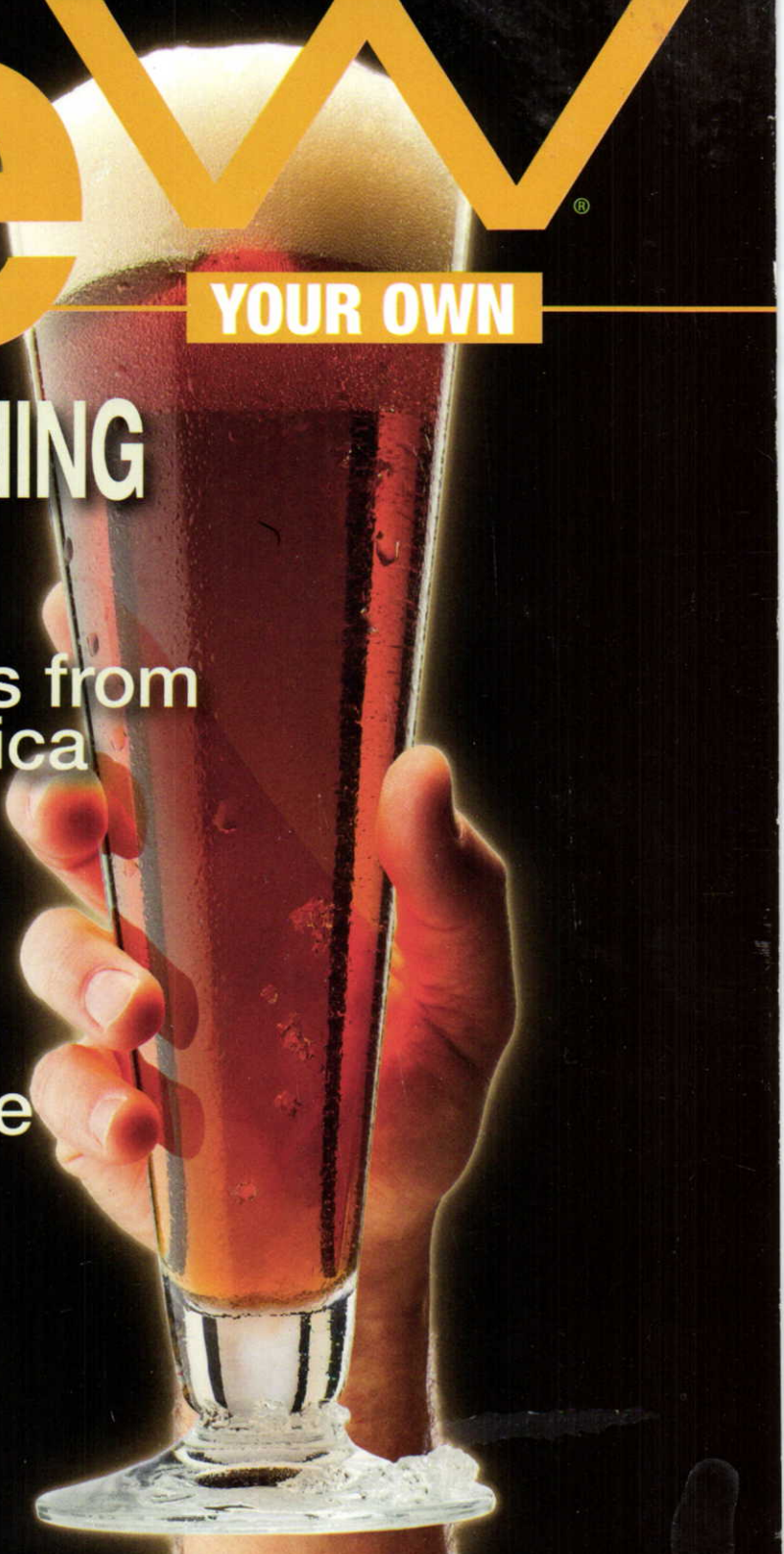
NEW TO BREWING? 20 KEYS TO GREAT BEER FOR BEGINNERS

Brew Your Own

THE HOW-TO HOMEBREW BEER MAGAZINE

JANUARY-FEBRUARY 2009, VOL.15, NO.1



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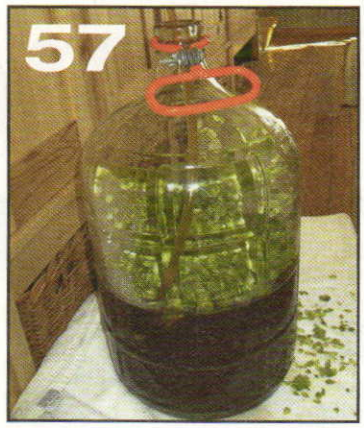

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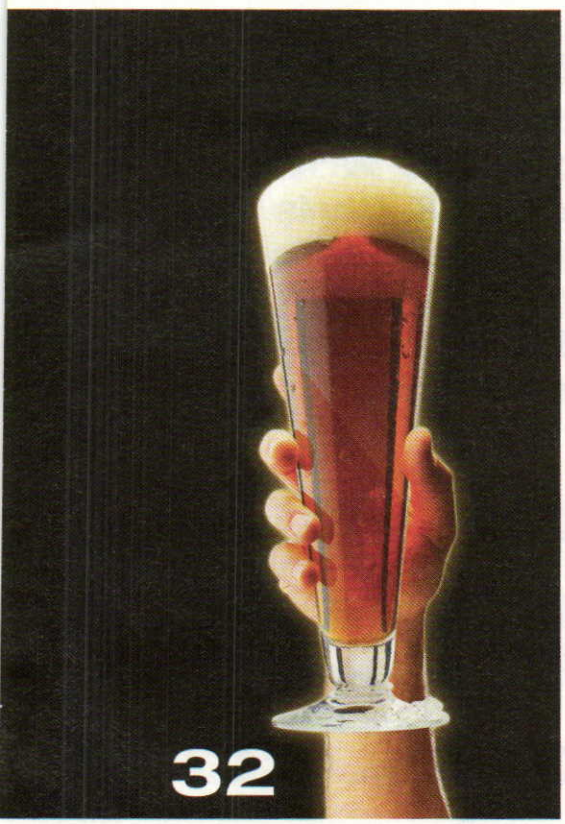
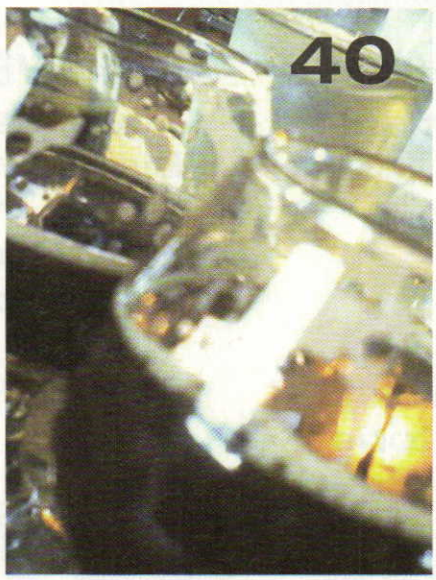
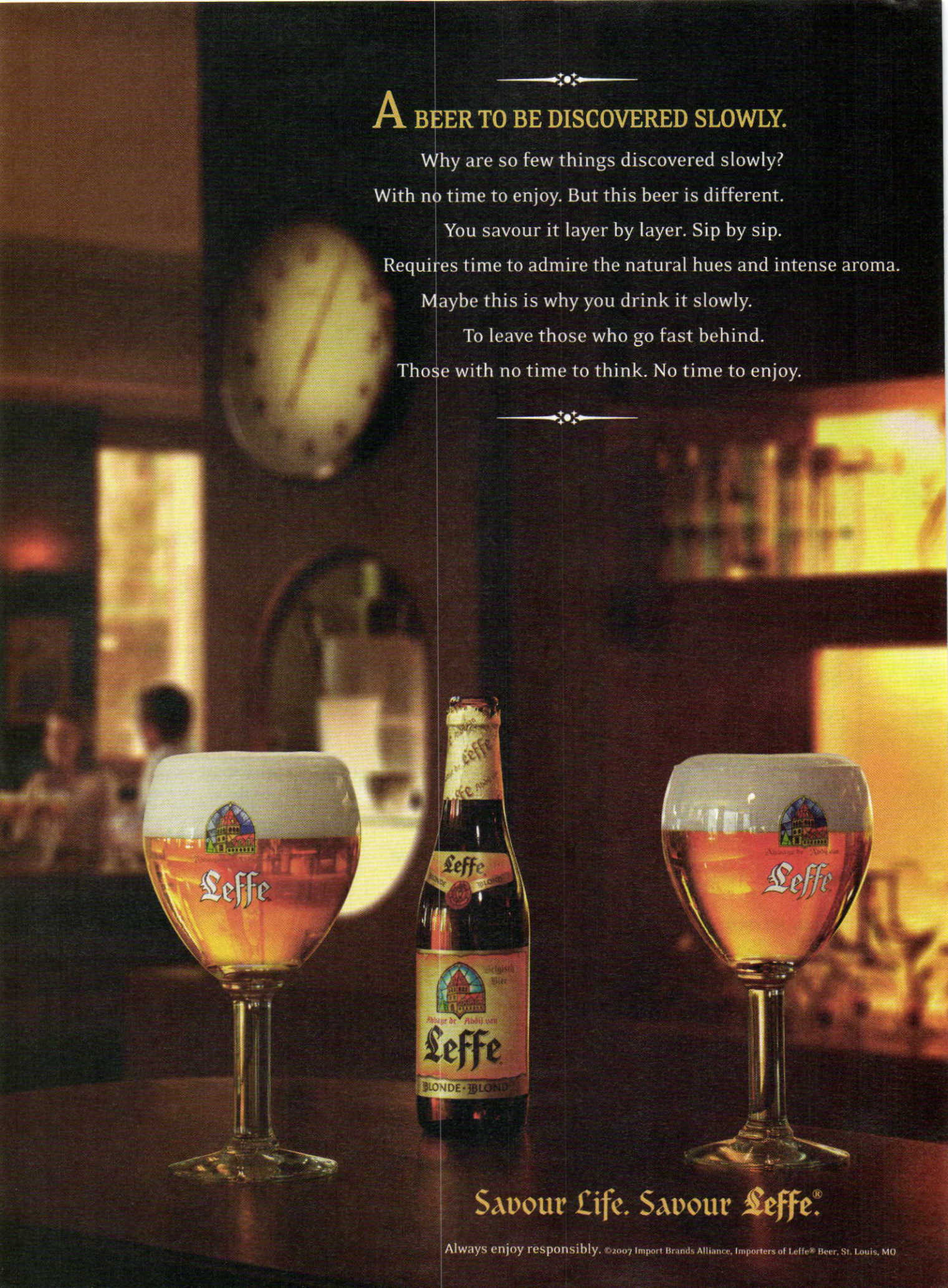




Departments

Where to find it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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 IBUs based on 25% hop utilization for a one hour boil of hop pellets at specific gravities less than 1.050.

