a stout must approach at least 1.080 (19.5 °P), before it starts to enter the Russian imperial realm. In my book, the higher I can push the OG-number, the better my stout will be. I always shoot for an OG-value above 1.100 (25 °P). At a system extract efficiency of 65%, this gravity requires a total grain bill of approximately 20 pounds (about 9.1 kg), an amount that tends to overload most homebrewers' mash tuns. Even if it doesn't, the run-off is always agonizingly slow and in danger of getting stuck. I solve the problem by making two mashes in succession, each with half the amount of grain, and ladling each mash after conversion into the lauter tun for sparging. I interrupt the first sparge at a kettle gravity of approximately 1.090 (22.5 °P) and dis-

Commerical RUSSIAN IMPERIAL STOUTS to Try

World Wide Stout 18% abv
Dogfish Head Brewery
Milton, Delaware

North Coast Old Rasputin Imperial Russian Stout 9% abv
North Coast Brewing Co.
Fort Bragg, California

Rogue Russian Imperial Stout 11% abv Rogue Ales
Newport, Oregon

Samuel Smith Imperial Stout 7% abv Samuel Smith Brewery
Yorkshire, England

Storm King Imperial Stout 9 % abv
Victory Brewing Company
Downington, Pennsylvania

Three Floyds Dark Lord Russian Imperial Stout 13% abv
Three Floyds Brewery
Munster, Indiana

card the spent grain. Then I mash in again and add the second runoff to the first in the kettle.

During the second mash I keep the wort just below the boiling point and I keep the flame going during the sparge. This way, the brew will come to a boil quickly. I add the bittering hops only after the second runoff is finished. At an evaporation loss of about 10%, I usually reach my high target original gravity. With this kind of approach, however, you never know exactly how much net kettle volume you end up with. However, because Russian imperial stout specifications are usually in the form of "more than," the slight resulting variation in hop bitterness ought not worry us.

Trick: Brew your Russian imperial stout with a brewer friend and pool your equipment. With two mash and lauter tuns as well as two brew kettles you can perform two mashes simultaneously and use a partigyle technique to make two different beers: Interrupt each runoff at the imperial stout strength and then continue sparging additional wort into the second kettle for a weaker dry stout with an OG in the upper 1.030s (approx. 9 °P). For this second brew, use about half the bittering and aroma hops as specified for the Russian imperial version.

Russian imperial ingredients

The foundation grain of a Russian imperial is a strong base of British-style pale ale malt. For rich malt aromatics, body and mouthfeel, I add a good amount of CaraMunich® Type II malt or Simpsons Caramalt. For chewiness and breadiness, I add small portions each of roasted and flaked barley.

Finally, we must pay attention to darkness and toastiness. For these I add high-Lovibond chocolate and black malts. This grain bill produces a beer that has a substantial mouthfeel and is truly full-bodied. It not only starts at the high original gravity that we seek, but also finishes high, with a final gravity of at least 1.020 (5 °P), but closer to 1.030 (7.5 °P). Far from being cloying or insipid, however, this heavy brew is made palatable by an almost refreshing touch of gently acrid roastiness and malty-fruity tartness. Diacetyl, however, is not a welcome flavor component in a clean-tasting Russian imperial. The alcohol level of a Russian imperial is rarely below 7%, but for my taste an "imperial" level of at least 10% is a necessity. Our wort of slightly above 1.100 (23 °P) yields about 9.2% abv. Therefore, I add about 1 lb. (0.45 kg) of corn sugar to the kettle to bump up the alcohol value to approximately 11% by volume.

Russian imperial stout has such an enormous depth of flavor that even a powerful dose of hops, one that would overwhelm other brews, is perfectly normal. Fifty IBU is generally considered the bitterness floor, but I regard 75 to 90 IBU a more appropriate target, especially if you use the archetype of English hops — East Kent Goldings — for both bittering and

I like my Russian imperial to be seriously dark, around 200 SRM.

aroma. If you decide to use more assertive American hops, such as Galena, Willamette, or Cascade, for an "un-English" twist, however, I would keep the IBU level closer to 50. Finally, as for color, I like my Russian imperial to be seriously dark, around 200 SRM.

Many brewers believe that a Russian imperial is easy to make, except perhaps for the risk of a stuck mash. They hold that any brewing mistakes are easily covered up, because the beer is so robust. In my view, however, this is an utterly false assumption, because a Russian imperial stout is also complex. In this brew, a balance of all the flavors is even more important and difficult to achieve than in other brews. Think of it as the difference between conducting a chamber orchestra and a full-blown symphony orchestra. In a Russian imperial there are just more players to keep under control to ensure a pleasant and harmonious outcome.

Because Russian imperial stout is a heavy brew, I always use twice the amount of yeast I normally do and make a starter the day before brew day.

I developed the all-grain recipe in this column in the mid-1990s. I have since tried to replicate this stout for grain-plus-extract and all–extract brewing, but the result was never adequate. I am now convinced that Russian imperial stouts can only be made in the all-grain method, but feel free to explore for yourself and write in if you find an effective malt extract for this style. Good luck!

Horst Dornbusch writes "Style Profile" in each issue of BYO.

THIS HOLIDAY SEASON GIVE THE GIFT OF BEER!

Check out these businesses for some great gift ideas for friends & family or your own holiday wishlist...

for Stovetop Extract Brewers

HOPPING HELP

a general guide to BETTER BITTERING

by **CHRIS COLBY**

Extract brewing shares many similarities with all-grain brewing, but it has its own set of challenges as well. Many of these challenges have been ignored or given only trivial consideration in homebrewing literature. With that in mind, I've written some articles over the past few years dealing with challenges in extract brewing, especially stovetop extract brewing. These articles include, "The Texas Two-Step" (October 2003), "Extract Experiments" (October 2004), "Steeping" (May-June 2005) and "10 Steps to Better Extract Beer" (October 2005). Two other useful *BYO* articles include "Boil the Hops Not the Extract," by Steve Bader (October 2002) and the October, 2004 Tips from the Pros column. In this issue, I continue in that series with a look at hopping procedures for extract brewers.

One of the biggest complaints of beginning extract brewers is that their beers do not turn out hoppy enough. Many homebrewers became interested in homebrewing after tasting hoppy pale ales or IPAs. However, their attempts to replicate these hoppy beers on their stovetop often end in disappointment.

Limits to Bitterness

The amount of bitterness in extract beer is primarily limited by two factors. The first is the inherent solubility limit of bittering compounds in wort. Alpha acids are compounds in hops that lend bitterness to beer. When you buy hops, their strength (measured in the percentage of alpha acids) should be given on the package. In the boil, alpha acids are extracted from the hops and the heat of the boil alters their confirmation (isomerizes them). The isomerized alpha acids are primarily what adds bitterness to beer, although similar compounds called beta acids also play a role. Only 20–30% of the alpha acids in hops are extracted and isomerized under typical wort boiling conditions.

There is a limit to the amount of bitterness that can be imparted by boiling hops. Estimates of maximum hop bitterness range from 100–120 International Bittering Units (IBUs). Above this level, adding more hops in the boil does not result in more bitter beer. However, more bitterness could theoretically be obtained by adding hop extracts.

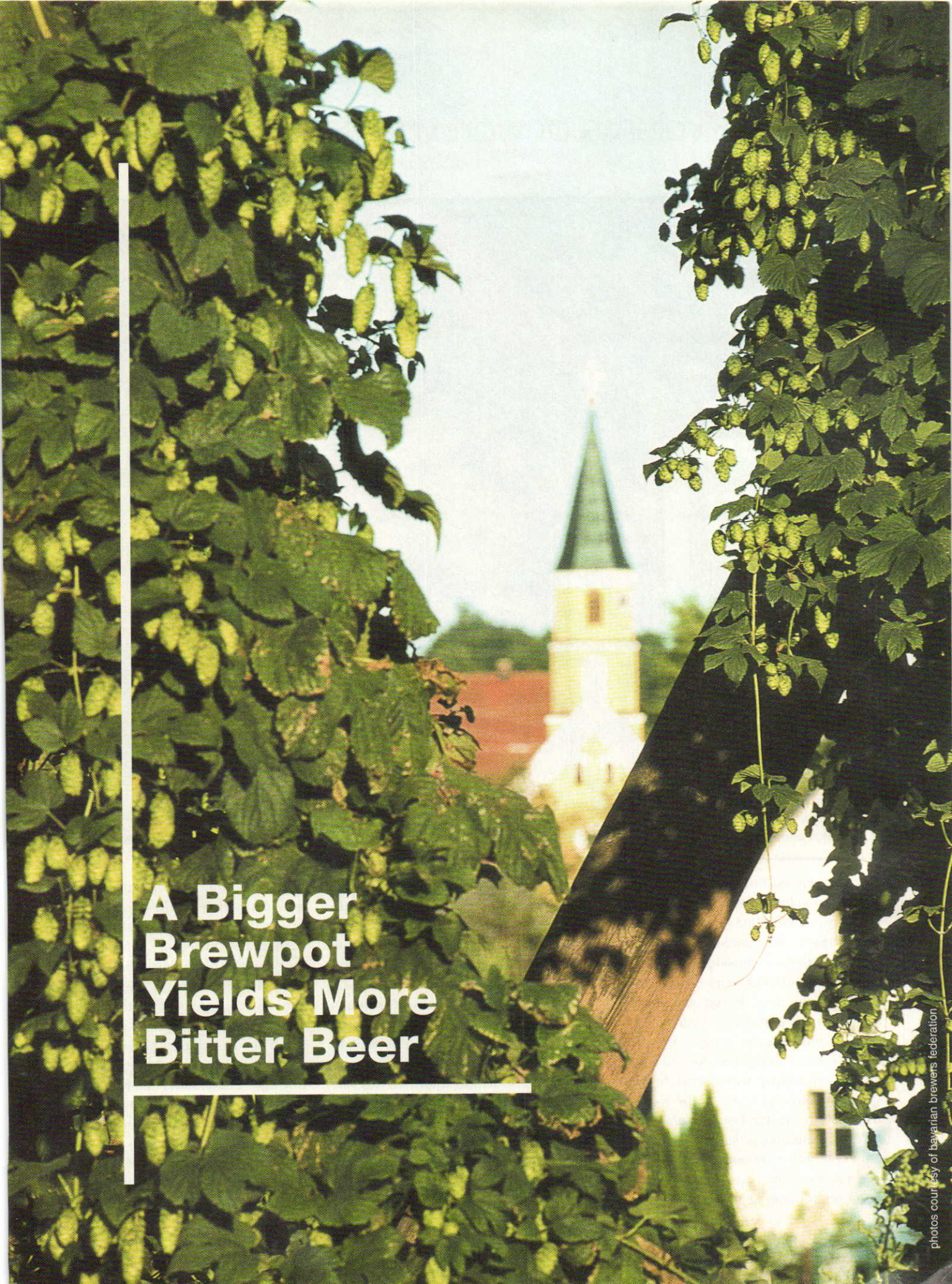
The solubility of (isomerized) alpha acids also varies with wort density — the denser the wort, the less alpha acids will dissolve into it. Given that most stovetop brewers boil a concentrated wort, wort density (measured by most homebrewers as specific gravity) frequently limits the amount of bitterness in their beers.

The second variable influencing bitterness in extract beers is the dilution factor. When stovetop brewers are done boiling their wort, they dilute it with water in their fermenter. The water dilutes not only the sugars in the wort (lowering the specific gravity to its target), but the alpha acids as well. So, if you want to brew 5 gallons (19 L) of beer with 30 IBUs and your post-boil volume is 2.5 gallons (9.5 L), your boiled wort will need to measure 60 IBUs.

The Best Solution

The best solution to increasing the amount of hop bitterness in a stovetop beer is boiling a larger volume of wort. With regards to hopping, there are two benefits to doing this:

First, with a larger volume, you add less dilution water — and consequently experience less dilution of the bittering compounds. Secondly, boiling the extract in more water results in a less dense wort. With a lower density wort, you extract more bitterness from your hops. Other factors, such as boil vigor and if the hops are bagged or not also influence



A Bigger Brewpot Yields More Bitter Beer

photos courtesy of bavarian brewers federation

> the volume of wort you boil determines the

Cones from the hop plant (*Humulus lupulus*) contain alpha-acids. These acids are extracted during the boil and lend bitterness to beer. Many factors determine how bitter a beer will be beyond how much hops are added to the kettle. These factors include wort density, boil intensity and how much the wort is diluted after the boil.

hop bitterness, but not to the degree that wort volume does.

If your limitation to boiling a larger volume is brewpot size, there are a couple options to consider. As you boil, the volume of your wort decreases as water evaporates. If you are already dealing with a small amount of wort, you should consider topping up with boiling water as you boil. Keep a smaller pot of boiling water next to your brewpot and add water to the wort to replace any water lost to evaporation every 10 minutes or so.

Two better options are to boil your wort in more than one pot, thus boiling a larger volume, or make your wort in stages — for example by splitting your wort preparation into two separate boils. If you boil in multiple pots, spread the hops amongst the pots evenly, taking into consideration the size of the pots.

Boiling a larger volume of wort has other benefits as well, most notably limiting the amount of wort darkening that occurs during the boil. The only drawbacks to boiling a larger wort volume are that you need to cool more wort (and you have less dilution water to help you) and you may have trouble maintaining a good rolling boil.

It's fairly easy to cool up to 2.5 gallons (9.5 L) of wort in a sink. Just put the lid on your brewpot after the boil and place the pot in a sink of cold water. Change the water several times, then add ice when the side of the pot feels neither hot nor cold (i.e. when it's around body temperature). A bathtub can be a convenient water bath for holding multiple pots.

If you're boiling 3 gallons (11 L) or more, you'll probably want to invest in a copper immersion chiller (about $35 at most homebrew shops.)

If you buy a larger brewpot, but your stove can't bring the full volume to a rolling boil, experiment with the placement of the lid on the pot. Although you don't want to boil wort in

a closed pot, leaving the lid mostly on can help your boil vigor and still provide an outlet for steam. If you still can't bring the full volume to a rolling boil, reduce the wort volume to the point that a rolling boil is possible.

Estimating Bitterness

Of course, it's been known for a long time that boiling a larger volume of wort leads to better hop utilization — but how big is the effect? To get some idea, see the table on page 30. The table shows the maximum level of bitterness (in IBUs) you can achieve in an extract wort, given your wort volume at the end of the boil.

Estimates for maximum IBUs in both extract late beers and "standard method" beers are given. For the extract late beers, it is assumed that you boil your wort (whatever its volume) with a boil gravity of less than SG 1.050, then add the remainder of your malt extract at the end of the boil. At that boiling gravity, the wort could contain up to 100 IBUs. The maximum IBUs achievable for 5 gallons (19 L) would then depend only on how much you diluted the wort.

For example, lets say you boiled 3 gallons (11 L) of wort down to 2.5 gallons (9.5 L). If the boil gravity was 1.050 or less, and you added enough hops, you should end up with 2.5 gallons (9.5 L) of wort at 100 IBUs. After dilution, you would have 5 gallons (19 L) of wort at 50 IBUs.

The values in the standard method column are calculated in a similar manner, but also figuring in that the boil gravity will be higher at smaller wort volumes. It's important to note that the values in the table are estimates based on the calculations I just described; they "make sense" — and mesh with my brewing experience — but they have not been experimentally verified. Also, note that the table applies to moderate-gravity beers (around OG 1.048); for bigger beers the values would be lower as the higher gravities would result in lower hop utilization.

Style Follows Size

So what do the numbers mean? Essentially, they mean that the volume of wort you boil determines the styles of beer you can brew successfully. For example, if you are following the "standard" extract instructions of boiling all

PREDICTED MAXIMUM IBUs (for 12 °Plato/OG 1.048 beer)

post-boil volume [gallons (L)]	max IBUs extract late method [boil SG < 1.050]	max IBUs standard method [boil SG in parenthesis]
1 (3.8)	20	5 (1.240)
1.5 (5.7)	30	17 (1.160)
2 (7.6)	40	30 (1.120)
2.5 (9.5)	50	42 (1.096)
3 (11)	60	53 (1.080)
3.5 (13)	70	66 (1.069)
4 (15)	80	77 (1.060)
4.5 (17)	90	89 (1.053)
5(*) (19)	100	100 (1.048)

(*) full-wort boil or Texas two-step method

Note: These are calculated estimates, not experimental measurements. Values given are for a 5-gallon (19-L) batch of beer hopped to saturation.

your malt extract in 1.5 gallons (5.7 L) of water, then diluting to 5 gallons (19 L) after the boil, you can only get about 17 IBUs of bitterness in your beer. With this limitation, your choice of possible beer styles isn't very wide. Two good candidates for this method are British mild ales or Scottish 60-shilling ales. Both of these styles are lightly hopped (target IBUs less than 20), low gravity (original gravity less than 1.040) ales and are dark enough (SRM values of 20–30 are fine) that moderate amounts of wort carmelization won't detract from the beer's look.

By increasing the amount of wort you boil to 2.5 gallons (9.5 L) and switching to the extract late method, you can brew beers with up to 50 IBUs. This will allow you to brew almost any classic beer style, including most pale ales, porters and stouts.

To brew the newer, hoppier styles of American ales — such as American pale ales, ambers, IPAs and double IPAs — you will need to boil at least 3.5 gallons (13 L) of wort.

Other Considerations

There are a few other ways to boost the amount of hop bitterness, or the perception of bitterness, in a beer.

Extract brewers should add their hops loose in kettle. Hop bags are convenient, but they limit the degree of hop utilization.

Adding some gypsum in the boil — up to 2 tsp. per 5 gallons (19 L) in soft or distilled water — accentuates hop bitterness. Likewise, adding hop aroma by dry hopping increases the perception of hop bitterness slightly. Use up to 2 oz. (57 g) per 5 gallons (19 L).

Finally, hop bitterness is more pronounced in drier beers, so always add enough yeast to properly attenuate your beer — yet another reason for making a yeast starter.