Brew YOUR OWN
THE HOW-TO HOMEBREW BEER MAGAZINE

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Fax: (760) 738-4805

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Web Site
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Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for $28.00 per year by Battenkill Communications, 5515 Main Street, Manchester Center, VT 05255; tel: (802) 362-3981; fax: (802) 362-2377; e-mail: BYO@byo.com. Periodicals postage rate paid at Manchester Center, VT and additional mailing offices. Canada Post International Publications Mail Agreement No. 40025970. Return undeliverable Canadian addresses to Express Messenger International, P.O. Box 25058, London BC, Ontario, Canada N6C6A8. POSTMASTER: Send address changes to ***Brew Your Own,*** P.O. Box 469121, Escondido, CA 92046-9121. Customer Service: For subscription orders call 1-800-900-7594. For subscription inquiries or address changes, write ***Brew Your Own,*** P.O. Box 469121, Escondido, CA 92046-9121. Tel: (800) 900-7594. Fax: (760) 738-4805. Foreign and Canadian orders must be payable in U.S. dollars plus postage. The subscription rate to Canada and Mexico is $33; for all other countries the subscription rate is $45.

Cover Photo: **Charles A. Parker**

Mail

Small Pro Follow-up?

Just read the latest issue of *Brew Your Own* (December 2008) and was intrigued by the guys that started small volume breweries (10, 15.5, 150 gallons, I believe). Would it be possible to do a follow-up article with these guys and cover the trials and tribulations of starting such a small scale operation (legal, insurance, etc.)?

Rick Conley
via email

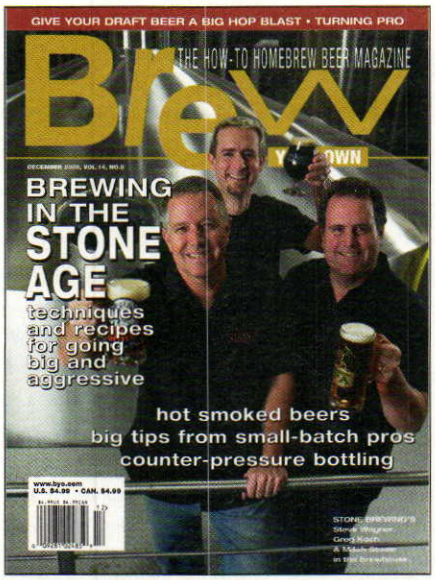
In Brew Your Own, *we try to stick strictly to stories with a how-to-homebrew angle. Covering the legal and insurance aspects of small-scale commercial brewing is beyond our editorial scope. Peter Ausenhus spoke about some of these issues on the* December 20, 2007 *installment of* James Spencer's podcast, Basic Brewing. *(You can download this at www.basicbrewing.com) In addition, all three brewers maintain Web sites for their breweries and there you'll find some discussions about the challenges they face. If you're thinking about opening a small-scale brewery, remember that — in the* US *— regulations differ from state to state, and sometimes by county within a state.*

Don't Fear the Bleacher

I thoroughly enjoyed your issue on green brewing (October 2008), and I hope to be able to use some of the tips from that issue in my homebrewing.

I was writing in to correct some information that was presented in the article from Amelia Slayton of Seven Bridges Cooperative. I enjoyed her conversations about how to use creativity to brew organic and I agree with her rationale as to why she brews organic. However, I would like to assure other homebrewers that they are not putting themselves at risk for dioxin exposure by using bleach. I spent 6 years of graduate school conducting research on dioxin (between trips to the student union for Optimator). Dioxin is a byproduct of some pesticide production (most notably the defoliant Agent Orange) as well as a product of combustion, but using bleach in your brewhouse at home cannot produce this compound.

There are certainly other reasons not to use bleach in your brewhouse, for example improper rinsing can lead to off flavors. But you aren't putting your life on the line if you do use bleach as a sanitizer. I would hate for your readers to have anxiety that they are exposing themselves to a toxin while they are relaxing and having a homebrew.



Paul Hanlon
via email

Thanks for your letter. The process of bleaching paper and other industrial products produces small amounts of dioxin; however, we agree that the use of household bleach in homebrewing is unlikely to pose a dioxin-related health threat. (Using bleach in an area without adequate ventilation can, however, result in an inhalation hazard.) The biggest three safety hazards for homebrewers are the possible exposure to broken glass, the potential for burns and scalds and the possibility of skin contact with or inhalation of harsh chemicals. However, with a little care on brewday, and a basic knowledge of the equipment and chemicals you use, these risks can be made quite manageable.

Partial Mash Problem

Recently I brewed an Extra Special Bitter using the countertop partial mash method. This was my first time attempting a partial mash, I have always done extract beers in the past, but wanted to use some actual base malts. My estimated original gravity was 1.058 and I came out with 1.057. Not bad right? However, after three days I took the gravity when racking to secondary and it was 1.027. I hoped transferring it might stir up some activity or maybe the yeast just needed some extra time to get down to my goal of 1.017ish. However, on bottling day, the gravity was still holding strong at 1.027.

Contributors

TERRY FOSTER was born in London and now splits his time between living in England and in the United States. He holds a PhD in chemistry from the University of London. He has written numerous BYO articles, most of which covered English ales. Most recently, in the September issue of BYO, he described how to make malty Scottish ales.

In this issue, he tackles the topic of barleywine. Barleywine evolved from strong ales and cover a lot of ground, stylistically. Dr. Foster covers the potential pitfalls, from mash tun to keg, of brewing this challenging style. His article begins on page 40.

GORDON STRONG is the President of the Beer Judge Certification Program, (BJCP), led the development of the 2004 and 2008 BJCP Style Guidelines and is the only Grand Master V beer judge. A prolific brewer and meadmaker, he has won Best of Show in more than a dozen competitions, recently won the 2008 Ninkasi Award and is a past winner of the Mazer Cup. He was Technical Editor of *Radical Brewing* and *Wild Brews*, a contributor to *Brew Like a Monk*, and is a regular panelist on *Zymurgy*'s "Commercial Calibration" column. He has spoken on brewing, judging and beer styles at three AHA National Conferences and a MCAB. Gordon discusses American pale ale for "Style Profile" on page 19.

JOHN PALMER, is the author of the book, *How to Brew* (2006, Brewers Publications) and a participant in many online brewing forums and — in addition to being *Brew Your Own*'s "Advanced Brewing" columnist — now blogs on BYO's website, which has recently been renovated. (Check it out at www.byo.com.) John's day job is as a metallurgical engineer for 3M.

In this issue, expanding on his previous article on hop bitterness, John examines hop polyphenols and their role in bitterness, especially in dry hopped beers. Read his story on page 57.

So I was thinking of three different things that could have ended me up where I am on my gravity.

1.) I was aiming for an initial strike temp. of 165 °F (74 °C). I have a meat thermometer that isn't the most accurate thing in the world, one of those 70–550 °F (21–290 °C) ranged thermometers. So there is a possibility that my strike temperature was higher. If my strike temp was high, it would have thrown off my fermentables, correct?

2.) Am I not lautering slowly enough? I thought this could be thrown out since my OG was almost dead on.

3.) Windsor yeast. I have read it likes to finish high.

Any help would be much appreciated,

Jack Rhodes
via email

Danstar Windsor yeast exhibits a moderate level of attenuation. It leaves beers with a slightly higher FG than with many other strains of brewers yeast. However, given that you are stuck at a very high FG (1.027), we doubt that your yeast is causing this problem.

Likewise, inefficient lautering leads to lower yields, but should not affect the fermentability of your wort.

Of the three options you list, your thermometer is the most likely culprit. Dial thermometers used in everyday kitchen applications are notoriously inaccurate. If you mashed at a temperature above the normal saccharification range (above 162 °F/72 °C), your wort would contain a lot of unfermentable carbohydrates. You should calibrate your dial thermometer and see if it is reading correctly.

Two other things that can lead to elevated FGs are an excess of crystal/caramel malts and certain malt extracts. Your recipe (which we deleted for space reasons) had 1.0 lb. (0.45 kg) of specialty malts in a 5-gallon (19-L) batch — this is entirely reasonable and shouldn't have caused an elevated FG. Your recipe also contained a combined 5.0 lbs (2.3 kg) of malt extracts. If the fermentability of one or both of your extracts was low, it could have contributed to the problem.

In addition, we are assuming you pitched an adequate amount of yeast and aerated your wort. Underpitching and inadequate aeration can also lead to high FGs.

Finally, sometimes adding a little bit of yeast nutrient to your wort helps you reach the proper FG. Check on your thermometer first and you will likely have found your problem. If not, try a different brand of malt extract and/or pitch more yeast, as appropriate.

Questions, concerns, comments?

Contact us!

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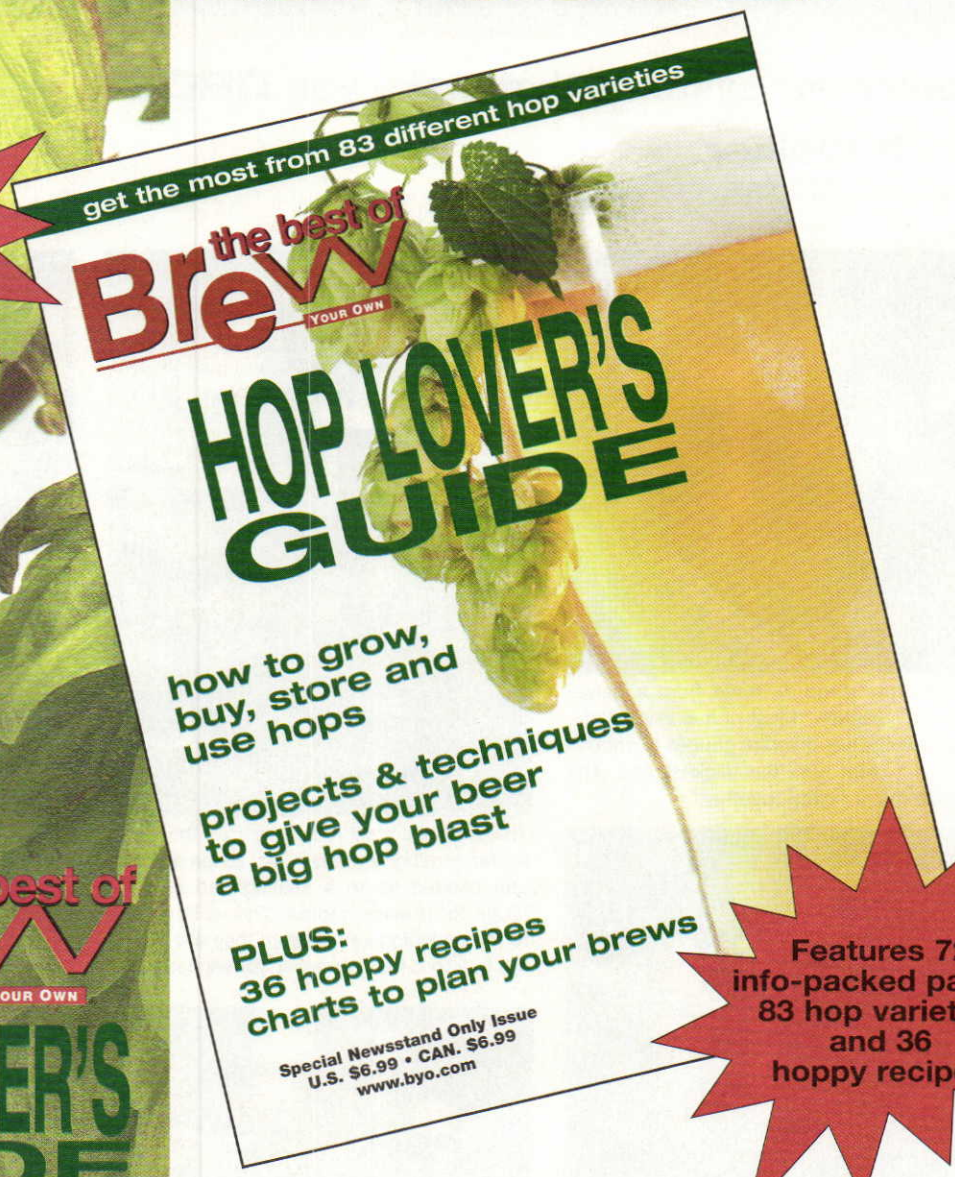

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homebrew NATION

BYO

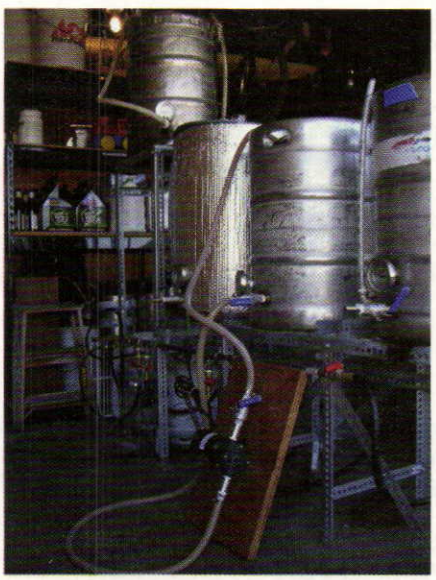
homebrew systems that make you DROOL

Brett Walker
Los Osos, California

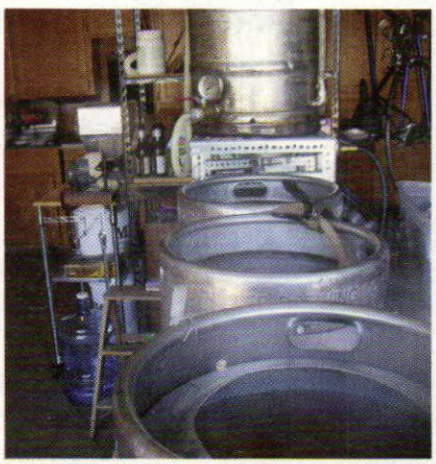
Brett's brew stand is made from a galvanized "L" bracket. "Most of it is from Home Depot, which has different gauges to choose from — I went with the thickest one. The whole thing is bolted together."

The stainless steel refrigerator on the left is for fermenting and has a two stage thermostat hooked up to a heating pad and the fridge for precise control. The white one is for conditioning kegs before they are put on tap in a four-faucet freezer conversion.

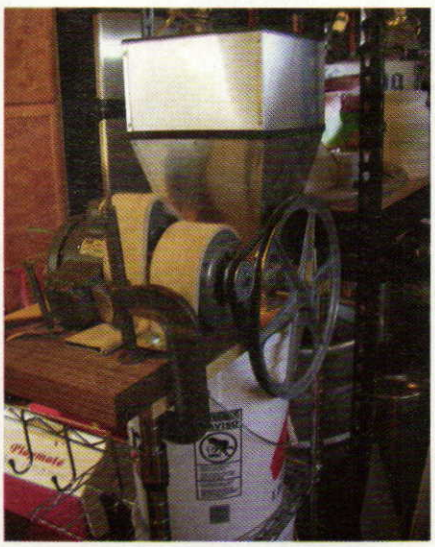
The brew set up is designed for two 11-gallon (42-L) batches per brew day. They are staggered one hour apart so the cooling on the first can finish before the second one is ready. He made a counter flow heat exchanger out of 40' (~12 m) of ½' copper and a garden hose.



With this set up, on brew day Brett can mash into both mash/kettles in the morning. When the first mash is ready the grain is transferred into the lauter, recirculated and transfer started back to the kettle.



When the kettle is full the grain is dumped and the next mash is transferred over. "Halfway into the first boil my second kettle is full and close to boil."

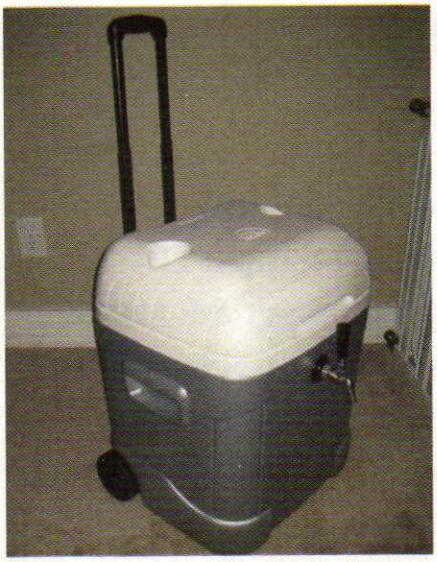


The barley crusher is motorized with a fire hose as a motor mount. (Brett is a firefighter by day). "I rigged the motor with fire hose because there is no motor mount that would fit. The barley crusher works really well." Keep up with Brett's brewing by visting his blog at http://bwbrewing.blogspot.com/.

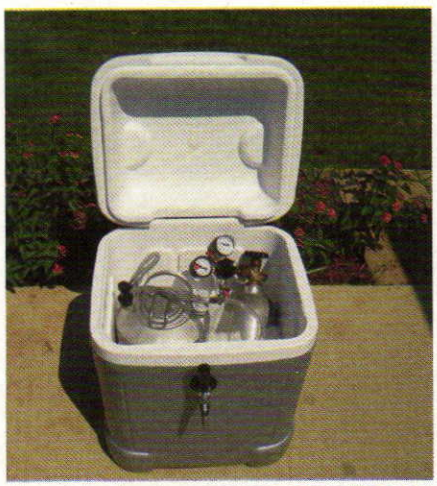
reader GADGET

Nick Netherland

Winston-Salem, North Carolina



After a year or so of filling bottles from my kegs to take to picnics and parties I started thinking of another way to take my beer on the road. I had seen pictures where people used 60-qt. (56.8-L) Igloo Ice Cube coolers as a swamp cooler to control the temperature of their fermenting beer. The problem was that these smaller coolers would not fit a 3-gallon (11-L) keg without cutting a large hole in the lid. One day I saw a stack of these 70-qt. (66-L) Ice Cube coolers with the bubble type lid. They seemed to have plenty of room for both a 5-lb. CO_2 tank and a 3-gallon (11-L) corny keg.



I bought a shank, some beverage tubing and another quick-disconnect, then drilled a 1" hole in the front center of the cooler with a hole saw. I installed the shank, hooked up the tubing and quick disconnect to the nipple on the end of the shank, and screwed the faucet on. I can now easily transfer beer into one of my 3-gallon (11-L) kegs, throw the keg and CO_2 tank into the cooler, ice it down and hit the road.

reader TIP

Wayne Norris

Liberty, Indiana

All-Natural Wort Chiller

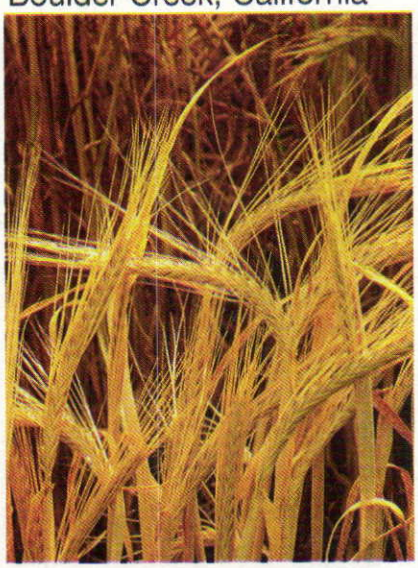
Why waste all that water, ice and sink space chilling your wort with an ice bath when there's plenty of cold, white stuff in many brewers' backyards this time of year? Wayne sent us this photo around this time last year to show us that sometimes the best brewing tips are the simplest ones. But Wayne — don't forget to cover that pot to prevent contamination!

"I had just brewed up a batch of stout, and seeing that we have snow in the backyard, who needs a coil chiller?" Wayne said.

reader RECIPE

Larry Lynch-Freshner

Boulder Creek, California



This recipe won Best of Show at the 2007 National Organic Homebrew Challenge in Santa Cruz, California, as originally published by Seven Bridges Cooperative.

Bad Weather Barleywine

(5 gallons/19 L, partial mash)

O.G. = 1.118 F.G. = 1.042

Ingredients

12 lbs. (5.4 kg) Gambrinus organic pale ale malt
1.0 lb. (0.45 kg) Briess organic extra special malt
0.5 lb. (0.23 kg) Briess organic caramel malt 60 °L
0.5 lb. (0.23 kg) Briess organic caramel malt 60 °L

Added to the boil:

7.0 lbs. (3.2 kg) Briess organic dried malt extract
24 AAU New Zealand organic Cascade hops (3.0 oz./85 g at 8% alpha acids) (boil 90 min.)
8 AAU New Zealand organic Cascade hops (1.0 oz./28 g at 8% alpha acids) (boil 30 min.)
8 AAU New Zealand organic Cascade hops (1.0 oz./28 g at 8% alpha acids) (boil 5 min.)
White Labs WLP029 (Kölsch) yeast

Step by Step

Use a single infusion mash at 154 °F (68 °C) for 70 minutes for the grain malts, then batch sparge three times with 170 °F (77 °C) water yielding about 7.5 gallons (28 L) of wort in the kettle. Add the dried malt extract to the boil and the hops according to the hopping schedule.

Chill the wort rapidly to pitching temperature and pitch the yeast. Ferment the beer at around 70 °F (21 °C) for two weeks. Following fermentation, transfer from the fermenter into two 2.5-gallon (9.5-L) kegs. Force carbonate and store at ambient temperature for several months.

replicator
by **Marc Martin**

Dear Replicator,

I lived in Grand Rapids, Michigan while my wife was going through her internship and I really enjoyed all of the breweries in the region. While we lived there, my favorite beer had to be the Breakfast Stout from Founder's Brewing Company. It was probably one of the best stouts that I have ever tasted. Just the way the chocolate, coffee and oatmeal blended together made it perfect. We have since moved to Alaska and cannot get that beer up here. I was wondering if you could possibly help me out with the recipe.

Adam Imperato
Wasilla, Alaska

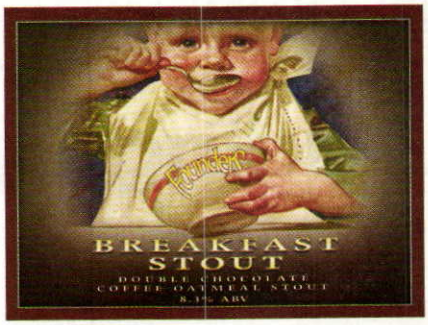
When brewers gather over a pint to discuss beer it is inevitable that at some point the topic of what style is best paired with certain foods will come up. The brewers at Founder's Brewing Company have chosen to circumvent that controversy and just develop a beer that is a meal in itself, Founder's Breakfast Stout.

Here we have a beer that would certainly gain the approval of any nutritionist. Multigrain goodness, energy boosting sugar, a dense milky head and caffeine to stimulate makes this a perfect way for a homebrewer to start the day.

My call to the brewery was eagerly fielded by Alec Mall, the Brewery Production Manager. I had met him in the mid-1990s when he was the head brewer at Peak Northwest Brewing in Portland, Oregon. He related the history and story of the uniqueness of this brewery.

Founder's Brewing began as a dream of Mike Stevens and Dave Engbers when a passion for homebrewing grew beyond their expectations. It seems homebrewing roots run deep in their operation as virtually everyone I talked with there started with 5-gallon (19-L) batches. After releasing their first commercial beer in 1997 they have never looked back.

Mike and Dave created an interesting business model by choosing to ignore mainstream microbrewery operations and focused instead on beers that are more expensive to brew but push the envelope of a style. The result is a staggering number of different beers produced during



any one season and distribution of bottles and kegs to 10 states. The day I called the brewery there were no less than 16 beers on tap. Beer aficionados return every week just to see what the next unique offering will be.