In the end, the amount of hop bitterness in your beer needs to be confirmed by your taste buds. If the numbers say your beer is fine, but your tongue says it still isn't hoppy enough, add more hops and boil more wort until you arrive at the taste you want.

Chris Colby is the editor of BYO.

BREWING IN THE PACIFIC NW

Four clone recipes and a roundtable with the brewers from **BridgePort, Redhook, Full Sail** and **Widmer Brothers.**

illustration by don martin

FULL SAIL AMBER ALE CLONE

(5 gallons/19 L, all-grain)

OG = 1.055 FG = 1.014

IBU = 30 SRM = 24 ABV = 5.3%

Ingredients

9.5 lbs. (4.3 kg) 2-row pale malt
1 lb. 14 oz. (0.85 kg) crystal malt (60 °L)
4.2 oz. (120 g) chocolate malt
2.6 AAU Hallertauer hops (45 mins)
(0.66 oz./19 g of 4% alpha acid)
3.3 AAU Cascade hops (45 mins)
(0.66 oz./19 g of 5% alpha acid)
1.0 oz. (28 g) Hallertauer hops (10 mins)
1.0 oz. (28 g) Cascade hops (10 mins)
1 tsp. Irish moss (15 mins)
Wyeast 1028 (London Ale), Wyeast 1318 (London Ale III),
White Labs WLP013 (London Ale) or WLP023 (Burton Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash grains for at least 45 minutes at 150 °F (66 °C). Boil wort for 60 minutes. Boil hops and Irish moss for times indicated. Chill wort, aerate and pitch yeast. Ferment at 68 °F (20 °C).

Extract with grains option:

Replace 2-row pale malt with 1.5 lbs. (0.68 kg) Muntons Light dried malt extract, 4 lbs. 2 oz. (1.9 kg) Alexander's Pale liquid malt extract and 1 lb. (0.45 kg) 2-row pale malt. Steep grains at 150 °F (66 °C) in 4.75 qts. (~4.5 L) of water for 45 minutes. Add water to make 3 gallons (11 L), add dried malt extract and boil for 60 minutes. Add liquid malt extract with 15 minutes left in boil.

REDHOOK ESB CLONE

(5 gallons/19 L, all-grain)

SG = 1.054 FG = 1.015

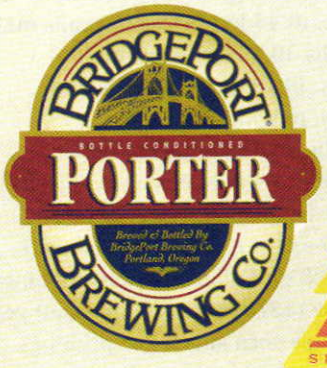
IBU = 27 SRM = 13 ABV = 5.0%

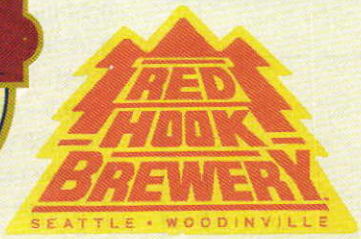
Ingredients

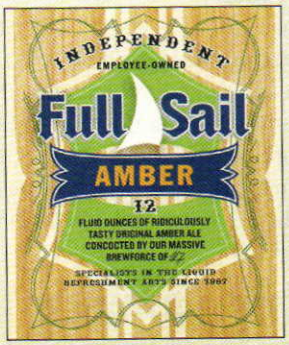
9 lbs. 14 oz. (4.5 kg) domestic 2-row pale malt
1 lb. 2 oz. (0.51 kg) Caramunich® malt (60 °L)

THE PACIFIC NORTHWEST HAS grown to be one of the most storied brewing regions in North America. As one of the foremost hop regions in the world, beers from this area have a unique fingerprint. While beers with citrusy hop notes are produced in vast quantities, maltier brews like porter and stout are also produced with that original **PACIFIC NORTHWEST TOUCH.**

BYO would like to thank the brewing staffs of BridgePort, Redhook, Full Sail and Widmer Brothers for their participation in this roundtable discussion and bringing their expertise to our readership.







compiled by **Garrett Heaney**

0.40 lbs. (0.51 kg) Carapils malt
5 AAU Willamette hops (60 mins)
(1.0 oz./28 g of 5% alpha acid)
2 AAU Tettnanger hops (15 mins)
(0.5 oz./14 g of 4% alpha acid)
2.5 AAU Willamette hops (15 mins)
(0.5 oz./14 g of 5% alpha acid)
1.5 oz. (42 g) Tettnanger hops (steep 5 mins post boil)
1.5 oz. (42 g) Willamette hops (steep 5 mins post boil)
4 oz. (112 g) gypsum ($CaSO_4$)
1 tsp. Irish moss (15 mins)
Wyeast 1084 (Irish Ale) or
White Labs WLP004 (Irish Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

In kettle, mash in at 150 °F (66 °C) and add gypsum ($CaSO_4$). Rest for 15 minutes then add 1 gallon (3.8 L) of hot water. Heat mash to 161 °F (71.5 °C) and let rest for 45 minutes. Heat up to 169 °F (76 °C) and let rest 5 minutes. Transfer mash to lauter tun. Sparge with 3 gallons (11 L) of sparge water to 169 °F (76 °C). Boil for 60 minutes, adding hops and Irish moss with indicated time remaining in ingredient list. Add final hops at knockout (end of boil) and hold for 5 minutes before cooling. Cool wort, transfer to fermenter and pitch yeast. Ferment at 68 °F (20 °C).

Extract with grains option:

Replace 2-row with 1.75 lbs. (0.79 kg) Coopers Light dried malt extract, 3.75 lbs. (1.7 kg) Coopers Amber liquid malt extract and 1 lb. (0.45 kg) 2-row pale malt. Steep grains at 150 °F (66 °C) in 4.5 qts. (4.3 L) of water for 45 minutes. Add water to make 3 gallons (11 L) of wort, add dried malt extract and boil for 60 minutes. Add liquid malt extract for final 15 minutes of the boil.

BRIDGEPORT PORTER CLONE

(5 gallons/19 L, extract with grains)
OG = 1.056 FG = 1.015
IBU = 35 SRM = 50+ ABV = 5.4%

Ingredients

6.6 lbs. (3.0 kg) Coopers Amber liquid malt extract
1.0 lb. (0.45 kg) Muntons Amber dried malt extract
0.5 lb. (0.23 kg) chocolate malt
0.75 lb. (0.33 kg) roasted black barley
8.7 AAU Magnum hops (60 mins)
(0.67 oz./18.8 g of 13% alpha acid)
3.7 AAU Kent Golding hops (5 mins)
(1.0 oz./28 g of 3.7% alpha acid)
White Labs WLP051 (California V Ale) or
Wyeast 1318 (London Ale III) yeast
0.75 cups of corn sugar (for priming)

Step by Step

Steep crushed chocolate malt and roasted black barley in 2 qts. (~2 L) of water at 150 °F (66 °C) for 30 minutes. Add water make 3 gallons (11 L). Add dried malt extract to wort and bring to a boil. Add Magnum hops and boil for

60 minutes. Add liquid malt extract for last 15 minutes of boil and Kent Golding hops for the last 5 minutes of the boil. Cool wort, transfer to fermenter and top off to 5 gallons (19 L). Aerate and pitch yeast. Ferment for 68–70 °F (20–21 °C).

All-grain option:

Replace extracts with 10 lbs. (4.5 kg) British pale malt and 1.0 lb. (0.45 kg) crystal malt (60 °L). Mash at 155 °F (68 °C). Boil for 90 minutes.

WIDMER BROTHERS SNOW PLOW MILK STOUT

(5 gallons/19 L, all-grain)

OG = 1.068 FG = 1.028
IBU = 27 SRM = 62 ABV = 5.2%

Ingredients

4.4 lbs. (2.0 kg) 2-row malt
1.1 lbs. (0.5 kg) malted white wheat
1.5 lbs. (0.7 kg) caramel malt (60 °L)
1.0 lb. (0.45 kg) Briess Carapils malt
0.33 lbs. (0.15 kg) black malt
1.6 lbs. (0.72 kg) roasted barley
0.9 lbs. (0.45 kg) flaked barley
0.75 lbs. (0.34 kg) flaked oats
0.95 lbs. (0.43) lactose (15 mins)
5 AAU Centennial hops (90 mins)
(0.5 oz./14 g of 10% alpha acid)
1 oz. (28 g) Willamette hops (0 mins))
Wyeast 1187 (Pride of Ringwood) yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash in at 120 °F (49 °C) for 30 minutes. Ramp slowly to 160 °F (71 °C) and rest for 30 minutes. Boil for 90 minutes, adding Centennial hops at the beginning of the boil and the lactose during the last 15 min of boil. Add Willamette hops at end of boil. Ferment at 68 °F (20 °C).

THE ROUNDTABLE

Brew Your Own posed the following questions to brewers from Redhook, Full Sail, BridgePort and Widmer Brothers. We would like to extend a big thank you to all who shared their expertise from this unique brewing region.

1. *When did your beer featured here originate? What major decisions went into the formulation of the recipe?*

Widmer: This beer debuted as Collaborator Milk Stout in 1997 and was draught only in the Portland, Oregon market. Members of the Oregon Brew Crew, a local homebrew club, created the recipe. We pay a royalty to the OBC when Snow Plow is in season. The beer debuted as Widmer Brothers Snow Plow Milk Stout in September 2004. Snow Plow was and currently is Widmer Brothers' winter seasonal brew, and is available in many Western markets in both draught and bottles. It will be on the shelves until February 2006.

BridgePort: We started brewing porter in 1996. I wanted to come up with a porter recipe that gave a bold roasted character and little hop note other than bitterness. Right now we brew it only for our two pubs.

Redhook. This recipe is a variation of our current ESB. Redhook's ESB started out as Winterhook in 1985. The same recipe was brought back in 1986 and customers kept asking for it and in August of 1987 we decided to keep it on year around.

Full Sail: The original Full Sail Amber recipe was written in 1987. It was, however, not our first commercial brew. That was Full Sail Golden Ale. Amber was brewed for commercial release in 1989.

2. *What hop varieties did you choose for this beer and why?*

Full Sail: Full Sail Amber Ale uses Cascades and Hallertauers for bittering and aroma. Cascades were chosen for their uniquely "Northwest" citrusy aroma and flavor, and Hallertauers were chosen for their smooth "noble" aroma. Together, they complement each other to provide a distinct hop character that is elegant, spicy and complex.

Widmer: Currently Snow Plow uses a blend of Warrior, Millennium and Horizon as the bittering hops. The aroma hops are Willamette. In any given brew, Widmer typically uses high alpha low cohumulone hop varieties for bittering purposes. The aroma varieties employed are typically chosen for a particular trait or character each hop contributes.

Redhook: We use U.S. grown Willamette and German Tettnang. These 2 aroma varieties complement each other — we use them for both bittering and aroma.

BridgePort: We have used high alpha bitter hops like Chinook and Nugget but found the bitterness too harsh. Right now we use Yakima Goldings because they seem to give a pleasant bitter background.

3. *Do you dry hop this beer or recommend this procedure for homebrewers?*

Redhook: Not currently, but we have experimented with a wide variety of hops including a variety of downstream hop products at different points in the process on a trial brew basis. If one were to try dry-hopping this beer, I would suggest trying it with Centennial.

Full Sail: We do not dry hop Full Sail Amber, but I think it would be very interesting for an adventurous homebrewer to try. I would think that a German Hallertau for dry hopping would enhance the smoothness of the hop flavor and aroma, as would a Czech Saaz dry hop. Styrian Goldings would also be fun.

4. *What would the "fingerprint" or "signature" of this beer be? What makes it recognizable or distinguished from other brews of the style?*

BridgePort: The dry roasty flavor of our porter is for people who like their coffee black, no sugar. We also keg condition the beer for added smoothness and fine carbonation.

Redhook: The ESB is malty upfront and all the way through and balanced with hop bittering in the middle through the finish. Very subtle hop aroma from the Tettnang.

MEMBERS of the ROUNDTABLE

FULL SAIL

James Emerson, Brewmaster

BRIDGEPORT

Karl Ockert, Brewmaster

WIDMER

Kurt & Rob Widmer, Owners

REDHOOK

Al Triplett, Brewmaster

Full Sail: Full Sail Amber's hallmark is its balance. Full caramel malt flavors combined with a subtle roastiness balanced with clean bitterness and a full spicy hop aroma.

Widmer: The "fingerprint" of Snow Plow is rooted in unexpected sweetness balanced by dark malt flavors. Snow Plow doesn't taste anything like a typical stout or dark beer. Snow Plow stands apart from other brews for a variety of reasons: Lactose is an unfermentable sugar that adds body, viscosity and slight sweetness to beer. Lactose tastes about one-half as sweet as table sugar, so the sweetness is subtle. Also, a very high percentage of specialty malts creates a complex beer with lots of depth.

5. *Are there any special brewing techniques that you use to perfect this beer?*

BridgePort: The beer is made using a single infusion mash — no mixing beyond the mash-in through a Steele's masher. This is a very traditional UK style.

Full Sail: Actually, our techniques are pretty standard: primary fermentation temperature of 68 °F (20 °C) followed by a long cold-conditioning period. Fermentation cycle is 14 days.

Widmer: There are several special brewing techniques that must be employed to successfully brew Snow Plow, at least there are for production at Widmer: Because of the oat content a dilute mash is recommended, as well as long beta-glucan rests around 120 °F (49 °C).

6. *Is there anything that a homebrewer might be able to do in his brew session that differs from the actual brewery's method that would help him achieve an accurate replica of your beer?*

Full Sail: As long as people are producing good wort quality with clean ferments, suggesting changes in someone's tried and true homebrewing methods becomes difficult. Hop utilization, brewhouse extracts and yields are all subject to change based on batch size, quality of equipment and brewing setup. My best advice would be to brew a single recipe several times in order to tweak the recipe for your particular system. There are no real secrets in brewing, so how many batches are you willing to brew?

Redhook: Judicious use of fresh hops. Balancing the hops with the malt is the key.

Widmer: Because of the high original gravity, judicious use of kettle fining agents must be employed, and wort separation from the trub must be gentle. Pitch the wort on the high side of normal to prevent problems with diacetyl and sluggish fermentations. It is also recommended that you lauter slowly and aerate the wort aggressively. Cold conditioning and lagering should also be done aggressively for at least a week.

BridgePort: Try to mill the dark grains finer than the pale grains to extract out the flavor and color better.

7. *What do you think the biggest challenge for a homebrewer would be in making this beer and how can these challenges be overcome?*

Full Sail: I think for the average homebrewer, besides sanitation, primary fermentation temperature control is probably the biggest challenge. When I homebrewed, I didn't have a dedicated refrigerator or anything, so I set my carboys in tubs of cool water for attemperation. At least that way, I was able to control esteriness somewhat.

Widmer: Three of our biggest challenges at Widmer when producing Snow Plow are maintaining mash homogeneity, lautering and beer clarification. The average homebrewer will probably not have to deal with beer clarification. We definitely do not recommend filtration of this product. Snow Plow is however, centrifuged.

Redhook: Consistency in your mash program and in the boil is critical —

and knowing the capabilities of one's system is key for consistency with any brewer.

8. *What are the impacts of the malt that you've suggested for this 5-gallon (19-L) recipe?*

Redhook: Caramunich® 60 °L is an interesting product to try versus Caramel 60 °L — the variations in flavor, sweetness, toastiness provide for a different amber beer. We have used both and each has its own attributes. You could also blend the two.

BridgePort: If you can, try experimenting with British malts. We do not have that ability but I think it would add dimension and complexity to the recipe.

Full Sail: We have used Great Western, Rahr, Cargill and Gambrinus for 2-row malts. I have found all of them to produce great beer. We have used Briess, Great Western, Muntons, Weyermann and others for specialty malts and they also produce great beer. Part of a brewer's skill is to take raw materials from different suppliers with varying specifications, take those variations into account and produce the same beer. This goes back to brewing the same recipe again and again in order to tweak it.

9. *If a brewer was going to substitute a malt extract (either dry or liquid) for any of the malts in your beer, could you offer any suggestions?*

Redhook: Our pilot brewer, who is also an avid homebrewer (almost every week), recommends Coopers Amber malt extract — the powdered version is fine as well.

Widmer: I personally would look for an extract that produces a beer that is so dark red that it looks black, and has mild dark malt flavors. Most of the dominant flavors in Snow Plow are from the lactose and from the yeast strain. If only a portion of extract is desired I'd pick a light extract and add a stew of dark malts for flavor and color.

10. *How does this beer age and are there any special serving suggestions (with regards to temperature, etc.)?*

Widmer: Snow Plow ages pretty well due to the high content of lactose and dark malts in the product. One very unique serving suggestion for Snow Plow is to add a scoop or two of vanilla ice cream and make a Snow Plow ice cream float. This dessert is popular at our brewery restaurant.

Redhook: I suggest serving the beer at 50 °F (10 °C) to enjoy the subtleness of the Tettnang hop aroma.

Full Sail: Full Sail Amber ages very well for a beer with 5.5% alcohol. After about four months, the hops will start to take a back seat to the malty and caramel flavors that emerge. On extended aging, the malt flavors start to take on sherry notes that are quite nice, if you like a more malty beer. If you're after more hoppiness, then the fresher the better.

11. *What type of yeast do you use and do you aim to use any special brewing water?*

BridgePort: We have very soft water in Portland — in fact it is literally rainwater — so we add 100 ppm of gypsum to the mash. Brewers need to play with the waters they have and see how the chemistry comes out in the final beers. We use a top fermenting ale strain that we got from the UC Davis yeast library in 1983. It's a strong fermenter and reduces diacetyl very well.

Redhook: We use an ale yeast that is highly flocculent. Other than filtration, we do very little with the Seattle city water — actually, we do add a small amount of brewing salts in the mash.

Full Sail: We use proprietary ale yeast, but any English style yeast should make a fine beer. Hood River water is very, very soft.

Widmer: Snow Plow uses a Wyeast ale yeast known as Ringwood Ale (1187). It imparts a complex aroma and flavor that is unique. Widmer uses Portland, Oregon municipal water, which in this case is also supplemented with calcium chloride (mash and kettle) and sodium chloride (in the kettle).

12. *Do you think there is such a thing as a "Pacific Northwest style" of brewing or a regional signature that sets apart the majority of beers brewed in your area from other parts of North America?*

BridgePort: Yes, we are in one of the biggest hop growing regions in the world. Many of us have known the hop farmers and dealers in Oregon and Washington for over 20 years. They have responded to the small brewers request for characterful (I made up this word) aroma hops and everyone up here loves to brew hoppy beers. It is not uncommon to see an IPA with 50–75 IBUs and loads of citrus aroma. We are now having some seasonal fun brewing fresh hop beers by taking hops right off the picking machines to the brew kettles in a matter of hours.

Redhook: From the outset in the early 80s, the Pacific Northwest style was recognized by the generous use of hops. This seems like a natural outcome with the hops grown in Oregon and Washington.

Widmer: I do believe there are regional characteristics in craft beers, though not in this particular product and generally I believe these regional characters to be devolving. However, these days there are many quality brewers all over the US and the hop craze has spread. The walls are coming down and it's getting easier and easier to find good beer of any style wherever you happen to look!

Full Sail: I think that originally the "Pacific Northwest" style of brewing produced full-bodied, citrusy-hopped, darker-colored ales with high alcohol and bitterness. Those beers still are being brewed, but now they are brewed alongside an amazing variety of beers from all beer styles. I think that the Pacific Northwest is a beer drinker's and brewer's paradise!

HARDEST 10 STYLES

WITH THE DECEMBER 2005 ISSUE OF BYO, we arrive at the last of our 10th Anniversary series articles. In the January-February 2005 issue, we kicked off the series with an article titled, "The 10 Easiest Beer Styles." All styles take skill to master, but some are more forgiving than others for beginners and we presented recipes for those styles then. Now we move onto the 10 most difficult beers styles — brews that even experienced brewers may have problems with, especially the first time out the gate. We'll tell you why these beers are a challenge and suggest ways to improve your chances at success.

WITBIER

Belgian wit (white) beers are very pale, turbid beers with a balanced spiced character and a crisp "zing." These traits make for an appealing and refreshing beer, but each of these characters also makes it potentially hard to replicate at home.

To get a somewhat stable haze, you can use up to 10% unmalted wheat in the grist. Don't add Irish moss when boiling your wort.

The typical spices in a witbier are coriander and bitter orange peel. Getting the spice level right can be tricky because spices differ in their intensity. Use about 20% less than you think you'll need in the boil, and correct the spice level — if needed — by adding spices (or an alcohol extract of the spices) in the bottling bucket or keg. The "zing" in a historical witbier may have come partly from contaminating lactic acid bacteria or wild yeast (esp. *Brettanomyces*). Modern homebrewed examples can be accentuated by a bit of lactic acid.

White Labs and Wyeast sell various strains of witbier yeast, each with noticeably different flavor and aroma profiles. Wit fans should try them all and pick their favorite.

Pierre, South Dakota Witbier

(5 gallons/19 L, all-grain)
OG = 1.053 FG = 1.012
IBU = 18 SRM = 5 ABV = 5.2%

Ingredients

6.0 lbs. (2.7 kg) Briess Pilsen malt
3.0 lbs. (1.4 kg) Briess red wheat malt
1.0 lbs. (0.45 kg) flaked wheat
0.5 lbs. (0.23 kg) flaked oats
0.33 lbs. (0.15 kg) flaked barley
5 AAU Styrian Goldings hops (60 min)
(1.0 oz./28 g of 5% alpha acids)
0.33 oz. (9.4 g) bitter orange peel
0.25 oz. (7.1 g) coriander
up to 1.0 oz. (29 mL) 88% lactic acid (to taste before bottling or kegging)
up to 1.5 tsp. vinegar (optional)
Wyeast 3463 (Forbidden Fruit) yeast (2 qt./~2 L yeast starter)
1.0 cup corn sugar (for priming)

Step by Step

Mash at 152 °F (67 °C). Boil for 90 minutes, adding hops at times specified. Add spices at end of boil and let steep 15 minutes before cooling. Ferment at 74 °F (23 °C). Add acid, vinegar and touch-up spices, if desired, in keg or secondary fermenter.

Extract option:

Replace all grains with 1.33 lbs. (0.60 kg) Briess dried malt extract, 4.0 lbs. (1.8 kg) Coopers Wheat liquid malt extract, 2.0 lbs. (0.91 kg) wheat malt and 1.0 lb. (0.45 kg) flaked wheat. Steep malt and flakes for 45 minutes in 1.1 gallons (4.3 L) at 150 °F (66 °C). Add water to "grain tea" to make 3 gallons (11 L), add dried malt extract and boil for 60 minutes. Add liquid malt extract at end of boil and let steep for 15 minutes before cooling. Review all-grain instructions for other info.

WEE HEAVY

Wee heavies are malty/sweet big ales, but don't smell fruity as most big ales do. You need to use a yeast strain that won't overattenuate the beer, pitch a large yeast starter and hold the fermentation temperature lower than with most ales. A Golden Promise malt for your base malt is a good choice.

Groundskeeper Willie's Wee Heavy

(5 gallons/19 L, extract with grains)
OG = 1.100 FG = 1.030
IBU = 22 SRM = 14+ ABV = 9.0%

Ingredients

12.75 lbs. (5.8 kg) Alexander's Pale liquid malt extract
3.0 lbs. (9.1 kg) Simpson's Golden Promise malt
3.0 oz. (85 g) crystal malt (60 °L)
0.75 oz. (21 g) roasted barley (300 °L)
6 AAU First Gold hops (60 min) (0.8 oz./23 g of 7.5% alpha acids)
1 tsp. Irish moss (15 mins)
¼ tsp yeast nutrient (15 mins)
Wyeast 1728 (Scottish Ale) or White Labs WLP028 (Edinburgh Ale) yeast (4 qt./~4 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

Steep crushed grains for 45 minutes at 158 °F (70 °C) in 1.2 gallons (4.6 L) of water. Add water to "grain tea" to make 3 gallons (11 L) of wort. Add about 5 lbs. (2.3 kg) of malt

extract to wort and bring to a boil. Boil for 60 minutes, adding hops at beginning of the boil. Add Irish moss and yeast nutrients with 15 minutes left in boil. Add remainder of liquid malt extract at end of boil and let steep 15 minutes before cooling. Ferment at 62 °F (17 °C).

All-grain option:

Replace malt extract and base grains with 20 lbs. (9.1 kg) Simpson's Golden Promise malt. Mash at 158 °F (70 °C). Collect about 10 gallons of wort and boil to reduce to 5 gallons (19 L), as long as 5 hours.

TRIPEL

Light colors and dry finishes don't go along with most big beers, but that's

exactly what makes a Belgian tripel great. The road to homebrew heaven is littered with failed tripel attempts, but here's your path to salvation — use only light base malts and about 25% clear adjunct (sugar); pitch a big yeast starter and add some yeast nutrients in the boil to supply nitrogen to the yeast.

Tripel the Light Fantastic

(5 gallons/19 L, all-grain)
OG = 1.081 FG = 1.015
IBU = 25 SRM = 4 ABV = 8.5%

Ingredients

9.75 lbs. (4.4 kg) Dingemans Belgian Pilsen malt
2.5 lbs. (1.1 kg) Durst Vienna malt (4 °L)
3.0 lbs. (1.4 kg) Belgian clear candi sugar
7.5 AAU Tettnang hops (60 min) (1.9 oz./53 g of 4% alpha acids)
1 tsp. Irish moss (15 mins)
¼ tsp. yeast nutrients (15 mins)
Wyeast 3787 (Belgian Trappist) or White Labs WLP500 (Trappist Ale) yeast (3 qt./~3 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

In your kettle, heat 3.8 gallons (14 L) of strike water to 151 °F (66 °C) and mash in at 140 °F (60 °C). Once mashed in, immediately begin heating mash to 148 °F (64 °C). Rest for 45 minutes. Heat mash to 167 °F (75 °C) and transfer to lauter tun. Boil wort for 90 minutes, adding hops, Irish moss and nutrients at times specified in ingredient list. Add sugar with 15 minutes remaining in the boil. Ferment at 70 °F (21 °C).

Extract with grains option:

Replace base grains with 2.0 lbs. (0.91 kg) Pilsner malt, 1.0 lb. (0.45 kg) Coopers Light dried malt extract and 6 lbs. 2 oz (2.8 kg) Coopers Light liquid malt extract. Steep grains at 150 °F (66 °C) in 0.75 gallons (2.8 L) of water for 45 minutes. Add water to make 3 gallons (11 L), add dried malt extract and boil for 60 minutes. Add liquid malt extract at 15 minutes. Follow all-grain instructions for other directions.

SCHWARTZBIER

A schwartzbier is like a good bluff in poker — it looks like one thing, but

is another. Schwartzbiers look like dark roasty beers, but taste similar to Pilsners. Luckily, brewers have a couple aces up their sleeve — debittered dark grains or malt color extracts. Either will give you lots of color with minimal roasty flavors.

Schwartzpils by Horst Dornbusch

(5 gallons/19 L, all-grain)
OG = 1.047 FG = 1.010
IBU = 27 SRM = 25 ABV = 4.8%

Ingredients

9.5 lbs. (4.3 kg) Weyermann Pilsner malt
5.5 oz. (155 g) Weyermann SINAMAR® malt color extract
6 AAU Tettnanger hops (60 min) (1.5 oz./43 g of 4% alpha acids)
2.5 AAU Hallertau Mittelfrüh hops (15 min) (0.5 oz./14 g of 5% alpha acids)
1 oz. (28 g) Tettnanger hops (0 min)
Wyeast 2042 (Danish Lager) or White Labs WLP850 (Copenhagen Lager) yeast (3.5 qts./~3.5 L yeast starter)

Step by Step

Step mash with a 20 minute rest at 122 °F (50 °C), a 30 minute rest at 148 °F (64 °C), a 30 minute rest at 162 °F (72 °C) and mash out to 169 °F (76 °C). Boil for 2 hours, adding hops at times specified in ingredient list. Add liquid malt color with 15 minutes remaining in boil. Ferment at 50 °F (10 °C) followed by a diacetyl rest at 55 °F (13 °C) for 3 days.

Extract with grains option:

Replace Pilsner malt with 5.66 lbs. (2.6 kg) of Weyermann Bavarian Pilsner liquid malt extract and 2.0 lbs. (0.91 kg) Pilsner malt. Steep Pilsner malt for 45 minutes at 148 °F (64 °C) in 0.75 gallons (2.8 L) water. Add water to "grain tea" to make 2.5 gallons (9.5 L) of wort. Boil 60 minutes, adding malt extract with 15 minutes left in boil.

RAUCHBIER

The biggest trick to making a good rauchbier is getting a clean smoke

character, one in which chlorine compounds from your water don't react with the smoky phenols to make odd flavors and aromas. To avoid this, carbon filter your water and — because carbon filtration may not remove all the chlorine compounds in your water — treat your brewing liquor with one crushed Campden tablet per 20 gallons (76 L).

Awesome Atavism by Chris Colby

(5 gallons/19 L, all-grain)
OG = 1.060 FG = 1.015
IBU = 20 SRM = 20 ABV = 5.8%

Ingredients

9.75 lbs. (4.4 kg) Weyermann rauchmalz
2.0 lbs. (0.91 kg) Weyermann Munich Type II malt (8.5 °L)
0.5 lbs. (0.23 kg) CaraMunich® III malt (55 °L)
2 oz. (57 g) Carafa® I malt (350 °L)
5.5 AAU Hallertau Hersbrücker hops

(60 min)
(2.2 oz./62 g of 2.5% alpha acids)
1 tsp. Irish moss (15 mins)
Wyeast 2206 (Bavarian Lager) or White Labs WLP820 (Oktoberfest/Märzen) yeast
(4 qts./~4 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

In your kettle, heat 3.9 gallons (15 L) of strike water to 142 °F (61 °C) and mash in at 131 °F (55 °C). Pull a 1.5-gallon (5.8-L) decoction and boil it for 30 minutes. (Option: Add a pinch of calcium to the decoction boil.) Return decoction to main mash and heat mash to 158 °F (70 °C). Rest for 30 minutes. Transfer to lauter tun and add boiling water to raise temperature to 168 °F (76 °C). Recirculate for 20 minutes and collect about 6.5 gallons (25 L) of wort. Boil for 90 minutes, adding hops and Irish moss at times specified in ingredient list. Ferment at 54 °F (12 °C).

GUEUZE (BLENDED LAMBIC)

A gueuze is a beer made from blending "old" lambics, up to three years old, with a "new" lambic that has just finished its main fermentation. The traditional mash program for a lambic is a turbid mash, involving both infusions and decoctions to step the mash through a variety of temperatures. The mash in the all-grain version is a simplified version of this.

When brewing the constituent beers in a gueuze, you can take a seasonal approach. Brew a lambic each spring, condition it warm over the summer and condition it in a bucket until it's time to blend. (Watch your airlocks so they don't dry out).

Gilligan's Gueuze

(5 gallons/19 L, all-grain)
OG = 1.052 FG = 1.003
IBU = 0 SRM = 4 ABV = ~5.0%

Ingredients

6 lbs. 14 oz. (3.1 kg) Dingemans Pilsen malt
3 lbs. 11 oz. (1.7 kg) unmalted wheat
3 oz. (84 g) aged (debittered) hops
Wyeast 3278 (Lambic Blend) blend of yeasts and bacteria
0.75 cups corn sugar (for priming)

Step by Step

Heat 2.7 gallons (10 L) of water to 124 °F (51 °C) in your kettle. Bring 5 gallons (19 L) of water to a boil in your hot liquor tank. Mash grains in to 113 °F (45 °C) and let rest for 10 minutes. You will step through the following steps: 131 °F (55 °C) for 15 minutes; 149 °F (65 °C) for 45 minutes; 162 °F (72 °C) for 15 minutes; mash out to 170 °F (76 °C). For each step, add about 85 fl. oz. (2.5 L) of boiling water, then use direct heat to hit target temperature. (By the end of your mash, it will be very thin.) Cool water in hot liquor tank to 200 °F (95 °C) and use this for your sparge water. Collect about 5 gallons (19 L) of wort, add 2 gallons (7.6 L) of water and boil for 2 hours, adding hops with 90 minutes left in boil. Ferment beer at 70 °F (21 °C) in a plastic bucket for one week. Let beer condition at 70–80 °F (21–27 °C) for 3 months, then hold at "room temperature." Do not rack to secondary. Do this once a year for three years, then blend beers after the most recent has been warm conditioned for three months.

EISBOCK

An eisbock is two difficult beers rolled into one. The first, a high-gravity lager (doppelbock) and the second, a freeze-concentrated beer.

Pitching a big yeast starter and running a temperature-controlled fermentation will mean your eisbock tastes smooth (and doesn't induce splitting headaches).

Freezing the beer in a bucket avoids the possibility of cracking a glass carboy or rupturing a keg.

Ötzi's Eisbock

(5 gallons/19 L, extract with grain)
Doppelbock:
OG = 1.072 FG = 1.018
IBU = 18 SRM = 12 ABV = 7.0%
Eisbock:
Final volume = 3.5 gallons (13 L)
ABV = 10%

Ingredients

3.0 lbs. (1.4 kg) Munich Type II malt
8 lbs. 14 oz. (4.0 kg) Weyermann Bavarian Maibock liquid malt extract (half as late addition)
4.75 AAU Hallertau hops (60 min)
(0.95 oz./27 g of 5% alpha acids)
1 AAU Hallertau Hersbrücker hops (15 min)
(0.8 oz./23 g of 2.5% alpha acids)
1 tsp. Irish moss (15 mins)
Wyeast 2206 (Bavarian Lager) or White Labs WLP833 (German Bock) yeast (5 qt./4.7 L starter)
0.75 cups corn sugar (for priming)

Step by Step

Steep Munich malt at 154 °F (68 °C) in 1 gallon (3.8 L) of water for 45 minutes. (Note: this is actually a small mash; follow instructions for temperature and volume.) While grains are steeping, heat 2 gallons (7.6 L) of water to a boil. Add "grain tea" to this water, along with about 2 lbs. (~1 kg) of malt extract. Boil for 60 minutes, adding hops at times specified in ingredient list. Add remaining malt extract at end of boil and let steep for 15 minutes before cooling. Ferment at 52 °F (11 °C), rack to secondary and lager at 40 °F (4.4 °C) for one month, then rack to bucket and lower temperature until ice crystals form. Remove ~1.5 gallons (5.7 L) of ice to yield 3.5 gallons (13 L) of beer at 10% ABV.

DRY STOUT

Dry stout? You may have been told that it is one of the easiest beers styles to make. In reality, there are several difficulties to making even a passable dry stout. The first is that there is a narrow window of acceptable roast flavors in a stout. The second difficulty is getting a dry beer. The third difficulty is that the large amount of dark roasted grains can make for an overly acidic beer.

A good recipe (that uses the dark, ~500 °L, version of roasted barley and some adjunct to dry out the beer) is a

start, but you'll have to muck with your water chemistry a bit on your own to deal with the acidity of the dark malt. A couple teaspoons of calcium carbonate per 5 gallons (19 L) of soft water is a good place to start. A small yeast starter is all you need because of the low original gravity, but you do need to make the starter to get the dry stout properly attenuated (i.e. dry).