Alec transferred me to their Head Brewer, Jeremy Kosmicki, for the real story behind the Breakfast Stout. Jerry began homebrewing when he was 19 and became hooked on beers with real flavor. With no formal brewing education, he started at Founder's eight years ago in the bottling department. Since then he has worked every job in the brewery, progressing to Assistant Brewer and eventually Head Brewer working his magic with a state of the art 30-barrel brew house.

Jerry describes Breakfast Stout as one of their beers that truly breaks the barriers of the style envelope. He calls it a robust oatmeal stout that approaches Imperial Stout specifications. The coffee and chocolate additions definitely place it into the specialty beer category. The Sumatran coffee has a somewhat bitter profile while the "dry hopped" Kona coffee has a sweeter flavor for balance. Similarly, the two unsweetened chocolates produce a distinct chocolate flavor that blends well with the residual grain sweetness. The high percentage of flaked oats builds body and helps create a dense tan head by offsetting the oils in the coffee and chocolate. Jerry reports that this is a beer that will cellar well and change over time. When the beer is young, the coffee really comes through but fades with aging revealing the chocolate. Overall, a thick, jet black beer of unusual proportions.

So, when you want to get the day off to a good, nutritional start have a Breakfast Stout because you can "Brew Your Own". For further information about the brewery and their many other fine beers visit their Web site www.foundersbrewing.com or call them at 616-776-1195.

Founder's Brewing Company Breakfast Stout

(5 gallons/ 19 L, extract with grains)

OG = 1.078 FG = 1.020
IBUs = 60 SRM = 59 ABV = 7.5 %

Ingredients

6.6 lbs. (3.0 kg) Briess light, unhopped, malt extract
1.7 lbs. (0.77 kg) light dry extract
22 oz. (0.62 kg) flaked oats
1.0 lb. (0.45 kg) chocolate malt (350 °L)
12 oz. (0.34 kg) roast barley malt (450 °L)
9.0 oz. (0.25 kg) debittered, black malt (530 °L)
7.0 oz. (0.19 kg) crystal malt (120 °L)
2.0 oz. (57 g) ground Sumatran coffee
2.0 oz. (57 g) ground Kona coffee
2.5 oz. (71 g) dark, bittersweet baker's chocolate
1.5 oz. (43 g) unsweetened chocolate baking nibs
14.3 AAU Nugget pellet hops (60 min.) (1.1 oz./ 31 g of 13% alpha acid)
2.5 AAU Willamette pellet hops (30 min.) (0.5 oz./ 14 g of 5 % alpha acid)
2.5 AAU Willamette pellet hops (0 min.) (0.5 oz./ 14 g of 5 % alpha acid)
½ tsp. yeast nutrient (last 15 minutes)
½ tsp. Irish moss (last 15 minutes
White Labs WLP 001 (American Ale) or Wyeast 1056 (American Ale) yeast
0.75 cup (150 g) of corn sugar for priming (if bottling)

Step by Step

Steep the crushed grain in 2 gallons (7.6 L) of water at 155 °F (68 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.8 L) of hot water. Add the liquid and dried malt extracts and bring to a boil. Add the hops and Irish moss as per the schedule. Add the Sumatran coffee and two chocolate varieties at the end of the boil. Add the wort to 2 gallons (7.6 L) of cold water in a sanitized fermenter and top off with cold water up to 5 gallons (19 L). Cool the wort to 75 °F (24 °C). Pitch the yeast and aerate the wort heavily. Allow the beer to cool to 8 °F (20 °C). Hold at that temperature until fermentation is complete. Transfer to a carboy, avoiding any splashing. Add the Kona coffee and condition for one week, then bottle or keg. Carbonate and age for two weeks.

All-grain option:

This is a single step infusion mash. Replace the malt extracts with 13.2 lbs. (6 kg) 2-row pale malt. Mix the crushed grains with 3.75 gallons (14 L) of 172 °F (78° C) water to stabilize at 155 °F (68° C) for 60 minutes. Sparge slowly with 175 °F (79° C) water. Collect approximately 6 gallons (23 L) of wort runoff to boil for 60 minutes. Reduce the 60 minute hop addition to 1 oz. (28 g) and the 30 minute addition to 0.4 oz. (11 g) to allow for the higher utilization factor of a full wort boil. Follow the remainder of the extract with grain recipe.

Homebrew CALENDAR

January 16-17
Anchorage, Alaska
Great Alaska Beer and Barley Wine Festival
Held at the Egan Civic Center in Anchorage, this two-day event is $30 for the general sessions and $40 for the connoisseur sessions. The cost of your ticket covers 30 beer samples, a commemorative mug and an official program guide. The proceeds go to the American Diabetes Association and the Brewer's Guild of Alaska. For more information, go to www.auroraproductions.net/beer-barley.html

January 23-24
St. Paul, Minnesota
Upper Mississippi Mash-Out
The annual homebrewing competition organized by the Minnesota Home Brewer's Association and the St. Paul Homebrewer's Club is a qualifying event for High Plains Brewer of the Year and Midwest Homebrewer of the Year. Deadline for entries is January 10. Two special categories this year: Eis-Anything and New Brewer. More information at www.mnbrewers.com/mashout

January 24
Orlando, Florida
Meadlennium 2009
The 11th Annual Meadlennium is one of the longest-running mead competitions in the world. Deadline for entries is January 19. Cost is $6 per entry. First, second and third place will be awarded in each category, as well as one best in show. Winners will receive an engraved mug and a medal. Special category is Historical Mead Recipe; entry must be a traditional recipe with no modern additives. More information at www.cfhb.org

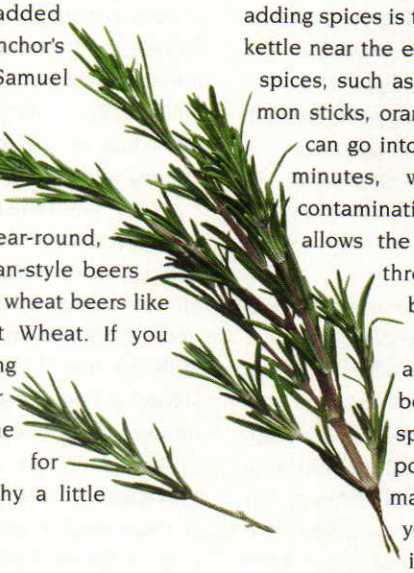
February 20
Roeland Park, Kansas
Kansas City Bier Meisters 26th Annual Competition
The deadline for submissions is February 7. Cost is $6 per entry. Events for the day include a beer tasting and the annual Silver Going for Gold banquet, a package that costs $30. More information at www.kcbiermeisters.org

BEGINNER'S block

Adding Spice

by Betsy Parks

In the winter months often there is a wide variety of craft and commercial beers with added spices, such as Anchor's Christmas Ale or Samuel Adams' Old Fezziwig. But there are also lots of beers with spices available year-round, including many Belgian-style beers like Allagash White or wheat beers like Leinenkugel's Sunset Wheat. If you would like to try adding some spice to your homebrews, learn the different methods for adding spices and why a little goes a long way.



Pick your brew

Spices can work in many different styles of beers, but not every spice is good for every beer. For instance, coriander works well in wit beers, but chili peppers are probably not as great — unless that's a combination you need to try. For your first few batches of spiced beers, try choosing some classic styles like winter warmers or wits so that you can taste your beers against similar commercial examples.

If you decide to blaze a new trail and experiment with styles and spices, BYO's "Style Profile" author Jamil Zainasheff recommends in his book *Brewing Classic Styles* to reduce the IBUs and remove late hop additions for most beer styles if you are adding spices. This way the spice additions can come through in the finished beer. Also, remember that no amount of spices will make a bad base beer taste better, and actually for any style (well made or not) too many spices can be overwhelming. Just as finding a balance between maltiness and bitterness is always important for making a good beer, well-made spiced beers also have balance between the spice, malt and hops. Always make a good base beer with the idea that your spices will be complementary.

How it's done

One of the most common methods for adding spices is to just toss them into the kettle near the end of the boil. Many dry spices, such as coriander seeds, cinnamon sticks, orange peel and cardamom can go into the boil in the last few minutes, which eliminates any contamination problems, but still allows the spice flavors to come through in the finished beer.

If you don't prefer to add spices directly to the boil, or you are using fresh spices with volatile compounds such as ginger that may be lost during boiling, you can steep the spices in near-boiling water, which will lower the risk of contamination but not boil away the characteristics you want from the spices. Allow the spices to steep until the mixture cools off then add the mixture to the beer in the fermenter.

A third option is adding a spice extract to your beer. You can use either a commercial extract from a grocery or specialty store, such as anise or hazelnut, or make your own extract by steeping a spice in vodka for a week or so until the vodka takes on a strong flavor of the spice and adding the extract to the brew.

Be wary

Aside from using too many spices, do also keep in mind that spices can vary in strength. For example, very fresh spices will likely be much stronger than their dried counterparts, especially those that have been hanging around the pantry for a while, so it can be easy to over or underdo it if you are following a recipe. If you aren't sure how much spice to add, be cautious and either make a test batch the first time around, or split your batch into two parts and add spices to each of them individually at different levels to figure out what a whole batch might taste like with more or less spice.

Big Fermentations

How to brew strong, Belgian-style beers

by Betsy Parks

What's the difference between fermenting everyday beers and fermenting the big, strong Belgians? The yeast of course. These three professional Belgian-style brewers talk about what it takes to keep your yeast happy, healthy and productive, even in the most extreme conditions.

GRADY HULL, Assistant Brewmaster for New Belgium Brewing Company in Fort Collins, Colorado. Grady graduated from Colorado State University in 1994 with a BS in Food Science and Technology. After an internship with Coors Brewing Company he worked as a brewer for CooperSmith's and Fleetside brewpubs in Fort Collins and Greeley, Colorado. In 1996 he began working at New Belgium where he is currently the Assistant Brewmaster. While working at New Belgium he received his MS in Brewing and Distilling from Heriot-Watt University.

The most important factor in fermenting these types of beers is to get the right yeast strain. Most homebrew shops have a good selection of Belgian yeasts but before you buy I would check out White Labs or Wyeast Laboratory's Web sites. They have great flavor profile descriptions, recommended temperatures, alcohol tolerances, etc. Proper aeration at the point of yeast addition is also key to getting a healthy, vigorous fermentation going.

We ferment our stronger, Belgian style beers in the mid 60s °F (~17-19 °C), based on the flavor profile of our yeast. The flavor profile of any yeast is dramatically affected by fermentation temperature. High gravity beers fermented with Belgian yeast strains are already prone to producing high levels of fruity esters. Other factors such as higher fermentation temperatures and lack of oxygen will accentuate that. We use temperature control to balance the esters out. Small batches could be cooled with a water bath or fermented in a cool area.

For the health of the yeast, we aerate the wort at the point of yeast addition. We also add a small amount of zinc and a nutrient for newly propagated cultures. The most important thing to remember when handling yeast is to keep everything as sanitary as possible. I think the best way to aerate wort on a homebrew scale is to fill the carboy with wort, put a rubber stopper in the top and shake the carboy hard prior to adding the yeast. The air in the headspace should aerate the wort. Since you are using atmospheric air you can't overdo it. I wouldn't recommend bubbling air through the wort unless you have a sterile way to do it. If the yeast you are using does not have built-in nutrient (like in a smack pack) it won't hurt to add some nutrient. The most important thing we do to maintain yeast health is to continually bring up fresh propagations, which the homebrewer does when they buy yeast.