Dropkick Murphy's Dry Stout

(5 gallons/19 L, extract with grains)
OG = 1.040 FG = 1.007
IBU = 33 SRM = 38 ABV = 4.2%

Ingredients

3.3 lbs. (1.5 kg) Muntons Light liquid malt extract (late addition)
0.5 lbs. (0.23 kg) Crisp Maris Otter pale ale malt
1.5 oz. (43 g) crystal malt (60 °L)
10 oz. (0.28 kg) roasted malt (500 °L)
2 oz. (57 g) chocolate malt (350 °L)
1 lb. 7 oz. (0.65 kg) cane sugar
7.5 AAU Target hops (60 min)
(0.68 oz./19 g of 11% alpha acids)
2.5 AAU Target hops (15 min)
(0.23 oz./6.4 g of 11% alpha acids)
¼ tsp. yeast nutrients (15 mins)
White Labs WLP007 (Dry English Ale) yeast
(1 qt./~1 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

Steep grains for 45 minutes at 150 °F (66 °C) in 0.5 gallons (1.9 L) of water. Add water to make 3 gallons (11 L) of wort, stir in sugar and bring to a boil. Add first hop addition and boil for 60 minutes. Stir in extract, remaining hops and nutrients with 15 minutes left in boil. Ferment at 70 °C (21 °C).

BERLINER WEISSE

The biggest challenge to making a Berliner weisse is making a light, clean base beer, then rapidly souring it with bacteria. You need to sour the beer fairly rapidly since it's a low gravity beer and doesn't have a lot of alcohol to act as a preservative.

Napoleon's Champagne

(5 gallons/19 L, all-grain)
OG = 1.030 FG = 1.004
IBU = 9 SRM = 3 ABV = ~3.0%

Ingredients

4.0 lbs. (1.8 kg) Durst Pilsner malt
2.0 lbs. (0.91 kg) wheat malt
5 AAU Spalt hops (15 min)
(1.0 oz./28 g of 5% alpha acids)
Wyeast 1007 (German Ale) or White Labs WLP029 (German Ale/Kölsch) yeast (1 qt./~1 L starter)
Wyeast 4335 (*Lactobacillus*) bacteria (1 qt./~1 L starter, not aerated)
1.2 cups corn sugar (for priming)

Step by Step

Make bacterial starter 2 weeks before brew day. Make yeast starter 2–3 days before brewday. Heat 2 gal-

lons (7.6 L) of strike water to 161 °F (72 °C) and mash at 150 °F (66 °C) for 45 minutes. Collect about 3 gallons (11 L) of wort and add water to make about 5.33 gallons (20 L) of pre-boil wort. Boil for 15 minutes, adding hops at beginning of boil. Pitch both starters to cooled wort. Ferment at 62 °F (17 °C) for one week, then condition for a week or two at 70–80 °F (21–27 °C) in primary fermenter. Rack to secondary and bottle the beer in heavy bottles a few days later.

AMERICAN PILSNER

An American Pilsner can be summed up in two words — flavorless and flawless. American Pilsners have little malt flavor, hop character or body. But, these elements are balanced and there are no faults. To make a good American Pilsner, you need to make a highly fermentable, high-adjunct wort, pitch plenty of yeast and hold the fermentation temperature constant.

Older, But Wiser American Pilsner

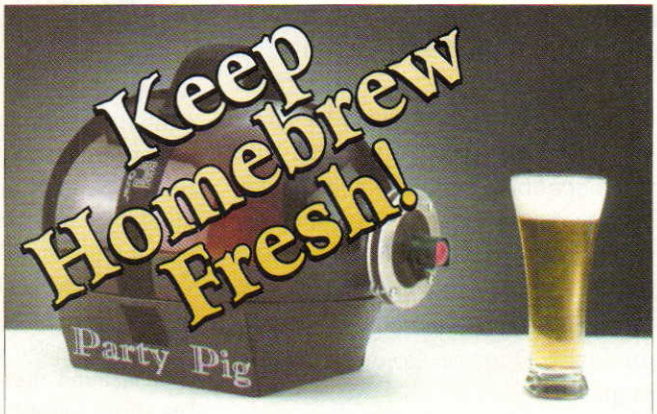
(6 gallons/23 L, all-grain)
Malt Liquor: (5 gallons/19 L)
OG = 1.051 FG 1.007
American Pilsner: (6 gallons/23 L)
IBU = 12 SRM = 3 ABV = 4.7%

Ingredients

4.0 lbs. (1.8 kg) Briess 6-row Brewer's malt
2.7 lbs. (1.2 kg) Briess Less Modified Pilsner malt
2.7 lbs. (1.2 kg) rice syrup solids
4 AAU Cluster hops (60 min) (0.66 oz./19 g of 6% alpha acids)
1 tsp. Irish moss (15 mins)
¼ tsp yeast nutrients (15 mins)
Wyeast 2007 (Pilsen Lager) or White Labs WLP840 (American Lager) yeast (3.5 quart/~3.5 L yeast starter)
1.0 cup corn sugar (for priming)

Step by Step

In your kettle, heat 2.1 gallons (7.9 L) of strike water to 142 °F (61 °C), stir in grains and mash at 131 °F (55 °C) for 15 minutes. Heat to 140 °F (60 °C) — raising the temperature about 2 °F (1 °C) every minute and stirring constantly — and rest for 30 minutes. Heat to 158 °F (70 °F) and rest for 30 minutes. Transfer mash to lauter tun and stir in boiling water to raise temperature to 168 °F (76 °F). Let rest for 5 minutes. Recirculate, then collect wort (about 3.33 gallons (13 L). Add water to make enough wort to boil for 90 minutes. Add hops with 60 minutes left and add rice syrup solids, Irish moss and yeast nutrients with 15 minutes left in boil. Ferment base beer (malt liquor) at 53 °F (12 °C). Dilute 5 gallons (19 L) of malt liquor with 1 gallon (3.8 L) of deaerated water to yield 6 gallons (23 L) of American Pilsner. Boil and cool water to deaerate. (You may also want to add a small pinch of potassium metabisulfite).



by **Horst Dornbusch**

do BARLEY VARIETIES MATTER

or is 2-row just 2-row?

When we brew according to a recipe, no matter which beer we make, it seems that there is a lack of specificity when it comes to base malts. Often, the only description given is pale malt (or pale malt extract). If the recipe is a touch more sophisticated, it may specify pale ale or Pils (pale lager) malt; it may even specify a malt brand, such as Muntons, Briess, Crisp or Weyermann. But rarely, do the specifications include the barley variety that would best be suited for the recipe or beer style we want to make. The rare exceptions to this rule are British ale recipes that call for Maris Otter or Golden Promise malt.

This seeming lack of attention to the grain raw material of malt has always struck me as surprising, considering that brewers would never assume such a casual attitude towards hops, for instance. Next to water, base malt is the second most plentiful ingredient in virtually any beer, yet the grain source that is responsible for the malt is often completely ignored, as if it were irrelevant.

In fact, as I found out, the grain variety of the base malt does influence the taste of the beer.

Tasting the Importance of Base Barley

The effect of the base malt on the brew is rarely discussed in the brewing literature according to Thomas Kraus-Weyermann of the Weyermann Malting Company in Bamberg, Germany, and Dr. Ulrich Heyse, editor-in-chief of the international brew magazine *Brauwelt*, in Nuremberg, Germany. If all base malts were essentially the same, regardless of the barley variety from which they are made, then one should not be able to detect a difference among brews that are identical except for the barley variety of their base malts. Thus, these two gentlemen set out to organize a test for this hypothesis, and invited experts from around the globe to participate. Dr. Heyse wrote the protocol for the test according to the guidelines of the European Brewery Congress and the World Beer Cup, which required the tasters to evaluate each beer blindly, on an ascending five-point scale, in terms of color, head, structure, aroma, flavor, mouthfeel, balance, and overall quality. In addition, the tasters were asked to supply free-hand impressions of what they were tasting and to discuss the beers after the written test.

Meanwhile, Thomas Kraus-Weyermann used his new 2.5-hectoliter (2.13-barrel/72 gallon) pilot brewery to make four identical Pilsner beers, with only the base malts being derived from the different barley varieties. The barley varieties used in the test were Alexis, Barke, Scarlett, and Steffi. The base malt in all four brews made up 90% of the grist. Weyermann Carafoam® comprised another 5% of the grist and the final 5% was Weyermann Acidulated Malt.

The structured blind taste test was scheduled for Saturday, November 15, 2003, and 19 of the invited international experts were able to make it to Bamberg. Among the panelists were Charlie Papazian, president of the Association of Brewers in Boulder, Colorado; Conrad Seidl, a noted beer journalist based in Vienna, Austria; Helen Knowles, a malt distributor from Toronto, Canada; Seth Schneider, General Manager of Crosby & Baker in Westport, Massachusetts; Jürgen Buhrmann, general manager of the Weyermann Malting Company; David Grinnell, director of brewing operations at the Boston Beer Company (Sam Adams); Dan Carey, president of New Glarus Brewing Company in Wisconsin and winner of four medals at the 2003 Great American Beer Festival; and yours truly from Boston.

Taste Test Results

Not surprisingly, all beers were uniformly judged to have virtually the same straw-blond brilliance, fine effervescence and firm, white, creamy head. Likewise, all the test beers were

fairly good. Along other criteria, however, the four brews showed remarkable differences. More than half the panelists ranked the Scarlett beer the maltiest. Scarlett also received very high marks for bitterness, flavor and overall quality. The Steffi beer placed second in maltiness and received rather favorable marks for mouthfeel and overall quality. The Alexis brew was judged to be slightly acidic in the finish, but it was praised for its strong body and mouthfeel. The Barke beer on the other hand seemed to accentuate notes of sulfur and diacetyl more so than did the other varieties, but it was given relatively favorable marks in the areas of bitterness and balance. In final discussions, there was general agreement that the Barke beer differed more from the other three beers than did the other three beers from each other. Given that each test beer was brewed only once, it is possible that some differences between the beers was not due to the barley variety.

Several members of the panel also suggested that perhaps not all four barley varieties were equally suited for Pilsner brewing. Some suggested that Scarlett- and Steffi-based malts are probably the most universally usable ones — especially for low-hop pale to golden brews. Some thought that the Alexis-based malt might be best suited for an assertively hopped pale beer, like a Pilsner, while the Barke-based malt might show up better in such deep-golden to deep-amber beers as Bohemian Pilsner or Oktoberfestbier.

Overall, the brew made with malt from Steffi barley received the most favorable average rating of 3.67 on the 5-point scale — in all characteristics combined from all tasters combined. Scarlett came in second with an average of 3.6 points. Alexis collected an average of 3.3 points and Barke brought up the rear with an average of 2.9 points.

It is interesting to note that the first-ranked Steffi and the third-ranked Alexis are among the oldest, still-planted brewing barley varieties in Germany, though today they account for only a few percentage points of the total acreage devoted to brewing barley in that country. By comparison, the second-ranked Scarlett and the fourth-ranked Barke have been bred only a few years, but together they account for almost half of all German brewing barley.

What Does This Mean to a Homebrewer?

Large commercial breweries, which purchase entire batches (or even trainloads) of malt from a maltster usually specify which of the available barley strains they prefer for their deliveries. The maltster then procures these from farmers or grain merchants. The large breweries, of course, rely for their revenues on the continued acceptance of their signature brands, which their consumers have come to expect to taste the same, year in and year out. These breweries are loath to constantly reformulate their recipes. They simply tell the maltsters and farmers what they want, and they get it.

Homebrewers and small craft brewers on the other hand have no such clout. Therefore, from the point of view of buying your grains or grain extracts based on foundation barley varieties, the Weyermann blind taste test is not going to directly make a difference to you. This is especially true since maltsters and extract manufactures tend not to disclose information about grain varieties on their product packaging or in their catalogues.

Nevertheless, I believe that the lessons learned from the Weyermann taste test can have an important bearing on your attitude towards your brewing hobby. In our brewing, we often strive to replicate our favorite brews or a classic style at home, and then get frustrated when we do not completely hit the mark. We may even believe that the principal reason for the perceived shortcomings in our beer-making stem from a deficiency in our brewing skills or equipment. However, next time you debate the success or failure of your brewing efforts, consider that perhaps the real culprit in the equation is that anonymous and seemingly generic brew ingredient, the base malt.

Also, if you are looking to tweak a homebrew recipe, consider that changing your base malt will alter the character of the beer. Swapping one Pilsner malt for another — or any pale malt for another of the same type — may alter your beer's character in a way you like. Although, you may or may not be changing barley varieties by swapping base malts, it's worth a try.

My experience at the taste test taught me how noticeable the differences in otherwise identical malts can be. All the panelists were able to taste these differences and to assess them qualitatively and quantitatively. Even though homebrewers and small craft brewers may never be able to purchase a base malt by its barley variety, at the very least this article might convince you to refrain, henceforth, from useless self-castigation if your beer turns out differently than planned. Hey, it could be the malt!

Horst Dornbusch is a frequent contributor to Brew Your Own *magazine.*

Ever-Changing BARLEY in the Fields

It may come as a surprise to many brewers that brewing barley is not a static commodity. Botanists constantly breed new and better barley varieties, and farmers rarely plant the same variety for more than a dozen years. A variety that may be ubiquitous today may be gone tomorrow — from the fields, from the malt house and from the brew house.

During much of the 1990s, for instance, Harrington and Klages ranked among the most favored two-row brewing barley varieties grown in the New World. Today Klages has become a rarity and Harrington is on a slow decline. Both are being pushed off the fields by up-and-coming varieties such as Conlon, Garnet and Merit. Likewise, in the Old World, such older barley varieties as Alexis and Steffi — and even such newer and still plentiful ones as Barke and Scarlett — are being replaced by such hot-out-of the-breeding-station varieties as Braemer, Cellar and Ursa.

Changes in barley varieties are usually not driven by their malting and brewhouse characteristics, but by agronomic characteristics such as yield per acre, disease resistance and suitability for specific growing conditions. In the end, the farmer, not the maltster and brewer, decides what varieties to plant.

BYO BACK ISSUE SALE!

Buy 5 Issues...Get 5 More Issues FREE!

We are offering readers a very special deal on our limited quantities of back issues. Buy any 5 issues for $25 (plus $10 shipping) and receive 5 more issues for FREE! Buy 5 and get 5 FREE! Choose from these collectible classics still in stock from 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003 and 2004.

HURRY! SUPPLIES ARE LIMITED!

DEC. 95
- Controlling Beer Color
- Winter Brew Recipes

APR. 96
- Apartment Brewing
- Lager & Kegs

MAY 96
- Lautering Tips
- Troubleshooting Guide

JUNE 96
- Partial Mash Tips
- 15 Great Extract Recipes

JULY 96
- Big Batch Brewing
- Scotch Ale

SEPT. 96
- Brewing with Wheat
- Grain Milling Tips

NOV. 96
- Medieval Beer Recipes
- Build a Mash Stirrer

FEB. 97
- Lager Tips
- Microwave Mashing

MAR. 97
- Build Tap Handles
- Growing Backyard Hops

APR. 97
- Low-Alcohol Recipes
- American Pale Ale Recipes

AUG.97
- Make Your Own Malt
- Dry Hopping Tips

SEPT. 97
- Build a Keg Cleaner
- Tips from Sierra Nevada Brewing

OCT. 97
- Extract Kit Guide
- Decoction Mashing

NOV. 97
- Refining Your Mash
- Brewing with Adjuncts

DEC. 97
- Clone Recipes
- Keg Tips

FEB. 98
- Belgian Lambic Tour
- Belgian Abbey Ale Recipes

MAR. 98
- Super Hoppy Recipes
- Lautering Guide

APR. 98
- Scotch Ale Recipes
- Choosing the Right Yeast

JUNE 98
- Hop Profiles and Tips
- Malt Cooler Recipes

JULY 98
- 15 Clone Recipes
- 3 Beers, 1 Mash

AUG. 98
- Easy Beer Calculations
- Yeast Pitching

OCT. 98
- Great Bock Recipes
- Choose the Right Kit

NOV. 98
- Kegging Techniques
- Using Liquid Yeast

DEC. 98
- Cask Conditioning Tips
- Convert Freezer to Beer Chest

JAN. 99
- Aging in Wood
- Figuring Hop Bitterness

FEB. 99
- Malta Yeast Starter
- Organic Homebrewing

MAR. 99
- Imported Clone Recipes
- Build an Electric Brew Stove

APR. 99
- Kegging Guide
- Understanding Brewing Water

MAY 99
- Perfecting Pale Ales
- Nitrogen Homebrews

JUNE 99
- Nut Brown Ale, Pilsner Recipes
- Experimenting w/ Grains

JULY 99
- Summer Homebrew Recipes
- Hempen Ale Recipe

AUG. 99
- Wit, Kölsch Recipes
- American Lager Clones

SEPT. 99
- Build a $50 Mash Tun
- Lager Techniques

OCT. 99
- Homebrewing Soda Pop
- Doppelbock Recipes

NOV. 99
- Hop Flavor Chart
- Easy Partial Mashing

DEC. 99
- Cutting Edge Equipment
- Increasing Batch Size

JAN. 00
- 7 Czech Beer Recipes
- Your First Brew

FEB. 00
- High-Gravity Brewing
- Foreign Clone Recipes

MAR. 00
- Master Beer Conditioning
- Beer Tasting Lessons

APR. 00
- Making Smoked Beers
- Your First Keg

MAY 00
- Your First Mash
- Understanding Your Water

SUMMER 00
- 4 British Clone Recipes
- Put a Spigot in Your Brew Kettle

OCT. 00
- 20 Autumn Extract Recipes
- Build a Counterflow Wort Chiller

NOV. 00
- 6 Belgian Clone Recipes
- Expert Belgian Brewing Tips

DEC. 00
- Brewing Lagers
- Homebrew Lab Gizmos

JAN. 01
- Brew Indigenous Beers From 4 Continents
- Making Root Beer

FEB. 01
- 5 German Clone Recipes
- Decoction Step-by-Step

MAR. 01
- Growing Yeast Strains at Home
- Brew Low-Carb Beer with Beano®

APR. 01
- Grow Your Own Hops
- Strong Ales

MAY 01
- 20 Extract Recipes for Spring
- Build a Counter PressureBottle Filler

SUMMER 01
- 5 Clone Recipes for Summer
- Build a Big-Batch Mash Tun

SEPT. 01
- Learn to Brew with No-Boil Kits, Extract with Grains, Partial Mash, Single-Infusion Mash and Step Mash

OCT. 01
- 15 Classic Extract Recipes for Different Beer Styles
- Build a Hopback

NOV. 01
- Using and Building With Stainless Steel
- Build a Draft Jockey Box

DEC. 01
- Brewing Scotland's Classic Beers
- Build an Easy RIMS

JAN./FEB. 02
- 8 Ski Town Clone Recipes
- Thomas Jefferson's Homebrew

MAR./APR. 02
- Understanding Malt
- Computer Brewing Software

MAY/JUNE 02
- Faster Brewing Tips
- Big Batch Brews

BUY 5 ISSUES...GET 5 MORE ISSUES FREE!

JULY/AUG. 02
- 21 Regional U.S. Recipes
- Brewing with Fruit

SEPT. 02
- Homebrew Trouble shooting Guide
- Build a Draft Beer Fridge

OCT. 02
- Better Extract Techniques
- One Batch, Two Beers

NOV. 02
- 4 Dream Homebrew Set-ups
- Indoor Brewing Systems

DEC. 02
- Monster Holiday Beer Recipes
- Oatmeal Stout, Coffee Beer

JAN./FEB. 03
- Brewing Porter
- Cleaning & Sanitation Made Easy

MAR./APR. 03
- Selecting Hops to Style
- Introduction to Kegging

MAY/JUNE 03
- How to Control the Color of Your Beer
- Adding Oak to Beer

JULY/AUG. 03
- Light Beer Recipes
- Tips for Entering Homebrew Competitions

SEPT. 03
- Pale Ale Recipes
- Yeast Pointers

OCT. 03
- 17 Foolproof Extract Recipes
- Trappist Ale Tips & Recipes

NOV. 03
- Choosing and Using Homebrew Pumps
- Steeping vs. Partial Mashing

DEC. 03
- High-Gravity Beers
- Brewing with Spices

JAN./FEB. 04
- Brewing Milk Stout
- 3 Mardi Gras Clone Recipes

MAR./APR. 04
- Brewing Sugars & How to use Them
- Yeast: Choose the Right Strain for your Beer

MAY/JUNE 04
- Making Low-Carb Homebrew
- Beer Barbecue Recipes

JULY/AUG. 04
- Brewing Bocks -American & German
- Water Tips for Extract Beer

SEPT. 04
- 13 Commercial Hoppy Beers Cloned
- Brewing Old Ales

OCT. 04
- Extract Experiments
- Lambic Brewing

NOV. 04
- 4 Homebrew Projects
- Hard Cider Made Easy

DON'T FORGET TO ORDER MAGAZINE BINDERS! AND THE BEGINNER'S GUIDE

BrewV YOUR OWN

BUY 5 GET 5 FREE

Mark your 10 choices below.

Qty.	Issue	Qty.	Issue
____	December 95 (limited quantities)	____	May 00
____	April 96	____	Summer 00
____	May 96	____	October 00
____	June 96	____	November 00
____	July 96	____	December 00
____	September 96	____	January 01
____	November 96	____	February 01
____	February 97	____	March 01
____	March 97	____	April 01
____	April 97	____	May 01
____	August 97	____	Summer 01
____	September 97	____	September 01
____	October 97	____	October 01
____	November 97	____	November 01
____	December 97	____	December 01
____	February 98	____	Jan./Feb. 02
____	March 98	____	Mar./April 02
____	April 98	____	May/June 02
____	June 98	____	July/Aug. 02
____	July 98	____	September 02
____	August 98	____	October 02
____	October 98	____	November 02
____	November 98	____	December 02
____	December 98	____	Jan./Feb. 03
____	January 99	____	Mar./April 03
____	February 99	____	May/June 03
____	March 99	____	July/Aug 03
____	April 99	____	September 03
____	May 99	____	October 03
____	June 99	____	November 03
____	July 99	____	December 03
____	August 99	____	Jan./Feb. 04
____	September 99	____	Mar./April 04
____	October 99	____	May/June 04
____	November 99	____	July/Aug. 04
____	December 99	____	September 04
____	January 00	____	October 04
____	February 00	____	November 04
____	March 00		

* issues not listed are sold out

5 copies . . . . . April 00 . . . . . .$25 $ _____
5 BONUS copies . . . . . .FREE $ FREE
Shipping/Handling . . . . . .$10 $ _____
Orders outside the U.S. please call or e-mail for shipping quote.
Beginner's Guide _____ x $6 each = $ _____

BYO Binders _____ x $15 each = $ _____
(Binders hold 12 issues each)
Total $ _____

Name _____
Address _____
City _____ State _____ Zip _____
E-mail _____
❑ Check Enclosed ❑ MasterCard ❑Visa
Card# _____
Exp. Date _____
Signature _____

MAIL ORDER FORM TO:
BYO Back Issues
5053 Main St., Suite A
Manchester Center, VT 05255

FAX FORM TO:
802-362-2377
or CALL:
802-362-3981

backissue@byo.com

Beer Foam

Are the details in the "the devil?"

Story and photo by Chris Colby

Beer foam can be a mystery. Usually, it just resides on top of our beers without us having made any special effort for it to appear. Other times, it can mysteriously disappear and nothing seems to remedy the situation.

In this article, I'll discuss what is known about beer foam and offer suggestions to homebrewers who wish to improve their foam.

What's in beer foam?

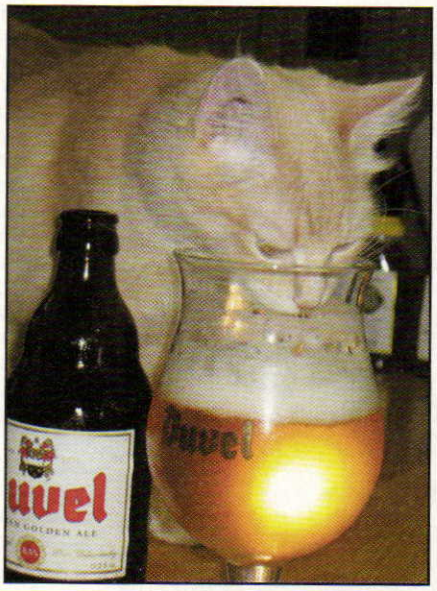
Brewing scientists have studied foam for decades, using a variety of techniques. They have sought to answer the questions, "What is beer foam?," "How can it be improved?" and "Is there a silver bullet hat makes or breaks the foaming potential of beer?" In one study, brewing scientists gathered foam to study using the following method:

The scientists put beer in glass cylinders and blew nitrogen bubbles through the beer to create beer foam. This foam was then collected and dissolved in a beer and water mixture and generated again by blowing more bubbles through it.

This foam was then gathered and separated into two fractions by a technique called gel filtration. One fraction contained high molecular weight molecules, the other contained low molecular weight molecules.

When scientists examined the high molecular weight fraction, they found it to be mostly carbohydrate. About 10% of this fraction was protein; the most common was a protein called protein Z. Protein Z is an albumin with a molecular weight of 40,000 Daltons. (Albumin is simply a name for any protein that is soluble in water and coaguable by heat. A "Dalton" is basically a measure of the size of a protein (or other molecule).)

Beer scientists found that the low molecular weight fraction of beer foam was mostly protein, in particular a 9,700 Dalton protein from barley called Lipid Transport Protein 1 (or LTP1). The fraction also had smaller amounts of the proteins hordein and glutelin. (In the brewing literature, protein Z and LTP1 are alternately referred to as proteins or polypeptides, reflecting the fact that native proteins undergo proteolysis (protein breakdown) during malting.)



The rocky foam from a bottle of Duvel ("the Devil") can stand up to even a cat's raspy tongue.

Once the scientists had isolated the two fractions of foam, they then took these fractions and tried to recreate beer foam from them. This worked well and — in recreating the beer foam from its constituent parts — they learned two interesting things. The low molecular weight fraction (the fraction containing LTP1) were good at forming foam while the high molecular weight fraction (containing protein Z) helped stabilize the foam.

They also tried making foam using only LTP1 (from the low molecular weight fraction). In fact, they used two kinds of LTP1 — LTP1 isolated from beer foam and LTP1 isolated directly from unmalted barley.

The foam formed from beer-foam-isolated LTP1 was not as stable as foam from the entire low molecular weight fraction. And interestingly, the beer foam formed from LTP1 extracted from unmalted barley was very unstable. The inference here was that something in the malting or brewing process alters LTP1 to make it more able to generate foam.

Later it was determined that LTP1 is folded into a roundish globule in barley. In boiling wort, LTP1 unravels (denatures, in the lingo) and changes shape. So, boiling wort converts LTP1 from a mostly inactive form to a form capable of forming good beer foam.

Eureka?

At this point, you may be wondering, "where's the mystery? Can't I just add LTP1 and protein Z to my beer and get good foam?" Given the results, this is very logical and beer scientists have indeed focused on these proteins in creating and enhancing foam.

Studies have shown that LTP1 concentrations vary in barley depending on weather conditions during the growing season. Specifically, drier growing conditions result in higher LTP1 levels. If LTP1 extracts could be harvested from barley in dry years, these could be used to enhance beer foam. In a somewhat more interesting approach, a German team has introduced the LTP1 gene into yeast cells, to try to get brewer's yeast to produce the protein.

Currently, if your beer doesn't have a head on it, you can't pop into your local homebrew shop and pick up a vial of LTP1 or protein Z. But, the conven-

tional homebrewing wisdom has been to do the next best thing — add something to your recipe that contains a lot of protein.

Add wheat malt?

The "something" that is usually recommended as a cure for headless beers is wheat malt. The recommended amount is usually around 0.5 lb. (0.23 kg) per 5 gallons (19 L) of beer.

This recommendation is logical. Wheat malt contains more protein than barley malt, and by inference it should have more LTP1 and protein Z. In addition, observational evidence suggests that it works — wheat beers typically have huge heads. The one and only problem I find with the suggestion of adding wheat malt is that I've never seen it work.

My experience has been that, if you are having problems with forming a head, adding wheat malt doesn't help. (On the other hand, if you are already getting decent foam, adding wheat can increase the amount and longevity of foam.) I've also noticed that many "low protein" beers form perfectly nice heads, counter to the idea that you need a lot of protein in your grain bill to form good beer foam.

One case in point is the Belgian beer Duvel ("devil"). Duvel is made from Pilsner malts and quite a bit of protein-less adjunct (sugar), yet it still forms a huge, rocky head that clings to the glass right to the end of the beer. (On the other hand, it's big beer, so — even with the adjunct — there is a decent amount of Pilsner malt in the grist.) My experience with other "low-protein" beers also suggests that you do not need a lot of protein in your beer to form a good head. If you're functionally foamless, I think you need to look to other avenues to generate beer foam.

Help for the headless

My suggestion for "headless homebrewers" is that there is one likely culprit for most headless homebrew — bad fermentations.

I think that most headless homebrews result from beers with too many "head killers" in them. Specifically, I'm thinking of some of the foam killing molecules — such as higher alcohols (or "fusel oils") — that result from fermentation temperatures that are too high or worts that are underpitched. In most cases, I believe there are enough foam positive elements in the beer, but these are negated by fermentation byproducts that kill foam. (Note that Belgian yeasts and German wheat yeasts both reputedly produce lower levels of fusel oils than normal brewers yeast strains, especially at higher fermentation temperatures.)

In addition, when yeast are stressed during fermentation, they secrete proteases in larger amounts than unstressed yeast do. Stress may result from underpitching, underaeration or high-gravity fermentation. The resulting protease activity may

decrease the amount of beer foam in the resulting beer.

Nobody said there would be a test

If you have little or no foam in your homebrew, a simple test should tell you whether you are lacking "foam makers" or have an excess of "foam breakers." While sipping on a Duvel, vigorously shake your headless brew, then pour the beer into a tall, thin glass.

If no head forms, you don't have enough foam positive molecules in your beer. In this case, more protein in the grist may be called for. (A more vigorous boil may also help if your boils are weak.)

If foam forms, but quickly dissipates, you have all the protein you need, but other factors are interfering with them. My suggestion in this case would be to make a yeast starter each time you brew, aerate well and control the fermentation temperature of your wort as it ferments.

Note that your beer needs to be carbonated for this test to work. If it's flat, try raising bubbles by another method, such as with an aeration stone.

Other factors

Foam is influenced by numerous other factors. Dirty glasses, for example, kill beer foam. Fat kills foam by occupying space on the surface of the beer where foam would form.

In contrast, higher levels of carbonation build foam. Bubbles in beer grab proteins (and other molecules) and drag them to the surface.

Glasses that are etched on the bottom, as Duvel glasses are, also enhance beer foam. The etching provides nucleation sites for bubbles to form and the continuing stream of bubbles builds foam that at least partially compensates for foam collapse.

Smaller bubbles also raise more beer foam, and nitrogen forms smaller bubbles in beer than carbon dioxide does. This partially explains the foam on stouts served from nitrogen taps.

Lastly, homebrewers who keg their beer should be aware that foam positive molecules can get "used up" when foam is created. Thus, if you shake your keg to carbonate it, you may be dipping into your pool of foam makers for your beer.

Some commercial brewers use a silicone anti-foam during fermentation to limit foaming during fermentation. This allows them to fill their tanks higher, but also minimizes "wasted" beer foam produced during fermentation. The silicone is later removed via filtration. (Note that beer foam and yeast kraeusen are not the same thing.)

Good foam seems to follow good general brewing practices. There is no silver bullet to getting good foam, so focus on making good beer and the foam should come naturally.

BYO *Editor Chris Colby would like you to know that no kittens were harmed in the making of this article.*

Transparent Oxygenator

An aeration system that you can see right through

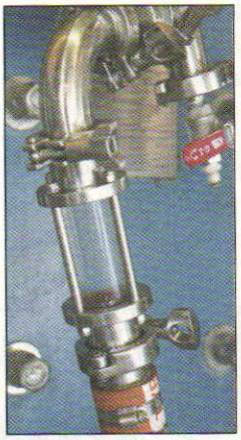
Story and Photos by Thom Cannell

Every first-time homebrewer has read about the necessity of oxygenating wort. Beginners typically shake the carboy or introduce oxygen by splashing as wort is transferred into the fermenter. Soon you begin the search for easier ways to introduce oxygen to your wort. Then you discover aquarium pumps and air stones that can aerate your wort efficiently.

Finally, you can attach a stainless steel air stone at the end of a stainless steel tube and direct injection of oxygen into the wort. It's a nearly perfect solution, relatively cheap and easy. Then the inevitable happens, you visit a microbrewery and see how the pros do it. They attach an in-line continuous oxygenation system directly to the output of their multi-plate wort chiller. Thus the idea is born — "Hey, I could do that!"

Yes, you can build an in-line oxygenation system and we showed you how in the December 2000 issue of *BYO*, but you couldn't observe the process. Now, I have discovered clear, food grade schedule 40 PVC tube and all normal fittings — plus FPT (Female Pipe Taper) adapters with ½" thread that are available at a modest price.

Note: Gases dissolve in liquids and they dissolve better when the liquid is chilled and under higher pressure. When the pros do it, the oxygen is being forced into a wort chilled to 45–70 °F (7–21 °C) in a system that is pump-pressurized to 15 pounds per square inch (PSI) or greater. If you use a counterflow wort chiller, you can pump your wort through the chiller and thus pressurize the system, but probably to only 1–2 PSI Thus the concentration of oxygen in the wort may not achieve theoretical maximum. My argument is this: how could this oxygenation method be less effective than using an oxygenating stone thrust into the wort once it is in the carboy? *Brew Your Own* Technical Editor Ashton Lewis says "The oxygen in wort is usually considered to be at atmospheric pressure and any added pressure in the line would be a boost. We aerate after our wort chiller and the wort flows into a tank with no top pressure. My guess is that the pressure in the line is pretty low and homebrewers should not be hindered by not having pressure beyond 2 PSI."



This is what starts it all, a commercial in-line oxygenator. The red handle controls introduction of pure oxygen into the wort stream, it is easily visualized in this glass chamber.

PARTS:

Air stone: FE396: ½" MPT Oxygen Stone (2-Micron)	$41.95
#34218 clear Schedule 40 PVC T	$5.45
#34227 clear Schedule 40 ½" x FPT	$4.87 - 2
or #34291 clear Schedule 40 cap	$3.95 - 2
#34102 clear Schedule 40 tube	$12.70 per 10'
PVC pipe cleaner	
PVC clear pipe cement	

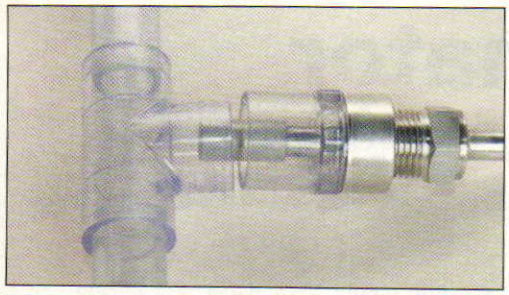
Another consideration is the sintered stainless steel gas stone itself. Stones are available sized according to gas passage, typically 2 to 0.5 microns. Each produces different gas bubble sizes. While smaller bubbles from a 0.5-micron stone dissolve better, the larger bubbles from a 2-micron stone are easier to push into a pressurized liquid.

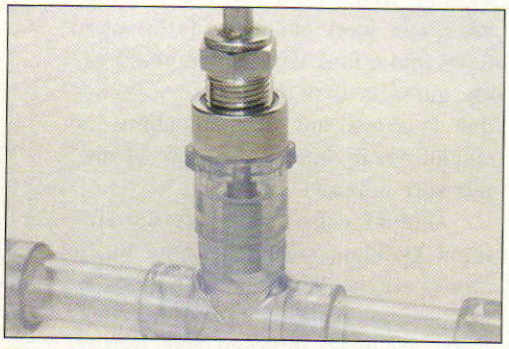
The commercial oxygenator — wort inlet, wort outlet and port for the sintered air stone — sounded like a T fitting to me. Connecting a barbed or other fitting to the inlet and outlet was a total no-brainer, the catalog had end caps and the aforementioned ½" x FPT fittings. Fortunately, the nylon or brass barbed fittings fit the FPT fitting (but if they didn't, I could self-tap an end cap with a brass barb fitting).