PHIL LEINHART, Brewmaster at Brewery Ommegang, in Cooperstown, New York. Phil has been in the brewing industry for over twenty years, and has worked in and studied brewing in England, Germany and the US. He managed for Manhattan Brewing and worked for Commonwealth and Harpoon in Boston, The Lion Brewery in Wilkes-Barre, Pennsylvania and at Anheuser-Busch as a brewing supervisor, quality assurance supervisor and in implementing a Siemens Process Control System in the fermentation department. He came to Ommegang in January 2007 and took over as Brewmaster in early 2008.

I would say the number one issue a novice brewer might encounter when trying to ferment a strong, Belgian-style beer would be under attenuation, which could be caused by several factors: poor yeast health, inadequate wort aeration with subsequent low yeast growth, a yeast strain that can't handle higher alcohol levels, too low of a fermentation temperature, etc.

We attemporate the fermentations at Ommegang at around 79 °F (26 °C) because this is the temperature our yeast strain ferments best at and we're trying to get good ester production. For homebrewing, ferment the beer in a room that is not too cool and remains at a consistent temperature.

To keep our yeast healthy we check the viability of the yeast before pitching by staining with methylene blue. Wort aeration is very important for yeast health and growth and therefore flavor production. Especially with higher gravity beers the yeast needs to have enough oxygen to enable it to reproduce adequately. Yeast handling and storage between batches is also very important for health. Keep the yeast as cold as possible without freezing it and store it as short a time as possible. I would think yeast starters would be advantageous.

A general rule of thumb for pitching rate is 1 million cells per milliliter per degree Plato of original gravity. For example if you are brewing a beer with an OG of 19.0; pitch 19–20 million cells per milliliter.

When you're brewing these kinds of beers on a small scale keep the fermenter in a room that has a consistent temperature – you do not want the fermenter to get cooled prematurely. Also, most of the higher gravity Belgian and Belgian-style ales are brewed using a significant amount of highly fermentable sugar such as dextrose or candi sugar. This is used primarily to boost the fermentability of the wort resulting in a beer that is relatively drier and less filling with good drinkability.

VINNIE CILURZO, Brewmaster and owner of Russian River Brewing Company (RRBC) in Santa Rosa, California. Vinnie was hired as the Brewmaster at Russian River when it was founded by Korbel Champagne in 1997. He and his wife bought the business in 2002. Over the years Vinnie has earned many awards for his brewing, including Small Brewing Company of the Year at the Great American Beer Festival. Russian River's Redemption Blonde Ale won the gold medal for Belgian-and-French-style ale at the 2008 GABF.

The biggest thing I often see when I taste strong Belgian-style brews is that the beers don't finish fermenting to a low enough gravity. This could be from either not enough yeast or not enough O_2 in the wort, though sometimes we see the same problem in a really, really big beer. I'm a proponent of starting with a lower original gravity and having the beer finish at a lower gravity to end up with a drier beer with the same alcohol content as it would have been if it was started at a higher gravity.

The way that we ferment Belgian-style beers at RRBC is very easily obtainable for homebrewers. In most cases we start the fermentation out at 62 °F (17 °C) for the first couple of days then let it free rise up to whatever temperature is ambient in the room. This process helps keep some of the fusel alcohols down as well as some of the big esters and phenolics. The number of days you hold the beer at 62 °F (17 °C) is up to the brewer and really comes down to experimentation. You can't hold it too long at that temperature, though, or else you run the risk of the beer not finishing because a higher temperature for the bigger beers will help the yeast carry on.

Back when we didn't have a lab we would use the yeast from another fermenter as quickly as possible and if we had to hang onto yeast we wouldn't store it for more than five days. Looking at it from a homebrewer's vantage point, I'd say to make a big beer consider starting out by making a smaller beer, which will act as a yeast growth phase. Then pull this larger quantity of yeast and use it to make the bigger beer. A yeast starter is also very important to get the yeast cell count up to a high level.

We aerate, but we don't use yeast nutrients. We use oxygen as opposed to compressed air, and using air is super easy for a homebrewer. An aquarium pump with one of those nifty stainless steel carbonation stones on the end of a ¼" piece of tubing works great — this is how I aerated my wort as a homebrewer.

The bottom line for a homebrewer is that most people don't have a microscope, so assuming that he or she uses a yeast starter or pulls a good quantity of yeast from another fermenter, probably adding a couple of cups of yeast should do the trick. On the rare occasion that I do homebrew I often add about a cup of yeast for an average gravity, so doubling that should do the trick.

Single or Blend?

Sugar and spice, choosing brewpots

"Help Me, Mr. Wizard"

by Ashton Lewis

Is single better?

When brewing a Pilsner-type lager is a single malt better than a blended malt? A silly question perhaps, but some people tell me that a single malt is superior to malt blended from different varieties. Is this true?

Stephen
via email

One truth about beer and brewing is that there are opinions and theories related to just about everything imaginable. When it comes to brewing a beer style like Pilsner it is entirely possible and quite common to brew excellent beers using only one malt type. Bear in mind that relatively few beer styles can be brewed with only one malt type. Most beers contain a blend of various malts and specialty malts. And in the global scheme of brewing most beers these days contain some adjunct ingredients such as corn, rice or some fermentable syrup made from a variety of starchy raw materials.

When I read your question I cannot help but wonder if the advice you have been given is not from a distorted interpretation of Scotch marketing. In the world of Scotch, so-called single malts reign supreme. But this term does not mean that the Scotch was brewed from a single malt variety, lot of malt or even from a single batch or barrel of whisky. A single malt Scotch is from a single distillery, as opposed to a blended Scotch that contains whiskies from various distilleries blended into one.

Contrary to the belief of some brewers, malt, the stuff we use to brew beer as opposed to the contracted name often applied to Scotch, is not something that brewers often get as an "unblended" product. In fact, to back up a little, I am not even sure how unblended malt could be produced since maltsters begin with barley and — you guessed it — silos of barley contain billions of kernels coming from different farms and harvested by multiple combines. In other words, barley is blended before any of the malting process ever begins.

Most batches of malt do indeed begin with a single variety of barley because different varieties have different malting properties and blending prior to malting would likely result in very inconsistent malt with respect to modification. After malting is complete maltsters do blend malt lots. Usually malt is blended to either produce a blend meeting a set of specifications or to produce uniformity among various lots. Some blends are made from a single variety and other blends contain multiple varieties.

Without getting into excessive detail about malt specifications and the nuances of blending, I just want to make the point in attempt to give you a general understanding of this topic that blending is not some method used by greedy corporations to make more profits at the expense of quality. Agricultural products by their very nature have variation within crop lots and blending is used to even out these variations.

When it comes to brewing I will repeat an old theme of mine and that is to have a reason behind your decision. I have brewed really nice ales from 100% floor malted Maris Otter barley malt. The first time was one of those, "I wonder what this will taste like?" brews. For my palate, the fullness of the malt was a bit too much and I now usually blend Maris Otter malt with some pale domestic 2-row to get the malt character I want in my brews. This is my own decision and is based on one thing; flavor. And blending is what we brewers do to develop flavor.

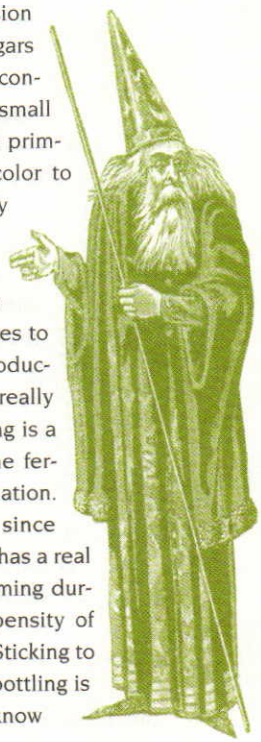
The way I see it is that the negative connotation with the term blended was exploited by people with marketing degrees who created an air of superiority associated with words such as unblended, single variety and single barrel. At the end of the day it's all about flavor. If you want to experiment with single varieties to better understand flavor go for it, but don't be fooled into thinking that you will make a better beer because of it.

Brown sugar and spice

I successfully made my first homebrew, a nut brown ale, for the fall and it was fantastic. I am now going to make a winter seasonal and I am interested in substituting the usual dextrose used as priming sugar with a brown sugar, light or dark, to impart a darker color and a molasses taste. My question is whether there is a formal conversion for the dextrose-brown sugar changeup or even if this practice is recommended. To go along with this seasonal I am considering adding some special flavors; at what point in the brew process should a flavor, for example cinnamon, fruit extract, clove or nut flavoring, be added?

James Elliott
Long Island, New York

Adding brown sugar for priming instead of dextrose is not that big of a change. The main difference is that brown sugar has much more moisture than white sugars, dextrose included, and you need to account for the water by adding a bit more sugar as determined by weight. I honestly do not know of a formal conversion because not all brown sugars have the same moisture content. I can tell you that the small amount of sugar added at priming is not going to add color to your beer and very likely will not add any detectable flavor. If you want molasses flavor you should simply add molasses to the wort during wort production. The only thing you really want to add before bottling is a controlled amount of some fermentable sugar for carbonation. Control is important since adding the wrong amount has a real affect on carbonation, foaming during pouring and the propensity of producing bottle bombs. Sticking to predictable sugars when bottling is a good idea unless you know

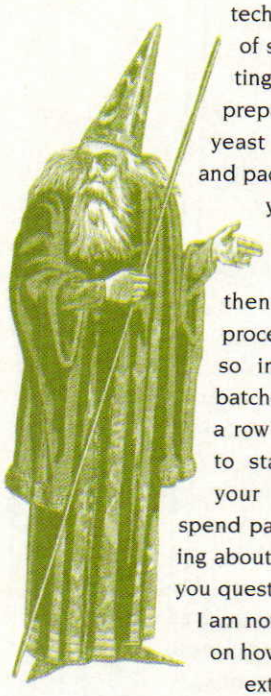


enough about the alternate to be sure you are adding the right amount.

When it comes to adding spices, fruit and various extracts, you can add these to the kettle, to the cool wort before fermentation or to beer after primary fermentation is complete. The time of addition has a lot to do with the particular ingredient and what you want from that ingredient. When adding fruits, especially sizable amounts, it is important to recognize that fermentable sugars are in the fruit and that your brewing method addresses this fact. In other words, adding a bunch of sugar from fruit to finished beer can result in enough bottle fermentation to cause major problems.

I also feel as though I should give you a little beginner's guidance here as well, however. I know this can be irritating, but sometimes the answer you don't want to hear is the one you need to heed the most. According to your question you just brewed your first batch of beer and it turned out great. That's wonderful and you should be encouraged by your success! However, jumping head first into rearranging recipes, using brown sugar for priming and brewing with nuts, berries and spices is, in my opinion, not where you need to be headed.

What you need to do for your next batch is to brew another beer that someone else formulated and focus on your technique. There are plenty of skills to hone before getting ahead of your step. Wort preparation, cooling, racking, yeast pitching, fermentation and packaging are all things that you need to get used to doing before adding more to your plate. And then there is the whole process of sanitation, which is so important. Brew several batches that are really good in a row and then you are ready to start improvising. During your early brews you can spend part of the brew day reading about the types of techniques you question.



I am not going to write a treatise on how to use fruits, spices and extracts in brewing because the topic is very broad and has been addressed in many good homebrewing books available in homebrew shops and bookstores. I don't want to dim your enthusiasm, but if you really want to modify recipes and start adding other ingredients to your brews the best thing you can do is to practice the basics and read, read, read while preparing to branch out. Think of it this way, some really great brewers spend their entire brewing careers mastering the standards and one good brew needs an encore or two before taking the next step.