Finding an easily installed air stone was a greater challenge. My air stones are small and connected to ⅜" outer diameter (o.d.) stainless steel pipe. My idea was to cut one down and use a compression fitting. However, in my shopping around, I found that Beer, Beer and More Beer makes a 2 micron air stone welded to a stainless steel ½" MPT fitting — a perfect fit!

All I would need to build the project would be a T fitting, three end caps or FPT adapters, the air stone, some tubing and glue. Once all the parts were on hand, it looked like a one-hour project. There is always a "gotcha" lurking somewhere, isn't there? Mine was the tubing to join the slip-fit T and other fittings.

Clear tubing is sold only in 10-foot





(top): Here you slip-fit the parts to check on sizes. (bottom): Note that our oxygen stone does not intersect the main wort flow. The oxygen will be forced into the wort naturally. If you would like your stone to reach the wort, shorten the T-fitting.

lengths; I needed less than one foot. Solution #1, buy 10 feet of clear tube, which I did for this project. Solution #2, any white or gray Schedule 40 ½" tube will fit. You or a buddy probably have some lying around. If not, it's only a couple of bucks at your home store.

Tools and parts:

You need minimal tools for this project, a tubing cutter or hack saw, a ruler, and an adjustable wrench. The parts list is short, a clear plastic T, three ½" x FTP fittings and some Teflon tape, two barbed or other ½" fittings for inlet/outlet, an air stone, 8–12 inches of ½" Schedule 40 tubing, and the required PVC glue. Use clear tubing cement for a nice appearance.

Once all the pieces are assembled, cut your joining tubes to length. I decided to add a bit of extra length to the in/out ends of the T, and the length of the air stone required a near-flush fit, a 1½" tube section.

Cut the tubing — clear or colored — to length and smooth the cut edges. Every brewing text points to crevices as hiding places for bacteria so smooth the surfaces with several grades of sandpaper. Then clean the surfaces with PVC plastic cleaner before assembly. PVC glue literally melts the plastic before evaporating and proper application will leave a nearly seamless joint.

Apply glue (we did not for clarity in photos) and assemble like any PVC plastic plumbing with a ⅛-¼ twist. Apply Teflon tape to your brass or nylon barb fittings, or quick-disconnects if you're using them, and insert into the FPT fittings. Tighten approximately ½ turn beyond finger tight.

That is it — you're done. Connect to your normal wort output and start the oxygen flowing as fresh wort cascades from your kettle.

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

Aeration

Give your yeast some breathing room

by Bill Pierce

New brewers are cautioned that oxygen is bad for their beer, and commercial breweries go to great lengths to reduce the oxygen introduced during packaging to the parts per billion (ppb) level. However, there is one time during the brewing process when oxygen is of great benefit. Yeast requires abundant amounts of oxygen for healthy reproduction. The yeast cells reproduce by budding, that is, new cells are formed and then separate from the existing cells. The chemical building blocks for the new cell walls are sterols and unsaturated fatty acids, and a major element in these compounds is oxygen.

If starved for oxygen during this critical time, the yeast will stop reproducing. Additionally, the walls of the new cells will be fragile and can easily rupture, preventing the cell from doing its fundamental work of metabolizing the sugars in the wort to produce ethanol and carbon dioxide. Without a sufficient population of healthy yeast, fermentation may stall prematurely or be incomplete, the beer may be too sweet and underattenuated and other undesirable compounds and flavors may result.

It's in the air

Where does the yeast find a source of this essential element? Fortunately the earth's atmosphere contains approximately 21% oxygen, which dissolves readily in water. However, the solubility of gases in water (and wort or beer) is greatly dependent upon the temperature. As the temperature decreases, the solubility increases. For example, at sea level and freezing (32 °F or 0 °C) pure water can hold up to 14.6 milligrams per liter (mg/L, equivalent to parts per million, or ppm) of dissolved oxygen. At a typical lager fermentation temperature of 50 °F (10 °C), the saturation level decreases to 11.3 mg/L, while at an ale fermentation temperature of 68 °F (20 °C) it is 9.2 mg/L. At boiling (212 °F or 100 °C at sea level), it is essentially zero.

As the wort is boiled, virtually all of the dissolved oxygen is driven off, resulting in extremely low levels even after it is chilled. Therefore it is necessary to supplement the wort with additional oxygen so that the yeast can reproduce properly. This is accomplished by aerating or oxygenating the wort. Those homebrewers who boil only a partial volume of concentrated wort and top off the fermenter with cold water enjoy some advantage in terms of aeration. The cold top-off water as it comes from the tap is likely to contain 3-4 mg/L of dissolved oxygen and vigorous splashing of the water can increase this.

The sugars and other solids dissolved in the wort also affect the oxygen solubility, which decreases as the specific gravity increases. This can be significant at higher wort gravities. For example, the saturation level decreases more than 3 mg/L when the specific gravity increases from 1.040 to 1.100. This is despite the fact that higher gravity worts place more stress on the yeast and require more oxygen.

Is enough enough?

How much oxygen is required for healthy yeast reproduction? There is some disagreement about this among brewing scientists, but the minimum level is considered to be 5 mg/L, and the optimum demand for oxygen by some yeast strains at higher specific gravities increases to as much as 12–13 mg/L, which can be beyond the saturation level.

Excessive oxygen can be toxic to the yeast. While this is true, it is unlikely to be a problem from a practical standpoint. Oxygen toxicity occurs at levels above that of saturation in the wort. As oxygen is added during aeration, any excess beyond the saturation level is quickly bubbled off into the air where it can do no harm.

The evidence that the yeast quickly consumes the dissolved oxygen is clear. Within only a few hours after pitching the yeast, the level of dissolved oxygen in the wort drops to nearly zero. To some extent it is possible to "pre-load" the yeast with sterols and unsaturated fatty acids, reducing the dissolved oxygen requirements. Some dry yeast manufacturers claim to enhance their yeast with these components, but there has been little research into its effectiveness. Continuously aerating the yeast during propagation and prior to pitching also reduces the oxygen demand; however, this is seldom practical for homebrewers who are making starters from liquid yeast.

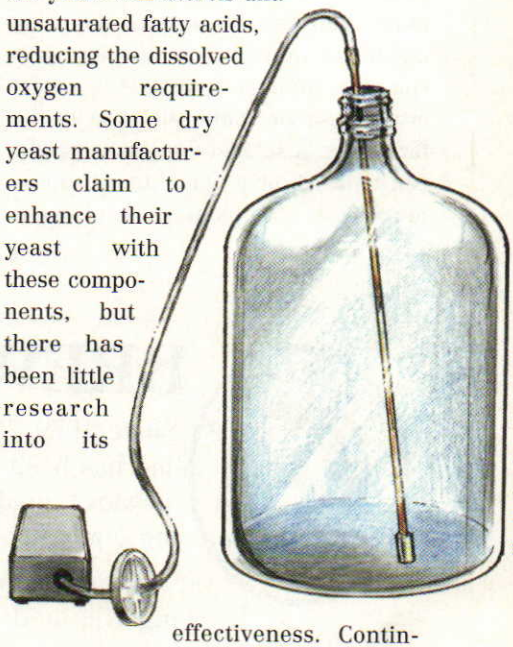


illustration by don martin

Almost everyone agrees that wort aeration is desirable, but it is more difficult to quantify the amount. The instrument for measuring oxygen levels in liquids is a dissolved oxygen meter. Unfortunately DO meters are expensive ($500 or more), need frequent calibration and the sugars in the wort tend to foul the probe. This shortens the life of the probe and requires rather frequent replacement (adding another $150 or more to the cost). This places them beyond the means of all

but the most dedicated homebrewer, and only a few larger craft breweries use such a tool.

However, the vast majority of commercial breweries do add pure oxygen or compressed air to the wort immediately after it is chilled. The most common method is to introduce the gas via an aeration stone placed in the line between the wort chiller and the fermenter. Major American lager brewers, for example, strive for a dissolved oxygen level of 9-10 mg/L in their wort.

Letting the air in

Several different aeration practices are used by homebrewers. Some merely let the chilled wort fall from a distance into the fermenter, acquiring additional oxygen from the air as it splashes. Another technique is to vigorously stir or shake the wort in the fermenter. A sanitized spoon or paddle can be used, or a paint stirrer can be purchased at a paint store or home center and attached to an electric drill. This will provide an increased level of dissolved oxygen above that of the tap water, but it is far from optimal, especially for lagers and higher gravity beers. Additionally, caution is required when using fragile carboys and other glass fermentation vessels.

Somewhat more effective is pouring the wort repeatedly between sanitized buckets from a height of several feet (1 m) or higher. It's possible to achieve dissolved oxygen levels of 6–7 mg/L via this method, but there is the risk of spilling and the fact that it should be done repeatedly (at least 5–6 times) and can be time-consuming and impractical for batches larger than 5 gallons (19 L).

An alternative is the Wortwizard (http://www.wortwizard.com), which utilizes the chilling water flow and the Venturi principle to act as both a wort pump and aerator. This device is placed in the cold water line and slightly restricts the flow. A small hole pulls in the ambient air, creating a partial vacuum that is used to draw the wort from the kettle to the fermenter and also to provide aeration. The manufacturer has not provided any data on the resulting level of dissolved oxygen.

Getting directly to the point

It is also possible for homebrewers to inject air or oxygen directly into the wort, much like commercial breweries. The goal is to increase the contact area between the gas and liquid so as to decrease the time necessary to achieve the proper level of dissolved oxygen.

Merely inserting a hose into the wort would be highly inefficient. A far better device for diffusing the gas quickly and efficiently into the wort is a porous aeration stone, which produces extremely tiny bubbles that dissolve in the wort rather than being lost into the air. Stones suitable for wort aeration have a pore diameter of 0.5 micron

or less.

Inexpensive ceramic aeration stones intended for keeping live fish can be found at aquarium shops, but these should be considered disposable. They tend to crumble in the relatively acidic environment of the wort and are very difficult to clean afterward. Permanent aeration stones made from sintered stainless steel are more expensive (typically $10–25) and can be purchased from homebrew shops and suppliers. With proper cleaning and sanitation (boiling in water for several minutes is usually sufficient), a stainless stone should last a very long time. If your brewing water is hard and contains a lot of dissolved minerals, it may be necessary periodically to soak the stone in a solution of commercial lime remover.

An aquarium pump can be used as a source of air for the stone. There are several factors to consider if you use this method. The first is that the volume of air delivered by the pump is relatively small. Coupled with the fact that air is only approximately 21 percent oxygen, this means that a considerable length of time may be required to adequately aerate the wort. One hour or more per 5 gallons (19 L) of wort is typical.

Furthermore, the ambient air is hardly sterile. Airborne wild yeast, bacteria and other microorganisms can contaminate the wort — especially during warm weather and in humid climates. Therefore, it is highly recommended to filter the output of the pump. A sterile HEPA filter with an effective size of 1.0 micron, intended to remove impurities from the air for allergy sufferers and those with breathing disorders, is available at pharmacies and from some homebrew suppliers. The HEPA filter should be replaced regularly.

A rudimentary disposable filter can be made from sterile cotton balls soaked in isopropyl alcohol, enclosed in a larger diameter piece of tubing and inserted into the air line.

The pure stuff

More effective and much quicker than an aquarium pump is to use pure oxygen from a compressed gas cylinder and regulator. Hardware stores and home centers sell brazing torch kits that can be adapted for homebrew wort aeration. These are also available at some homebrew shops and suppliers. They include a small oxygen regulator that attaches to a disposable cylinder. When this is connected to an aeration stone, it is possible to adequately aerate 5 gallons (19 L) of wort in 45–60 seconds. One disposable cylinder will oxygenate approximately 40–50 gallons (150–190 L) of wort before needing replacement at a cost of $8–12.

Larger regulators and refillable cylinders are available from welding gas suppliers. If you brew larger batch sizes or relatively often, it may be less expensive in the long run to buy or

lease your regulator and gas from a welding shop. An explanation is in order about the various grades of oxygen. Industrial grade is the most commonly available type and can be found at any welding gas supplier. Aviation grade has more stringent requirements for the water content and medical grade requires a prescription and more detailed recordkeeping on the part of the manufacturer and dealer.

For brewers, these distinctions are largely unimportant, for it is not cost effective to manufacture the grades differently. (All are separated from highly compressed liquid air at extremely low temperatures.) Moreover, pure oxygen is a very inhospitable environment for microorganisms, so bacterial contamination is not really a problem. Because of this, filtration is not necessary as it is with air.

As might be expected, aeration of the wort tends to produce foaming, which of course is also an indication of its relative success. This is not considered undesirable, but sometimes the foam can overflow the fermenter. A commercial food grade foam control agent, available at homebrew shops, can greatly ease any problem.

A small amount of foam reducer — anywhere from a few drops to a teaspoon per batch — is effective at reducing the foam, yet it does not later diminish heading of the finished beer because it breaks down during fermentation. Many commercial breweries use foam control agent to effectively increase their fermenter capacity.

Mo' better air?

You may wonder if additional aeration is beneficial after the yeast is pitched. There is some indication that the yeast will continue to reproduce and consume oxygen for as long as 24 hours after fermentation begins. The risk to aerating this late is that not all of the oxygen will be used, and it will end up contributing to oxidation and the papery and sherry-like flavors that are the signs of staling. Some commercial breweries give their wort additional oxygen or air after a period of 12–24 hours, especially for high gravity beers. It may be worthwhile for homebrewers to do the same in cases where there is a long "lag time," that is, a period with little or no apparent fermentation activity. However, once there are signs of vigorous fermentation, it is wise not to introduce additional oxygen into your wort.

Whatever method you use to provide oxygen to your wort, your yeast is likely to be grateful for this essential element and will reward you with flavorful beer that is properly fermented and fully attenuated. Some of the best advice I can give for successful homebrewing can be summed up in this simple mantra: pitch a large population of healthy yeast and aerate the chilled wort well.

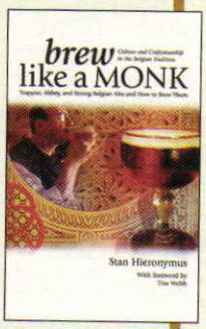
Bill Pierce is BYO*'s "Advanced Brewing" columnist.*

READERSERVICE

For direct links to all of our advertisers' Websites, go to www.byo.com

BREWER'S log

Brew like a Monk: Trappist, Abbey, and Strong Belgian Ales and How to Brew Them



This new book by Stan Hieronymus focuses on the tradition of monastic brewing and gives readers an inside look at modern producers in both America and Belgium. The book also contains educational information on the methods of brewing the unique styles of Trappist and Abbey ales. The book is meant to inform both the commercial and amateur brewer alike. The book retails for $17.95 and is available at www.beertown.org. For more information contact Cindy Jones at (303) 447-0816 x 144 or via email at cindy@brewersassociation.org.

"Basic Brewing Radio" brings homebrewing to Podcast Listeners and new DVD

Podcasting is making its way to homebrewers. Basic Brewing Radio is a weekly podcast, or Internet radio show, that is dedicated to the subject of brewing beer at home. Spencer is also the producer of "Basic Brewing: Introduction to "Extract Home Brewing," a DVD video that helps those who are new to home brewing get started. To tune into the podcast and to find out more about the DVD, visit www.basicbrewing.com.

CLASSIFIEDS

BREWER'S MARKETPLACE

Statement of Ownership, Management, and Circulation. Filing Date: September 29, 2005. Brew Your Own, Publication No. 1081-826X, is published monthly except February, April, June and August, 8 times a year, at 5053 Main St., Suite A, Manchester Center, VT 05255 by Battenkill Communications, Inc. Annual subscription price is $24.95. Publisher, Brad Ring, 5053 Main St., Suite A, Manchester Center, VT 05255. Editor, Chris Colby, 5053 Main St., Suite A, Manchester Center, VT 05255. Managing Editor, Garrett Heaney, 5053 Main St., Suite A, Manchester Center, VT 05255. Owner, Battenkill Communications, Inc., 5053 Main St., Suite A, Manchester Center, VT 05255, Brad Ring, 5053 Main St., Suite A, Manchester Center, VT 05255. There are no additional bondholders, mortgages, or other securities holders owning or holding more than 1 percent. Total copies: 28,338 average, 35,660 October 2005. Paid/requested outside-county mail subscriptions: 17,056 average, 21,939 October 2005. Paid in-county subscriptions: 0 average, 0 October 2005. Paid dealer sales: 4,207 average, 5,880 October 2005. Other classes mailed through the USPS: 489 average, 531 October 2005. Total paid/and or requested circulation: 21,752 average, 28,350 October 2005. Free distribution by mail outside-county: 244 average, 501 October 2005. Free distribution by mail inside-county: 0 average, 0 October 2005. Free distribution by other classes mailed through the USPS: 115 average, 120 October 2005. Free distribution outside the mail: 338 average, 350 October 2005. Total free distribution: 697 average, 971 October 2005. Total distribution: 22,449 average, 29,321 October 2005. Copies not distributed: 5,889 average, 6,339 October 2005. Total circulation: 28,338 average, 35,660 October 2005. Percent paid and/or requested circulation: 96.90% average, 96.69% October 2005. Submitted September 29, 2005 by Brad Ring, Publisher.

ALABAMA

Werner's Trading Company
1115 Fourth St. S.W.
Cullman
1-800-965-8796
www.wernerstradingco.com
The Unusual Store.

The Wine Smith
6800 A Moffett Rd. (US Hwy. 98)
Mobile 36618
(251) 645-5554
fax (251) 645-6446
e-mail: winesmith@bellsouth.net
Serving Central Gulf Coast Homebrewers

ARIZONA

Brew Your Own Brew
2564 N. Campbell Ave., Suite 106
Tucson (520) 322-5049 or
1-888-322-5049
www.brewyourownbrew.com
Where the art of homebrewing starts.

Homebrewers Outpost & Mail Order Co.
801 S. Milton Rd., Suite 2
Flagstaff
1-800-450-9535
www.homebrewers.com
Free Shipping in Arizona on orders over $50.

What Ale's Ya
6363 West Bell Road
Glendale
(623) 486-8016
www.whatalesya.com
Great selection of beer & wine making supplies.

ARKANSAS

Fermentables
3915 Crutcher St.
North Little Rock 72118
(501) 758-6261
www.fermentables.com
Complete homebrew & winemakers supply

The Home Brewery
455 E. Township St.
Fayetteville
1-800-618-9474
homebrewery@arkansasusa.com
www.thehomebrewery.com
Top-quality Home Brewery products.

CALIFORNIA

Beer, Beer & More Beer Riverside
1506 Columbia Ave. #12
Riverside 92507
1-800-622-7393
www.morebeer.com
Top-quality Supplies for the Home Brewer or Vintner.

Beverage Company Beer, Wine & Cheesemaking Supply
2990 East St.
Anderson 1-800-317-9963
E-mail:
maltbyault@winemakingbrewingco.com
www.winemakingbrewingco.com
53 Years Brewing Experience!

The Beverage People
840 Piner Road, #14
Santa Rosa
1-800-544-1867
www.thebeveragepeople.com
Fast Shipping, Great Service!

Brewers Discount
8565 Twin Trails Dr.
Antelope 95843
1-800-901-8859
sales@brewersdiscount.com
www.brewersdiscount.com
Lowest prices on the Web!

Doc's Cellar
855 Capitolio Way, Ste. #2
San Luis Obispo
805-781-9974
www.docscellar.com
Largest beer & wine supplier on the central coast.

The Good Brewer
2960 Pacific Ave.
Livermore 94550
(925) 373-0333
fax (925) 373-6232
www.goodbrewer.com
Home brew and wine making supplies

Home Brew Shop
1570 Nord Ave.
Chico 95926 (530) 342-3768
E-mail: homebrushop@yahoo.com
Years of experience, advice always free!

HopTech Home Brewing Supplies
6398 Dougherty Rd. #7
Dublin 94568
1-800-DRY-HOPS
www.hoptech.com
Beer, Wine, Root Beer-Kits & Brew Supplies!

HydroBrew
1319 South Coast Hwy.
Oceanside 92054
(760) 966-1885
www.hydrobrew.com
Homebrewing & Hydroponics supplies serving the San Diego area.

Morning Glory Fermentation Supply
6601-C Merchandise Way
Diamond Springs 95619
1-866-622-9660
www.morninggloryfermentation.com
Great selection. Best quality. Awesome service!

Napa Fermentation Supplies
575 3rd St., Bldg. A (Inside Town & Country Fairgrounds)
P.O. Box 5839
Napa 94581
(707) 255-6372
www.napafermentation.com
Serving your brewing needs since 1983!

Original Home Brew Outlet
5528 Auburn Blvd., #1
Sacramento (916) 348-6322
Check us out on the Web at www.ehomebrew.com

O'Shea Brewing Company
28142 Camino Capistrano
Laguna Niguel
(949) 364-4440
www.osheabrewing.com
Providing southern California with great beer!

San Francisco Brewcraft
1555 Clement Street
San Francisco 94118
(800) 513-5196
or 415-751-9338
www.sfbrewcraft.com
Low Prices, Large Selection

Seven Bridges Organic Homebrewing Supplies
325 A River St.
Santa Cruz 95060
1-800-768-4409
fax 831-466-9844
www.breworganic.com
Certified Organic Brewing Ingredients

Stein Fillers
4160 Norse Way
Long Beach (562) 425-0588
www.steinfillers.com
brew@steinfillers.com
A nonprofit public benefit company.

COLORADO

Beer and Wine at Home
1325 W. 121st. Ave.
Westminster 720-872-9463
www.beerathome.com
Now Open!

Beer at Home
4393 South Broadway
Englewood (303) 789-3676
1-800-789-3677
www.beerathome.com

The Brew Hut
15108 East Hampden Ave.
Aurora 1-800-730-9336
www.thebrewhut.com
Beer, Wine, Mead & Soda — WE HAVE IT ALL!

Lil' Ole' Winemaker
516 Main Street
Grand Junction 81501
(970) 242-3754
Serving Colorado & Utah brewers since 1978

My Home Brew Shop & Brew on Premise
5923 N. Academy Blvd.
Colorado Springs 80918
(719) 528-1651
www.myhomebrew.com
Taking Homebrewers to the next level

Stomp Them Grapes!
2563 15th Street, 101
Denver 80211
(303) 433-6552
www.stompthemgrapes.com
Because making it is almost as fun as drinking it!

CONNECTICUT

Beer & Wine Makers Warehouse
290 Murphy Road
Hartford 06114
(860) 247-BWMW (2969)
e-mail: bwmwct@cs.com
www.bwmwct.com
Area's largest selection of beer & winemaking supplies. Visit our 3000 sq ft facility with class & demo areas. New grain crushing room.

Maltose Express
887 Main St. (Route 25)
Monroe 06468
In Ct.: (203) 452-7332
Out of State: 1-800-MALTOSE
www.maltose.com
Connecticut's largest homebrew & winemaking supply store. Buy supplies from the authors of "CLONEBREWS" and "BEER CAPTURED"!

FLORIDA

The Shady Lady
2475 B East Nine Mile Rd.
Pensacola 32514
(850) 436-4436
www.theshadylady.net
From bottles to books, from kits to chemicals - We have everything to brew your own!

GEORGIA

Beer Necessities
9850 Nesbit Ferry Rd.
Alpharetta 30022
(770) 645-1777
www.brewvan.com
Located North of Atlanta off of HWY 400

Just Brew It
103 Rainbow Way
Fayetteville 30214
(770) 719-0222
Fax (770) 719-0274
www.aardvarkbrewing.com
9 miles south of Perimeter on GA Hwy. 85

Wine Craft of Atlanta
5920 Roswell Rd., C-205
Atlanta 30328 (404) 252-5606
winecraftatl@bellsouth.net
Helping customers make beer and wine since 1969!

IDAHO

Your Place or Mine?
9424 N. Government Way
Hayden Lake 83864
1-800-606-6046
or (208) 762-2550
www.vintit.com
"Check us out again for the very first time"

ILLINOIS

Bev Art Brewer & Winemaker Supply
10033 S. Western Ave.
Chicago (773) 233-7579
www.bev-art.com
Mead supplies, grains, liquid yeast and beer making classes on Premise.

The Brewer's Coop
30 W. 114 Butterfield Road
Warrenville 60555
(630) 393-BEER (2337)
www.TheBrewersCoop.com
DuPage County's LARGEST homebrew shop!

Chicagoland Winemakers Inc.
689 West North Ave.
Elmhurst 60126
Phone: 1-800-226-BREW
E-mail: cwinemaker@aol.com
www.cwinemaker.com
Personal Instruction!

Crystal Lake Health Food Store
25 E. Crystal Lake Ave.
Crystal Lake (815) 459-7942
Upstairs brew shop - Complete selection incl. Honey, Maple Syrup & unusual grains.

Home Brew Shop
225 West Main Street
St. Charles 60174 (630) 377-1338
www.homebrewshopltd.com
Full line of Kegging equipment, Varietal Honey

Somethings Brewn'
401 E. Main Street
Galesburg 61401 (309) 341-4118
www.somethingsbrewn.com
Midwestern Illinois' most complete beer and winemaking shop.

INDIANA

The Brewers Art Supply
1520 N. Wells Street
Fort Wayne 46808 (260) 426-7399
e-mail: francie.brew@verizon.net
www.brewersartsupply.com
Friendly, Reliable service in house and on-line

Butler Winery, Inc.
1022 N. College Ave.
Bloomington 47404
(812) 339-7233
e-mail: vineyard@butlerwinery.com
Southern Indiana's largest selection of homebrewing and winemaking supplies. Secure shopping online at www.butlerwinery.com

Co-op Corner General Store
5015 N. St. Joe Ave.
Evansville 47720
1-800-398-9214 or
(812) 423-6481
Beer & Wine. Brew supplier for Southern Indiana.

Great Fermentations of Indiana
853 E. 65th St.
Indianapolis
(317) 257-WINE (9463)
or toll-free 1-888-463-2739
www.greatfermentations.com
E-mail us at anita@greatfermentations.com

Hammer's Wine
408 Arnold Ct.
Kokomo 46902
(765) 453-9165
fax (765) 453-9209
www.hammerswine.com
For all your beer making pleasures.

Kennywood Brewing Supply
Crown Point
(219) 765-BREW
www.kennywoodbrew.com
Visit us online. Fresh homebrewing ingredients and more!

Quality Wine and Ale Supply
530 E. Lexington Ave., Suite 115
Elkhart 46516
Phone or fax (574) 295-9975
e-mail: info@homebrewit.com
www.homebrewit.com
Quality wine & beer making supplies. 24/7 secure online ordering w/fast, safe & reliable worldwide shipping. Visit our FULLY STOCKED retail store in Elkhart for everday supplies and over 200 wine and beer kits always in stock.

IOWA

BlueStem Winery
305 Third St.
Parkersburg (319) 346-1046
www.bluestemwine.com
e-mail: bluestemwine@mchsi.com
Brewing & Winemaking Supplies

KANSAS

Bacchus & Barleycorn Ltd.
6633 Nieman Road
Shawnee 66203
(913) 962-2501
www.bacchus-barleycorn.com
Your one stop home fermentation shop!

Homebrew Pro Shoppe, Inc.
2059 E. Santa Fe
Olathe (913) 768-1090 or
Toll Free: 1-866-BYO-BREW
Secure online ordering: www.brewcat.com

Kramer's Ale-N-Vino
925 N. Kansas Ave.
Topeka 66608 (785) 232-1990
e-mail: ale-n-vino@kscoxmail.com
www.ale-n-vino.com
Not the largest, just the best. Personal service.

MARYLAND

Annapolis Home Brew
836 Ritchie Hwy., Suite 19
Severna Park 21146
(800) 279-7556
Fax (410) 975-0931
www.annapolishomebrew.com
Friendly and informative personal service; Online ordering.

The Cracked Cork LLC
19202 Poffenberger Rd.
Hagerstown 21740 (301)791-2882
e-mail: egbowles1@earthlink.net
www.crackedcork.com
Brew on Premise and brewing supplies.

The Flying Barrel
103 South Carrol St.
Frederick (301) 663-4491 or
Fax (301) 663-6195
www.flyingbarrel.com
Maryland's 1st Brew-On-Premise; winemaking and homebrewing supplies!

Maryland Homebrew
6770 Oak Hall Lane, #115
Columbia 1-888-BREWNOW
www.mdhb.com
We ship UPS daily.

MASSACHUSETTS

Beer & Wine Hobby
155 New Boston St., Unit T
Woburn 1-800-523-5423
E-mail: shop@beer-wine.com
Web site: www.beer-wine.com
One stop shopping for the most discriminating beginner & advanced beer & wine hobbyist.

Beer & Winemaking Supplies, Inc.
154 King St.
Northampton (413) 586-0150
or Fax (413) 584-5674
www.beer-winemaking.com
29th year! Fresh White Labs.

Modern Homebrew Emporium
2304 Massachusetts Ave.
Cambridge 02140 (617) 498-0400
fax (617) 498-0444
www.modernbrewer.com
The Freshest Supplies, In Business for 13 Years!

NFG Homebrew Supplies
72 Summer St.
Leominster 01453 (978) 840-1955
or Toll Free: 1-866-559-1955
www.nfghomebrew.com
Email: nfgbrew@aol.com
Great prices! Personalized service! Celebrating 10 years in business.

Strange Brew Beer & Winemaking Supply
331 Boston Post Rd. E. (Rt. 20)
Marlboro 1-888-BREWING
E-mail: dash@Home-Brew.com
Website: www.Home-Brew.com
We put the dash back in Home-Brew!

West Boylston Homebrew Emporium
Causeway Mall, Rt. 12
West Boylston (508) 835-3374
www.wbhomebrew.com
Service, variety, quality. Open 7 days.

The Witches Brew, Inc.
12 Maple Ave.
Foxborough (508) 543-0433
thewitchesbrew@att.net
www.thewitchesbrew.com
You've Got the Notion, We've Got the Potion

MICHIGAN

Adventures in Homebrewing
23439 Ford Road
Dearborn (313) 277-BREW
Visit us at www.homebrewing.org

Brewingworld
5919 Chicago Rd.
Warren 48092 (586) 264-2351
Brew on Premise, Microbrewery, Homebrewing Supplies
www.brewingworld.com
www.kbrewery.com

Cap'n' Cork Homebrew Supplies
16812 - 21 Mile Road
Macomb Twp.
(586) 286-5202
Fax (586) 286-5133
www.capncorkhomebrew.com
e-mail: cap_n_cork@netzero.net
Wyeast, White Labs, Hops & Bulk Grains!

Oppermann's Cork 'N' Ale
2940 Midland Rd.
Saginaw 48603
(989) 797-8466
fax (989) 790-8885
www.cork-n-ale.com
Mid-Michigan's Largest Home Beer & Wine Making Supply. Your Store for Knowledge!

The Red Salamander
205 North Bridge St.
Grand Ledge (517) 627-2012
Fax: (517) 627-3167
Phone or fax your order.

Siciliano's Market
2840 Lake Michigan Dr. N.W.
Grand Rapids 49504
(616) 453-9674
fax (616) 453-9687
www.sicilianosmkt.com
The largest selection of beer and wine making supplies in west Michigan.

things BEER
Webberville 1-800-765-9435
www.thingsbeer.com
Your Full-Service Homebrew Shop With A Home Town Feel!

MINNESOTA

Homebrewersupply.com
Minneapolis 55413
(612) 788-6160
info@homebrewersupply.com
www.homebrewersupply.com
Large Selection, low prices. Free shipping on orders over $60. Most orders shipped within 24 hours.*

Midwest Homebrewing and Winemaking Supplies
3440 Beltline Blvd.
St. Louis Park 55416
1-888-449-2739
www.midwestsupplies.com
FREE instructional video with any purchase

Northern Brewer, Ltd.
1150 Grand Ave.
St. Paul 55105 1-800-681-2739
www.northernbrewer.com
Call or write for a FREE CATALOG!

WindRiver Brewing Co., Inc
7212 Washington Ave. S.
Eden Prairie 55344
1-800-266-4677
www.windriverbrew.com
FREE catalog. Fast nationwide shipping.

MISSOURI

Home Brew Supply
3508 S. 22nd St.
St. Joseph (800) 285-4695
or (816) 233-9688
www.thehomebrewstore.com

The Home Brewery
205 West Bain (P.O. Box 730)
Ozark 1-800-321-BREW (2739)
brewery@homebrewery.com
www.homebrewery.com
The original Home Brewery products.

Homebrew Pro Shoppe, Inc.
531 SE Melody Lane
Lee's Summit 64063
(816) 524-0808 or
Toll-free 1-866-BYO-BREW
support@brewcat.com
www.brewcat.com
Secure On-line shopping - Complete line of beer & wine making supplies & equipment.

St. Louis Wine & Beermaking
251 Lamp & Lantern Village
St. Louis 63017
1-888-622-WINE (9463)
www.wineandbeermaking.com
The complete source for Beer, Wine & Mead makers! Fax us at (636) 527-5413

NEBRASKA

Fermenter's Supply & Equipment
8410 'K' Plaza, Suite #10
Omaha 68127
(402) 593-9171
Fax: (402) 593-9942
www.fermenterssupply.com
Beer & winemaking supplies since 1971. Same day shipping on most orders.

NEVADA

Nevada Brew and Wine Supply
4800 S. Maryland Pkwy., Suite J
Las Vegas 89119
(702) 940-7817
www.nevadabrew.com
Serving Southern Nevada, Northern Arizona and Southwest Utah.

NEW HAMPSHIRE

Hops and Dreams
P.O. Box 914
Atkinson 03811
1-888-BREW-BY-U
www.brewbyu.com
Great prices & FREE catalog!

NEW JERSEY

BEERCRAFTERS
110A Greentree Road
Turnersville 08012
(856) 2-BREW-IT
E-mail: drbarley@aol.com
www.beercrafters.com
NJ's Leader in Home Wine & Beer Supplies

Brewer's Apprentice
179 South Street
Freehold 07728
(732) 863-9411
www.brewapp.com
Online Homebrew Shopping.

Rubino's Homemade Wine & Beer Supply
2919 Route 206, Store# 405
(located at the Columbus Farmer's Market) Columbus 08022
(609) 261-8420
homebrewsupply@optonline.net
www.hamiltonhomebrew.com
Beer making equipment & ingredient kits including: Brew House, True Brew & Brewer's Best.

NEW YORK

Bottom of the Barrel
1736 Mt. Hope Ave.
Oneida 13421 (315) 366-0655
fax (315) 363-0670
Best Little Homebrew Store Around

E.J. Wren Homebrewer, Inc.
Ponderosa Plaza,
Old Liverpool Rd.
Liverpool 13088
1-800-724-6875
E-mail: ejwren@twcny.rr.com
www.ejwren.com
Largest homebrew shop in Central New York

Hennessy Homebrew Emporium
470 N. Greenbush Rd.
Rensselaer 12144
(800) 462-7397
www.beerbrew.com
Huge Selection, Open 7 days a week, Est. 1984

Niagara Tradition Homebrewing Supplies
1296 Sheridan Drive
Buffalo 14217
(800) 283-4418
Fax (716) 877-6274
On-line ordering. Next-day service. Huge Inventory. www.nthomebrew.com

Party Creations
345 Rokeby Rd.
Red Hook 12571
(845) 758-0661
www.partycreations.net
Everything for making beer and wine

NORTH CAROLINA

Alternative Beverage
114-E Freeland Lane
Charlotte
Advice Line: (704) 527-2337
Order Line: 1-800-365-2739
www.ebrew.com
29 years serving all home brewers' & winemakers' needs! One of the largest suppliers in the country

Asheville Brewers Supply
2 Wall Street #101
Asheville 28801 (828) 285-0515
www.ashevillebrewers.com
The South's Finest Since 1994!