Spicing secrets

I have tried to brew with cinnamon several times and have been disappointed in the results. Either the cinnamon flavor is nearly undetectable or comes through as bitter (definitely not hop bitterness). What do you recommend?

Steven Sindt
Iowa City, Iowa

I must admit that I have developed many beers at the Springfield Brewing Company over the last 11 years and I am very proud of most of my formulations. We don't have a small system to use for formulation and I usually come up with new recipes based on experience using different ingredients or reading about ingredients I have not used. There was one recipe I developed several years back, however, that had cinnamon in it and the flavor intensity was way too much. Upon returning from a trip I anxiously rushed to the pub for a pint and was immediately horrified. The next day that batch was taken off line and given a sailor's funeral.

When brewing with spices the first rule is caution. It's very easy to be tempted with spices. I think this tendency comes from cooking things like chili where you taste your concoction as it cooks and add a dash of this, a dash of that. The difference between brewing and cooking, of course, is that brewing ingredients are not added by the dash, so it's really tempting to add enough spice to be able to actually taste it. The downside is that adding too much is pretty easy.

In addition to exercising caution you need to consider what flavors the spices are capable of adding. As you point out with cinnamon you can get more flavors than you want. I am guessing that the bitter notes you got from your cinnamon resulted from boiling in the kettle. Many spices are best added at the end of the boil and in many cases added to the beer after fermentation to control how the flavors are extracted. When I think of cinnamon in beer I think of a nice spicy, inviting aroma. By boiling aromatic spices the nice aromas dissipate and other compounds of the spice extract into the wort. In the case of cinnamon these compounds include tannins from the tree bark. Not only do tannins add to the perception of bitterness in beer, they add astringency.

Personally I like to have control over my salt shaker. You can have this control if you brew a spice tea and add the tea to your beer after fermentation. By using this method you can add the spice little by little until you are satisfied. If you make spice teas you have many options on brewing method and can choose to steep in hot water, cold water, small volumes of beer or neutral spirits. In all cases you brew the tea and add it to your beer and by doing so retain control.

In conclusion, remember to use an easy hand and to consider your spicing method. If you are too subtle with the expression of the spice of choice there is always the next batch where you can tweak your recipe. Also remember that some ingredients add more than one signature flavor. I have had chili beers that have so much DMS aroma from green chilis that I forgot what I was drinking and half expected to get a kernel of corn stuck in my teeth. Define your expectations and make sure your planned method is likely to result in success before attempting to use the method or methods that seem to have failed you so far.

What size brewpot?

I just brewed my first partial mash beer and really enjoyed the whole mashing process. I want to move to all-grain but will need to get a bigger brew kettle as my current 5-gallon (19-L) one will not accommodate a full wort boil. I expect to spend between $200 and $400 on a quality stainless steel one with the hopes it will last a lifetime. My question, and one that I am having trouble finding an answer to, is what size kettle to get? I currently brew 5-gallon (19-L) batches, but I would

like to be able to do 10-gallon (38-L) batches as well (for those recipes that tend to go extra quick and for events).

Blichmann recommends a kettle double the size of the batch you are brewing to account for the larger pre-boil amount and head space for a vigorous boil. Would a 20-gallon (76-L) pot be too big for 5-gallon (19-L) batches? Will the larger diameter pot result in too much evaporation for a 5-gallon (19-L) batch? Would my immersion chiller be rendered useless in 5-gallon (19-L) batches done in a 20-gallon (76-L) pot? Would a 15-gallon (57-L) pot be a suitable compromise, or will it still be too big for 5-gallon (19-L) batches and not be big enough for 10-gallon (38-L) batches? I read that all-grain batches have a greater chance of boiling over so will more head space be needed than with extract brewing? Will I need to get two separate pots, one for each size batch?

Ross Druckenmiller
Wollaston, Massachusetts

This dilemma is not unique to homebrewing and I have had discussions about brewhouse sizing with many breweries over the years. The fact is that most kettles really work best for a fairly narrow range of volumes.

In a commercial brewery the limitation may be related to kettle geometry, the location of heating jackets or the size of an internal calandria (percolator-type) heater. At home the location of the heating jacket or the size of the internal calandria are really not issues to be worried about since most homebrewers only apply heat to the bottom of the kettle.

Kettle geometry can be an issue, especially if you are boiling small volumes in big kettles where the surface to volume ratio is huge and you begin to get excessive evaporation. And if you use an immersion chiller you run into the problem highlighted in your question where the chiller does not work well for the small batch size.

With that being said, the size of a brew, or in commercial lingo the knock-out volume, is matched to fermenter size. Some breweries have a smaller fermenter size for high gravity beers like doppelbocks, barleywines and the like. One reason for brewing smaller batches of these strong beers is the size of the mash tun or lauter tun, depending on the type of brewhouse being used. Most mash and lauter tuns work best for a given range of grist loads and when you brew a big beer it is common to yield less wort than seen with normal gravity brews. This is when it is nice to have flexibility with the batch size you boil and later ferment.

I like the way you are thinking and suggest that you buy a kettle that affords you flexibility with batch size. When I size kettles for commercial breweries, which is part of what I do in our process systems group at Mueller, I calculate backwards and begin with cold wort volume in the fermenter. For the sake of discussion let's define this as 10 gallons (38-L). When hot wort cools it contracts by 4% so you need to divide 10 by 0.96 and determine the hot wort volume is 10.4 gallons (39.37 L). I figure 3% loss in the trub pile and 10.4

divided by 0.97 is 10.7 gallons (40.5 L). And then I figure total evaporation during boiling. Ten percent evaporation is a good working number and 10.7 divided by 0.90 is 11.9 gallons (45.5 L). This is the wort volume prior to boiling.

Since boiling wort does indeed foam, I like to have at least 30% of additional space above the kettle full volume. Multiplying 11.9 gallons (45.5 L), the kettle full volume in this example, by 1.30 yields 15.5 gallons (58.7 L) and this is how big I would size a kettle if my goal is to net 10 gallons (38 L) of wort in my fermenter. This same kettle could easily be used for smaller batches by controlling the heat added to the kettle during boiling (smaller batches will require less heat input since less water is evaporated during the boil) and by designing ancillary equipment, like your cooler, to function over a range of wort volumes. This is all pretty easy to do if you incorporate these criteria into your design.

Most commercial brew kettles have an aspect ratio, or height to diameter ratio, that is about 0.65:1. If you are designing a kettle to work over a range of volumes put the ideal ratio in the middle of your volume range. In the 10 gallon (38 L) example this means that the minimum pre-boil volume is about 6 gallons (23 L), the maximum pre-boil volume is about 12 gallons (45 L) and the mid-point is 9 gallons (34 L). Without going through boring calculations the kettle diameter needs to be about 16"; not much different than one of those nifty 15.5 gallon (58.7 L) containers that sit behind bar counters filled with cold beer! When used for a half batch, the height-to-diameter ratio before the boil is 0.43 and the full batch, pre-boil aspect ratio is 0.85. This is clearly a compromise, but one that will undoubtedly work if you adjust your heat input with batch size and design other equipment, like the wort chiller, appropriately.

Take my advice and start with one stainless steel kettle that has a gross capacity of about 15.5 gallons (58.7 L) — that's code language for a keg . . . that was obtained legally, of course! This should work great for 10-gallon (38 L) batches and if it doesn't work for half batches I suggest crossing that bridge at a later date. But I am pretty sure you will not be crossing that bridge and that you will find that one kettle can be used for a range of brew sizes.

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

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

American Pale Ale

The test of a brewer's skill

by Gordon Strong

Whenever I visit a new brewpub, my eye is invariably drawn first to their beer lineup — how many beers do they have, and are there any unusual seasonals or specialties? But before I explore their range, I first want to check out their craftsmanship; for that, I always call for an American pale ale first. Why? Well, it's a common style that every pub should have, and it allows for some creativity. But it also takes a little bit of finesse and is a good measure of the brewer's skill. The same holds true with homebrewers; don't tell me about all the oddball beers you can make. Show me first that you have basic skills down. Give me an everyday American pale ale.

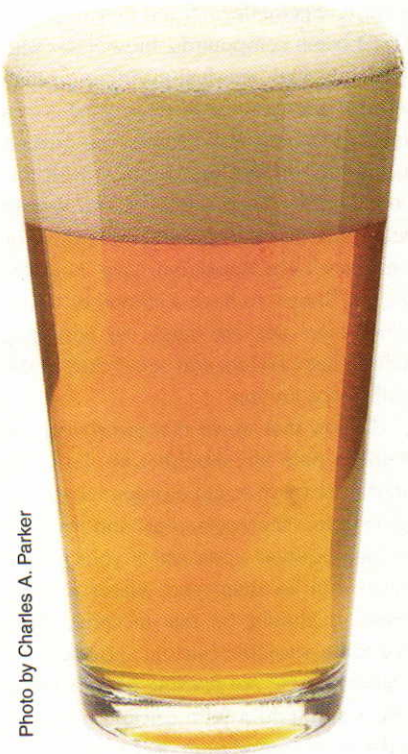


Photo by Charles A. Parker

AMERICAN PALE ALE by the numbers

OG:	1.045–1.060
FG:	1.010–1.015
SRM:	5–14
IBU:	30–45
ABV:	4.5–6.2%

Originally developed as a riff on English pale ale using American ingredients, American pale ale is the mainstream hoppy beer all across the country, even if there is significant regional variation in the style. It's an average strength beer, so you'd expect it to be around 5% ABV and not have a noticeable alcohol flavor or warmth. It's a hop-focused beer, so you'd expect the balance to be less towards the malt than the hops. And it's a pale beer, which simply means "anything lighter than brown" to most people. Within those general parameters, brewers have a lot of flexibility to experiment. However, an American pale ale should always be very drinkable.

I like to think about the "style space" a beer occupies. That is, which styles of beer are closest to the style you are discussing, and which variables are different. As far as hoppiness and strength, an American pale ale fits between a blonde ale and an American IPA. Back off on the hops (and maybe the strength) and you have a blonde ale. Increase the strength (and maybe the hops) and you have an IPA. Tweak the malt-hop balance to favor the malt a bit more, and you have either an American amber ale or American brown ale (add more crystal malt for an amber, add some chocolate malt for a brown). Play around with the varieties of malt, hops and yeast while keeping the strength and balance the same, and you have an English or Belgian pale ale. Knowing the nearest neighbors in the style space is helpful if you brew a beer but miss the mark on style. It might hit one of the neighboring styles.

Before we talk about the details of the style, let's first discuss the most common stylistic errors that brewers make. I'm not talking about the obvious brewing or handling faults (phenolics, oxidation, light-struck, etc.); I mean balance and drinkability issues. In American pale ales, the biggest faults that harm drinkability are excessive body, too much sweetness and lingering harshness. Beers that have too

RECIPE

Classic American Pale Ale

(5 gallons/19 L, all-grain)

OG = 1.050 (12.3 °P)
FG = 1.011 (2.7 °P)
IBU = 40 SRM = 6 ABV = 5.1%

This is an all-grain version of my first American pale ale recipe. It won gold medals in five different competitions before my wife drank it all.

Ingredients

8.5 lbs (3.86 kg) American two-row malt
0.25 lb (113 g) crystal malt (20 °L)
0.5 lb (227 g) CaraVienne malt
7 AAU Columbus whole hops (0.5 oz/14 g at 14% alpha acids) (60 min.)
0.5 oz (14 g) Centennial whole hops at 11% alpha acids (15 min.)
0.5 oz (14 g) Cascade whole hops at 6% alpha acids (5 min.)
1 oz (28 g) Cascade whole hops 6% alpha acids (0 min.)
1.5 oz (42 g) Centennial whole hops 11% alpha acids (dry)
Wyeast 1272 (American Ale II) yeast

Step by Step

Mill grains and dough-in using reverse osmosis (RO) water until a medium thickness mash is achieved. Treat mash with 1 tsp. (5 mL) calcium chloride. Hold mash at 152 °F (67 °C) until conversion is complete. Sparge slowly with 170 °F (77 °C) RO water treated with 2 tsp. (10 mL) phosphoric acid, collecting 6 gallons (23 L). Bring wort to a boil.

After the hot break, add the first charge of bittering hops. Boil for 60 additional minutes, adding the other hops per the hopping schedule. Allow the wort to rest for 5 minutes, then chill rapidly to 65 °F (18 °C). Rack to fermenter, leaving break material behind. Oxygenate, pitch the yeast, and ferment at 68 °F (20 °C). Fermentation should be done in less than a week, but don't rush it.

RECIPE (continued)

After the yeast has mostly settled, prepare a secondary fermenter (carboy). Blow in some CO_2 to displace any oxygen, add the dry hops and rack the fermented beer on top of the dry hops, minimizing splashing. Leave the beer in contact with the hops for a week. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and bottle. Target a carbonation level of 2 to 2.5 volumes. For a variation, add 0.5 lb (0.23 kg) orange blossom honey in the last 15 min. of the boil.

Classic American Pale Ale

(5 gallons/19 L, extract plus grains)

Substitute 6.4 lbs (2.9 kg) of light-colored American liquid malt extract or 5.1 lbs (2.3 kg) of very pale dry malt extract for the American two-row malt. Mill the specialty grains and steep them in a grain bag in the 6 gallons (23 L) of strike water (RO water treated with 1 tsp./5 mL calcium chloride) at 155 °F (68 °C) for 30 minutes. Lift the bag from the water and rinse gently with hot water. Let the bag drip into the kettle while adding the malt extract. Stir thoroughly and bring to a boil. Follow the main recipe from there.

Avant Garde American Pale Ale

(5 gallons/19 L, all-grain)

OG = 1.060 (14.7 °P)
FG = 1.012 (3 °P)
IBUs = 45 SRM = 10 ABV = 6.3%

This beer won a gold medal in the first round of the 2008 NHC competition.

Ingredients

6.5 lb (2.9 kg) Maris Otter malt
1 lb (0.45 kg) Vienna malt
0.75 lb (340 g) crystal malt (40 °L)
0.25 lb (113 g) crystal malt (80 °L)
0.5 lb (226 g) wheat malt
1 lb (0.45 kg) white sugar
8 AAU Amarillo whole hops (1 oz./28 g of 8% alpha acids) (first wort hopping)
0.5 oz (14 g) Columbus whole hops 14% alpha acids (15 min.)
0.5 oz (14 g) Columbus whole hops 14% alpha acids (10 min.)
0.5 oz (14 g) Simcoe whole hops 12% alpha acids (5 min.)
1 oz (28 g) Amarillo whole hops 8% alpha acids (2 min.)
0.5 oz (14 g) Simcoe whole hops 12% alpha acids (0 min.))
White Labs WLP060 (American Blend yeast

Step by Step

Mill grains and dough-in using RO water until a medium thickness mash is achieved. Treat mash with 1 tsp. (5 mL) calcium chloride. Hold mash at 150 °F (66 °C) until conversion is complete. Add first wort hops to kettle. Sparge slowly with 170 °F (77 °C) RO water treated with 2 tsp. (10 mL) phosphoric acid, collecting 6.5 gallons (24.6 L). Bring wort to a boil.

After the hot break, add the sugar. Boil for 75 additional minutes, adding the hops per the hopping schedule. Allow the wort to rest for 5 minutes, then chill rapidly to 68 °F (20 °C). Rack to fermenter, leaving break material behind. Oxygenate, pitch the yeast, and ferment at 70 °F (21 °C). Fermentation should be done in less than a week, but don't rush it. After the beer has dropped bright, rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar and bottle. Target a carbonation level of 2 to 2.5 volumes.

Avant Garde American Pale Ale

(5 gallons/19 L, extract plus grains)

Substitute 6 lbs (2.7 kg) of light-colored American liquid malt extract or 4.8 lbs. (2.2 kg) of very pale dry malt extract for the Maris Otter, Vienna and wheat malts. Mill the crystal malts and steep them in a grain bag in the 6.5 gallons (24.6 L) of strike water (RO water treated with 1 tsp./5 mL calcium chloride) at 155 °F (68 °C) for 30 minutes. Lift the bag from the water and rinse gently with hot water. Let the bag drip into the kettle while adding the malt extract and the first wort hops. Stir thoroughly and bring to a boil. Follow the main recipe from there.

much body, residual sweetness and/or alcohol are more difficult to drink. Think of barleywines; they are sipping beers that you enjoy slowly. In contrast, it should be easy to drink a few pints of American pale ale. The body should be no more than medium (medium-light is better). The finish should be fairly dry; it can have a moderately malty palate but the finish should not have much residual sugar. Alcohol shouldn't be noticeable. Get these three points right (body, finish, alcohol) and you should have a fairly drinkable beer.

Harshness is another matter entirely. It is a common problem with beers that use a lot of hops. In my experience, hop-derived harshness comes from four factors: the quantity of hops used, the amount of time the hops are boiled, the water chemistry, and the chemical makeup of the hop varieties used. While there are no hard and fast rules, be aware of these general guidelines. The more hops you use and the longer they are boiled, the harsher your beer can be. Large amounts of hops can give vegetal flavors, and long boils can extract harsh compounds. Brew water with a high pH, high residual alkalinity or high sulfate content can lead to harshness in a pale hoppy beer (John Palmer has written extensively on this topic). Hops with low cohumulone (check the varieties against data in the *Best of* BYO: *Hop Lover's Guide* or from places like HopUnion; "low" is under 30%) are known to have a smoother flavor. If your pale ales are harsh, try adjusting each of these factors and see if they make a difference for you.

So now that we've discussed what an American pale ale shouldn't be, let's talk about what to do to get a proper character to your beer. The water, yeast and malt are the blank canvas upon which your hoppy artwork will be displayed. Water is fairly simple. It should be low in carbonates, have some available calcium and have low alkalinity. If you are starting with distilled or RO water, add a little calcium chloride. It's the most neutral form of calcium. Some sulfates are acceptable, but too much and the hops will take on a sharp edge.

Yeast selection is fairly straightforward. Any clean, neutral American strain that attenuates well will do. The obvious choices are White Labs WLP001 California Ale, Wyeast 1056 American Ale and Fermentis Safale US-05. But I like to exper-

iment with some of the other strains. I really like the Wyeast 1272 American Ale II for pale ales and IPAs, and I've had good luck with the WLP060 American Blend. Keep the fermentation temperatures in the 65–70 °F (18–21°C) range. You may be able to use some of the cleaner British strains, such as White Labs WLP002 English Ale or Wyeast 1968 London ESB Ale if you keep the temperatures closer to 65 °F (18 °C). Light fruitiness from yeast is acceptable in this style, but is usually restrained.

The grain bill for an American pale ale is fairly simple as well. The majority of the grist should be pale malt, typically domestic two-row (I use Briess). You might be able to use English pale ale malt (Crisp Maris Otter is my favorite) or a Belgian pale ale malt (like Dingemans). I also sometimes like to use German Vienna malt in some of my malty beers (Durst is my choice). But first use a simple grain bill consisting of mostly US two-row to get a flavor similar to most US commercial and brewpub examples.

Most all-grain brewers will add a small amount of wheat (under 3%) to aid in head retention. The base grains previously mentioned plus any wheat should constitute at least 90% of the grist, up to 100%. The remaining grains are where the brewer can experiment. Usually some crystal malt is used, but not as much as in an English pale ale or an American amber ale. Something light in color (40 °L or lower) works best. I like to use Belgian crystal malts, such as CaraVienne as well. Watch overuse of crystal malts, especially the very lightly kilned ones, as they are often designed to add dextrins (unfermentables) to the beer. Be very light-handed in the use of darker crystal malts; you don't want the color or the flavor. Too much crystal malt will make the beer too sweet and have too much body.

Some brewers add other character malts, such as Victory, Biscuit, or special roast, but I think these flavors are distracting. You do not want a muddy-flavored beer, and that's what you can get if you use too many different types of malts. Any roasted flavors are inappropriate, even if they can add a little dryness to the beer (as in an Irish red ale). Keep it simple, especially when first brewing the style. Freshness of ingredients matters as well.

A single-infusion mash is appropriate

for this style, keeping it on the low end of the range (148–152 °F/64–67 °C). With the simple grain bill and lack of unusual specialty grains, this style is perfect for extract brewers. Use fresh, light-colored American malt extract with good fermentability. Steep crystal-grains at 155 °F (68 °C) for a half hour before adding the malt extract. Extract brewers or all-grain brewers mashing at the high end of the range may wish to add up to 10% sugar to make sure the body isn't excessive. I think adding a little orange blossom honey is also an interesting touch.

The choice and use of hops is the most important factor in the overall profile of this beer. Hops should be showcased in the bitterness, flavor and aroma of this style. Freshness of ingredients is very important, particularly for the late hops. The choices you have to make regarding hops are primarily the quantity and variety, the level of bitterness, the flavor hop method, and the aroma hop method.

Hops used in an American pale ale are typically (but not always exclusively) American varieties. One of the regional variations I mentioned earlier is the type of hop character in the beer. Many examples in the Pacific Northwest and Northern California feature strong citrusy and piney flavors. However, hops with floral and spicy qualities are also quite nice in this beer. Classic American hops used in this style are Cascade, Centennial, Columbus, and Chinook (the "C" hops). More recent choices include Amarillo, Ahtanum, Simcoe and Glacier. I sometimes like to use noble-type hops, including American varieties such as Santiam, Crystal, Liberty or Sterling, especially as flavor additions. All are fine, but beware of mixing too many different varieties of hops. Some of the flavors might clash.

Some of my favorite combinations are using Cascade and Centennial together, or using Amarillo with Simcoe. I like to use less than four varieties of late hops in an American pale ale, often just using two. American pale ale is also a great style for making as a single hop varietal beer. Nothing will teach you the character of a hop variety better than using nothing but that type of hop in your beer.

Bittering hops are usually higher alpha varieties so that less vegetal matter will be introduced into the boil. Use a clean, neutral bittering hop such as Warrior, Magnum or Horizon, or a higher-alpha, multi-purpose American hop such as Columbus or Chinook. The level of bitterness varies greatly within this style. West Coast versions tend to be over 40 IBUs, while most moderate examples will be in the low-mid 30s. Keep in mind that drier beers need less bitterness to seem balanced.

There are some interesting choices for late hop (flavor and aroma) additions. The classic method is to simply add flavor hops during the last 10-15 minutes of the boil, and the aroma hops in the last 5 minutes or less. That works fine, and is the baseline for experimentation. Dry hopping is a technique where additional hop aroma can be gained by adding hops to the secondary fermentation. You can use between 0.5 oz and 2 oz (14 and 56 g) per

5-gallon (19-L) batch. Note that dry hopping often imparts a grassy, vegetal note that some may not like. Limit contact time of dry hops with your beer to a week or less to help limit the vegetal flavors.