Assembly Required
1507D Haywood Rd.
Hendersonville 1-800-486-2592
www.assemblyrequired.com
Your Full-Service Home Brew Shop!

Homebrew.com
526 Griffith Rd.
Charlotte 28217 1-888-785-7766
www.homebrew.com
The Southeast's best-stocked store with excellent low prices!

OHIO

America's Hobby House
4220 State Route 43
Kent 44240
Toll Free: (877) 578-6400
(330) 678-6400
fax (330) 678-6401
www.americashobbyhouse.com
www.homebrewcompany.com
Specializing in winemaking/homebrew supplies & equipment.

The Grape and Granary
915 Home Ave.
Akron 44310 (800) 695-9870
www.grapeandgranary.com
Complete Brewing & Winemaking Store.

Leeners
9293 Olde Eight Rd.
Northfield 44067
1-800-543-3697
www.leeners.com
Complete supplies for making beer to bubblegum, wine to cheese

Listermann Mfg. Co.
1621 Dana Ave.
Cincinnati 45207 (513) 731-1130
fax (513) 731-3938
www.listermann.com
Beer, wine and cheesemaking equipment and supplies.

The Pumphouse
336 Elm Street
Struthers 44471
1(800) 947-8677 or
(330) 755-3642
www.thepumphouse.cjb.net
Beer & winemaking supplies & more.

The Winemakers Shop
3517 North High Street
Columbus 43214
(614) 263-1744
www.winemakersshop.com
Serving Beer and Winemakers since 1974

OKLAHOMA

High Gravity Homebrewing and Winemaking Supplies
7164 S. Memorial Drive
Tulsa 74133
(918) 461-2605
e-mail:store@highgravitybrew.com
www.highgravitybrew.com
Online ordering. Fast friendly service.

PENNSYLVANIA

Country Wines
3333 Babcock Blvd.
Pittsburgh 15237-2421
(412) 366-0151 or
FAX (412) 366-9809
Orders toll-free 866-880-7404
Online catalog at:
www.countrywines.com

Keystone Homebrew Supply
599 Main St.
Bethlehem 18018
(610) 997-0911
E-mail:
sales@keystonehomebrew.com
www.keystonehomebrew.com
Our new location to serve you better.

Keystone Homebrew Supply
779 Bethlehem Pike (Rt. 309)
Montgomeryville
(215) 855-0100
E-mail:
sales@keystonehomebrew.com
www.keystonehomebrew.com
Quality Ingredients and Expert Advice!

Triangle Homebrewing Supply
2100 Smallman St.
Pittsburgh (412) 261-4707
www.ralph.pair.com/triangle.html
Bringing you the BEST for less!

Wine, Barley & Hops Homebrew Supply
248 Bustleton Pike
Feasterville 19053
(215) 322-4780
winebarleyandhops@worldlynx.net
www.winebarleyandhops.com
Your source for premium beer & winemaking supplies

Wine & Beer Emporium
101 Ridge Rd. #27
Chadds Ford 19317
(610) 558-BEER (2337)
winebeeremporium@aol.com
www.winebeeremporium.com
We carry a complete line of beer & winemaking supplies, honeys, cigars and more!

RHODE ISLAND

Blackstone Valley Brewing Supplies
407 Park Ave.
Woonsocket (401) 765-3830
Quality Products and Personalized Service!

SOUTH CAROLINA

Bet-Mar Liquid Hobby Shop
736-F Saint Andrews Rd.
Columbia 29210
(803) 798-2033 or
1-800-882-7713
www.liquidhobby.com
Unmatched Value, Service & Quality Since 1968

TENNESSEE

All Seasons Gardening & Brewing Supply
3900 Hillsboro Pike, Ste. 16
Nashville 1-800-790-2188
www.allseasonsnashville.com
Nashville's Largest Homebrew Supplier!

Brewers Corner
800 Park Ave., Suite E
Murfreesboro 37129
(615) 849-7797
www.brewerscorner.com
Middle Tennessee's source for homebrew supplies.

TEXAS

Austin Homebrew Supply
7951 Burnet Rd.
Austin 1-800-890-BREW
(512) 467-8427
www.austinhomebrew.com
Free Shipping on orders over $60.00!

The Brew Stop
16460 Kuykendahl #140
Houston 77068 (281) 397-9411
Fax: (281) 397-8482
www.brewstop.com
Your complete brewing & wine-making source!

DeFalco's Home Wine and Beer Supplies
8715 Stella Link
Houston 77025 (713) 668-9440
fax (713) 668-8856
www.defalcos.com
Check us out on-line!

Foreman's / The Home Brewery
3801 Colleyville Blvd.
(P.O. Box 308)
Colleyville 1-800-817-7369
www.homebrewerysupply.com
Top-quality Home Brewery products. Check out our site.

Homebrew Headquarters
300 N. Coit Rd., Suite 134
Richardson 75080
(972) 234-4411
fax (972) 234-5005
www.homebrewhq.com
Dallas' only home beer and wine making supply store!

Pappy's HomeBrew
3334 Old Goliad Rd.
Victoria 77905
(361) 532-8371
or (361) 576-1077
www.pappyshomebrew.com
"Let The Fun Begin"

The Winemaker Shop
3006 S.E. Loop 820
Fort Worth 1-800-482-7397 or
(817) 568-4700
brew@winemakershop.com
http://winemakershop.com
FREE catalog

UTAH

The Beer Nut
1200 S. State
Salt Lake City 84111
(888) 825-4697
fax (801) 531-8605
www.beernut.com
"Make Beer not Bombs"™

VIRGINIA

HomeBrewUSA
5802 E. Virginia Beach Blvd., #115
Norfolk 23502
1-888-459-BREW
or (757) 459-2739
www.homebrewusa.com
Largest Selection of Beer & Wine Making Supplies & Equipment in Southeastern Virginia!

Vintage Cellar
1340 South Main St.
Blacksburg 1-800-672-9463
www.vintagecellar.com
Ingredient kits with White Labs Yeast, Belgian Ales & Glassware! Complete line of brewing supplies.

Weekend Brewer - Home Beer & Wine Supply
4205 West Hundred Road
Chester/Richmond area 23831
1-800-320-1456 or
(804) 796-9760
beerinfo@weekendbrewer.com
www.weekendbrewer.com
LARGEST variety of malts & hops in the area!

WASHINGTON

Bader Beer & Wine Supply, Inc.
711 Grand Blvd.
Vancouver, WA 98661
1-800-596-3610
Sign up for our free e-newsletter at www.baderbrewing.com

The Beer Essentials
2624 South 112th St., #E-1
Lakewood 98499
(253) 581-4288 or
1-877-557-BREW (2739)
www.thebeeressentials.com
Mail order and secure on-line ordering available

The Cellar Homebrew
Make your own beer & wine
14320 Greenwood Ave. N.
Seattle 98133
1-800-342-1871
FREE Catalog/Guidebook, FAST Reliable Service, 33 Years! Secure ordering online www.cellar-homebrew.com

Larry's Brewing Supply
7405 S. 212th St., #103
Kent 1-800-441-2739
www.larrysbrewsupply.com
Products for Home and Craft Brewers!

Mountain Homebrew & Wine Supply
8520 122nd Ave. NE, B-6
Kirkland 98033
(425) 803-3996
www.mountainhomebrew.com
The Northwest's premier home brewing & winemaking store!

Northwest Brewers Supply
1006 6th Street
Anacortes 98221 (800) 460-7095
www.nwbrewers.com
All Your Brewing Needs Since 1987

Rocky Top Homebrew & Beer Emporium
3533 Mud Bay Rd. SW
Olympia 98502 (360) 956-9160
www.rockytopbrew.com
"We see things from a different pint of brew."

WISCONSIN

BrewCitySupplies.com
The Market Basket
14835 W. Lisbon Road
Brookfield 53005-1510
1-800-824-5562
Fax (262) 783-5203
www.BrewCitySupplies.com
Secure On-Line Catalog, Superb Service, Superior Selection & Unbeatable Prices

Homebrew Market
1326 North Meade St.
Appleton 54911 1-800-261-BEER
www.homebrewmarket.com
Beer & Wine Supply Retail Store and Mail Order

House of Homebrew
415 Dousman St.
Green Bay 54303
(920) 435-1007
Fax (920) 435-1008
staff@houseofhomebrew.com
www.houseofhomebrew.com
Beer, Wine, Cider, Mead, Soda, Coffee, Tea, Cheese Making.

Point Brew Supply
3041 A. Michigan Ave.
Stevens Point 54481
(715) 342-9535
marc@pointbrewsupply.com
www.pointbrewsupply.com
"The Feel Good Store"

Wine & Hop Shop
1931 Monroe Street
Madison 53711
1-800-657-5199
www.wineandhop.com
Southern Wisconsin's largest selection of beer & winemaking supplies.

CANADA

SASKATCHEWAN

Paddock Wood Brewing Supplies
#B1-116 103rd Street
Saskatoon S7N 1Y7
1-888-539-3622
experts@paddockwood.com
www.paddockwood.com
Canada's largest mail order store - We've got what you need.

Last Call

Eis Storm

An innovative new "eis-anything" category

Story and photos by Steve Fletty • Falcon Heights, Minnesota

"What kind of moron would eis a mild?" I asked, knowing the brewer Steve Piatz was across the room. Steve was busy judging a flight and didn't hear me.

"I know!" Curt Stock said. "And why would you eis a lambic? That's just evil."

Steve wasn't paying attention to our teasing, so our group of four judges got back to looking over the flight sheet. We had everything from an eis bitter to an eis Russian imperial stout to an eis Chardonnay pyment.

Eisbock is a German beer style that utilizes the process of freezing the beer and removing a portion of the ice in order to create a more alcoholic brew. Our club added an "eis anything" category to our annual competition and judging it was quite educational.

We tend to get a little rough with our beer judging, with comments like "I didn't know you could get horse urine to carbonate" or "tastes like pool water" or "you should find another hobby and never brew again." It's all meant in good fun, however, and you'd better be prepared to take as good as you give.

The eis-anything concept was born in my basement in a flurry of Sierra Nevada Bigfoot barleywine while we tried to come up with a special category for the Upper Mississippi Mash-Out (UMM), the Twin Cities homebrew contest. As we moved through the vertical tasting, hashing out contest details and rejecting ideas, Kris England hit on Minnesota weather — Eureka — "Eis anything!"

Now, here we were, back in my basement bar facing 26 of the eisy monsters with names like Old Paint Stripper and Hell Freezes Over. And there was that eised lambic we'd have to taste. It looked like a tough night.

We split the 26 eis-anything entries into two flights of thirteen and got going. I knew what to expect for an eisbock, but this was mostly uncharted territory without the luxury of style guidelines or commercial examples. How to proceed?

For our main judging criteria, we settled on evaluating the eised concoctions based on technique and style enhancement. In other words, how good was the brewer's technique and how well did the style fare after eising.

The Upper Mississippi Mash-Out homebrew competition included an Eis-anything category this year. These judges learned the hard way which eis-beers worked and which ones failed the test!

We started off with the eis mild. "Does that make a brown ale then?" Paul Dienhart, another judge, asked smirking.

"I suppose so." I said. "We've also got an eis bock, but shouldn't that be an eised eis bock?"

Our fourth eis judge, Thomas Eibner, cursed and shook his head.

"What?"

"Some @#$&%& eised a cranberry blossom mead." Thomas said. We'd all tasted the non-eised version of that. Just thinking about it was enough to induce a shudder.

As Curt, Paul, Thomas and I worked our way through gems like an eised weizenbock and real clunkers like the eised sour beers, some common themes developed.

Here's a summary of our findings:

•The eis technique diminishes hop flavor and aroma, so avoid eising hoppy beers.

•If you have a flaw in your beer (such as a slight infection or off-flavor) the eis technique will magnify it. Don't try it to salvage or reduce a bad batch (such as a cranberry mead, for example). Your friends will not appreciate it.

•Some eis choices are just evil, such as eis straight lambic. Eising seems to accentuate the sourness but reduces lambic complexity.

•Using the eis technique to approximate other established styles, such as "eising" a bitter into a pale ale or IPA, results in a mediocre version of the new style. In other words, if you want an IPA, just make one. If you want a Scotch ale, don't eis a Scottish 70 (on the other hand, "eising" a Scotch ale could be interesting.)

•Malty styles seem to work best, witness the classic eisbock or the 2005 UMM first place Eis-anything winner, an eis weizenbock. Other winners all mimicked existing strong styles: the smoked porter became a smoked imperial porter and the Chardonnay pyment became an eis wine. So don't take the "eis anything" phrase too literally. There's a reason styles develop: they tend to be something people want to drink. Try to create a new, appealing style that uses a base beer that doesn't depend on hop flavor or aroma. Once you've got your frozen treat send it up north for the 2006 UMM.

Absolutely Everything!℠ For Homebrewing

World Class Service, Advice, Quality, & Reliability Since 1995

Beginner Equipment Kits

Start brewing the right way - with a MoreBeer PersonalBrewery Kit! Each kit is designed to get you brewing right out of the box.

Beginning Beer Kit #3

Super Deluxe Kit #4

Kegging Super Deluxe Kit #5

Cool Down Your Beer

We carry the largest selection of brewing equipment - over 3,000 products to choose from.

FE600 - $49

FE610 - $89

KEG400 - $180

Keep a Keg Cold for 4 Hours With No Ice!
KEG437 - $30

Slip in Some Ice Packs Before Work...
FE333 - $43

Insulated With Cap No Spilling!
BAR540 - $10

Mini-Regulator
VERY COOL
KEG960 - $135

Cooled Conical Fermenters

No fridge space? No probelm! MoreBeer cooled conicals are the ultimate solution. Ferment your beer up to 30 degrees below ambient temperatures with our powerful, space-saving fermenters.

Manufactured by MoreBeer!

Cooled Conical - CON500
(7.1 Gallons)

Cooled Conical - CON530
(12.2 Gallons)

Cooled Conical - CON660
(24.4 Gallons)

Signature Series Kits

A One-of-a-kind line-up of kits designed by some of our very best customers. Off the beaten path and full of flavor!

The Original:
The Frank Ellis Kit

Jamil's Chocolate Hazelnut Porter

Jim Rossi's Honey Pale Ale

Jason Breatt's Honey Stout

John Palmer's
Klangfreudenfestbier

Jim Nielson's HopMothra

Beer Beer & more Beer™

Since 1995

Absolutely Everything! for Homebrewing & Beer Dispensing!

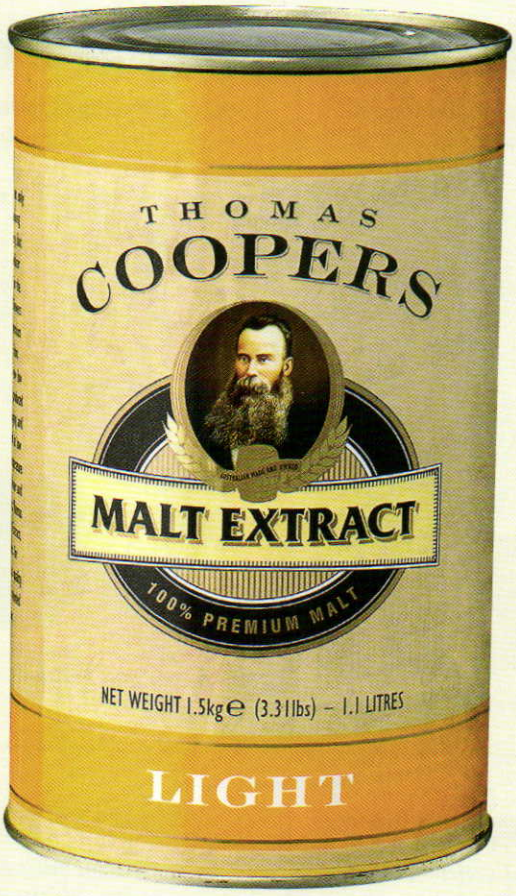
- Starter Kits
- All-Grain Systems
- Custom Welding Shop
- Full line of Draft Supplies
- Brewing Sculptures
- Great selection of hops
- Glassware/Barware
- Storage & Dispensing
- Huge website
- Knowledgable staff
- Giant Book Selection
- White Labs Yeast
- Huge grain choices
- Oxygen Systems
- European Faucets
- Yeast Testing Kits
- Bi-Metal Thermometers
- pH Meters
- Tons of Scales
- RO Water Systems
- Beer Filtering Units
- Stainless Conicals
- Grain Mills
- Quality Wort Chillers
- Yeast Culturing
- Refractometers
- Bottles/Fillers
- Custom-Made Extracts
- New/Used Cornies
- Stainless Ball Locks
- Temperature Control
- Stainless Fittings
- Pumps
- Food-grade Tubing
- Expert Advice
- Much, Much More...

1–800–600–0033 • www.MoreBeer.com

*Worldwide Supplier of **Absolutely Everything!**℠ needed for Beer Making, Wine Making, & Coffee Roasting*

Regional Stores • Huge, Very Helpful Website • Over 3000 Products • Free Full-Color BeerMaking Catalog • Free WIneMaking Catalog

A STYLISH, NEW LOOK



The Same Coopers Brewery Quality!

Also available in Amber, Dark & Wheat. When buying malt extract, Don't trust your beer to an unknown generic and don't forget to look for the "Born On" date; your assurance of freshness and quality.

How can I make better beer?
Any new products from
Coopers Brewery?

What's with The Big Beard Guy on the label of the Coopers Pilsner Beer Kit?

Entertaining stories, fun facts,
award-winning recipes, special offers
and All Your Questions Answered
In a glossy, colorful,
FREE quarterly newsletter
From the fine folks at
Coopers Brew Products.

Visit us at www.cascadiabrew.com
to sign up for your FREE Coopers Club
Quarterly Newsletter

Coopers

www.cascadiabrew.com