In recent years, I have gotten away from dry-hopping my American pale ales. I prefer the aroma that you get from using a hopback or from adding hops at the end of the boil or in the whirlpool. Giving the hops some heat helps remove those raw aromatics, but you have to cool the beer rapidly from this point so as to keep the liberated aromatics within the beer.

I really like to use first-wort hopping with American pale ales. I add my flavor hop addition to the kettle and run my hot wort onto them. I calculate they give you the same amount of IBUs as a 20-minute bittering hop addition. Contrary to what some have written, I don't find first-wort hopping gives much aroma, but it does give a ton of flavor. The flavor is different than if used late in the boil; it is more refined and elegant, and seems better blended with the beer. I don't have an explanation why, but it's what I perceive.

One final hop method you may want to explore is the use of nothing but late hop additions. You have to use more hops this way, but the chance of getting a harsh hop bitterness is vastly reduced. Add all your hops within the last 20 minutes of the boil, adjusting your amounts to compensate for the reduced utilization. I think this is a similar method to adding your dark roasted grains during the sparge when making a dark beer. Less contact time with heat extracts less tannins, which makes for a smoother beer.

My recommendation is to first try to brew a classic American pale ale to make sure your process is solid. Then start adjusting variables and trying out different hop varieties, techniques, grain bills and yeasts. Keep good records and see what you like. Don't be afraid to experiment and to try new hop combinations. Just keep in mind that as with all hoppy beers, American pale ales are best enjoyed when they are fresh.

Gordon Strong is the President of the Beer Judge Certification Program (BJCP), led the development of the 2004 and 2008 BJCP Style Guidelines and is the only Grand Master V beer judge.

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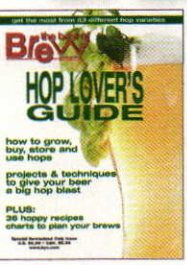

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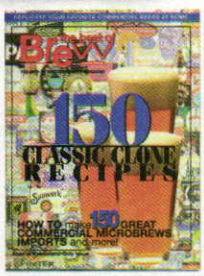

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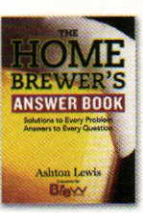

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•Always be clean. Everything on the planet likes beer as much as we do. Everything you read about cleanliness is true.

Jim Leverentz
Leeners You-Make-Kit Brand
Northfield, Ohio

•Cheap vodka makes a great sanitizer. Use vodka in your airlock instead of water. If any pesky little critters try to get to your bubbly barley concoction, they are killed instantly! Keep some in a small mist-style spray bottle and use it to spray the opening of your carboy before pitching your yeast. Keep the spray bottle handy for those times when you need some sanitizer, but don't have the time to mix up a fresh batch.

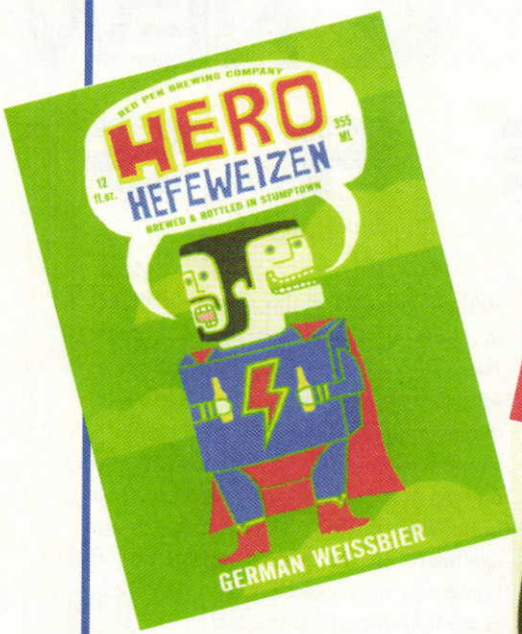
Francie Lengerich
The Brewers Art Supply
Fort Wayne, Indiana

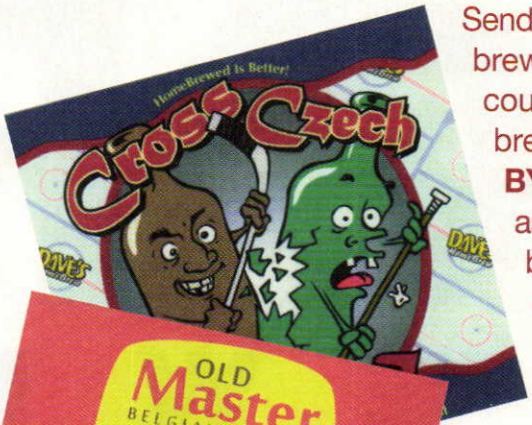
•I'd recommend staying away from bleach to clean or sanitize brew equipment. There is a chemical reaction that occurs with the chlorine and maltose molecules that gives off nasty flavors. Bleach doesn't always rinse out that well and even a little bit can ruin a batch of otherwise great brew. With all the available cleaners and sanitizers on the market, those new to homebrewing should not have to rely on household bleach for the task.

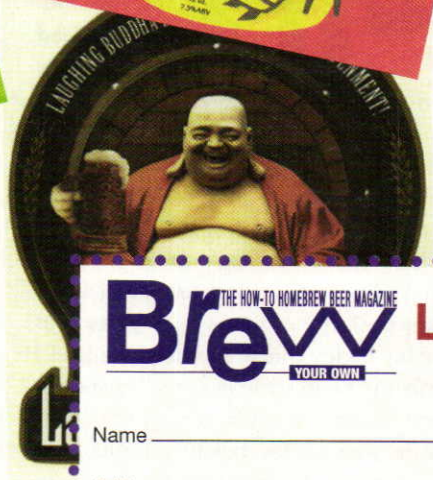
Bob Bacolas
Grains Beans & Things
Medford, Oregon

•The best way to sanitize all your bottles at once, is to grab a large cooler - like what you would take to a tailgate party, because most larger sized coolers hold at least two cases of beer bottles. Place the cooler on the counter with the drain plug facing the sink, and fill with 5 to 7 gallons (19 to 26 L) of water along with some no-rinse sanitizer. Submerge the bottles upright and hold them under water until they stop trying to float to the surface. Double check that the

Brew THE HOW-TO HOMEBREW BEER MAGAZINE YOUR OWN 13th Annual Homebrew LABEL CONTEST







Send us your best homebrew labels and you could win some great brewing prizes from **BYO** advertisers! Enter as often as you like, but you can only win one prize. Winners will see their artwork featured in the July-August issue of the magazine. **Deadline to enter is May 1, 2009.**

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

Brew THE HOW-TO HOMEBREW BEER MAGAZINE YOUR OWN Label Contest Entry Form

Name _____

Address _____

City _____ State/Prov _____ Postal Code _____

E-mail _____

Daytime Phone _____

All original artwork? Y or N (circle one)

Send your entry to:
BYO Label Contest
5515 Main Street
Manchester Center, VT 05255

DEADLINE: May 1, 2009

bottles are completely submerged. You may need to add more H_2O and sanitizer to get larger sized bottles submerged. Let them soak until you are ready to bottle, and when you are done with bottling just open the drain plug to drain.

Francie Lengerich
The Brewers Art Supply
Fort Wayne, Indiana

Record Keeping and Research

•Keep a brew log, no matter how simple the recipe. This gives you the opportunity to tweak a recipe to get it perfect, as you know what you used and how you used it. Assign each beer with a code that you can write with a permanent marker on the cap and write the code and a brief description on an index page in the front of the log for easy reference. This makes it quick and easy to differentiate your beers without having to mess with labels. If you have a beer fridge, make a copy of the index page and hang it on the fridge with a magnet.

Francie Lengerich
The Brewers Art Supply
Fort Wayne, Indiana

•Don't get carried away reading absolutely everything you can find about beer or wine making on the Internet. You will get overwhelmed and talk yourself right out of the hobby.

Paul and Carolyn Baker
The Shady Lady
Pensacola, Florida

Ingredients

•A classic beginner's mistake is heavy-handed use of specialty malts, especially crystal. Too much isn't always better than not enough. Caramel malts generally shouldn't exceed 5% of the grist. If you are extract brewing, consider 7.5 lbs. (3.40 kg) of pale malt extract to be about 10 lbs. (4.53 kg) of pale malt when adding up the grist. When using roasted malts one type is usually enough. Too many colors make grey, too many types of specialties make blah. When tweaking your beer it's easier to add to a simple recipe than to subtract from a complicated one. And when you do, rely on your nose and your taste buds, not your computer program.

Dan Small
Dan's Homebrewing Supplies
Vancouver, British Columbia

•I have had many first-time brewers come in with complaints of over-bittered beer. After some questioning I find that they simply misunderstood how to read a recipe. Hop boil times in a recipe read: 60 min., 15 min., 1 min. A first time brewer reads this as a 76 min total boil, however these are the points during the boil when you should add the hops, not the total boil time. Be sure you understand the hop additions when reading recipes.

Doug Kimpel
Just Brew It!
Fayetteville, Georgia

•The best advice I have for beginning homebrewers is to pay just

as much attention to fermentation and yeast as the ingredients or type of beer. Many new homebrewers want to brew a lager beer on their first brew which requires advanced brewing procedures, so I usually recommend using a Kölsch yeast like White Labs WLP029 German Ale/Kölsch to produce a clean, lager-like beer at ale temperatures.

Alex Buerckholtz
Hops & Vines
West Asheville, North Carolina

Fermentation and Temperature Control

•Never rely on airlock activity because it doesn't tell you much about fermentation. Always use your hydrometer to monitor fermentation. Use the airlock activity as a gauge but not an end-all, be-all tool for fermentation. If you pitch your yeast and don't see activity in your airlock after a day, it doesn't mean the beer is not fermenting. It could mean that there is a leak somewhere in the lid, gasket or rubber stopper. During fermentation there is a lot of CO_2 produced and some is absorbed into the wort. Because of this you could potentially still have airlock activity after fermentation is complete and that activity is nothing but residual CO_2 being released.

Ben Knoerdel
Ben's Homebrew
Tarentum, Pennsylvania

•Living on the Gulf Coast, we are always fighting warm to hot fermentation temperatures. Our better-established, experienced homebrewers simply buy a thermostat and relegate their fermentation to an ugly avocado green or harvest gold refrigerator, which can maintain very precise fermentation and maturation temperatures. This is beyond the scope of most beginning homebrewers as it is quite an investment in money and space for someone just sticking their toe in the water. The way to get around it is placing the fermenter in a bath of water (sink, spare bathtub, bus tub, galvanized steel tub, picnic cooler, etc.). Keep a few half liter or liter PET soda bottles 80% full of water and toss them into the freezer. Depending on the temperature of the room and the desired temperature for the wort, toss one or two of the bottles into the cooling bath once or twice a day. Wrap your fermenter with an old towel, t-shirt or blanket and you can maintain very reasonable temperatures.

Scott Birdwell
DeFalco's Home Wine & Beer Supplies
Houston, Texas

Boiling and Steeping

•Bend a paper clip into an "S" shape and pin one end through the top of your grain bag so that you can hang it over the top edge of your brew kettle during the steeping phase of extract or partial mash recipes.

John "JB" Brack
Austin Homebrew Supply
Austin, Texas

•Boilovers are a common beginner problem and can be the cause of domestic problems. They usually happen just before the wort starts to boil. An insulative foam forms on the wort's surface that allows the liquid to superheat a bit, which can cause a boilover. Should this occur, a quick dash of cold water will bring the boilover to a halt. Always have a small glass of water nearby. A rolling boil does not usually get out of hand. Stirring until this is achieved should not take long.

Dan Listermann
Listermann Manufacturing
Cincinnati, Ohio

Chilling

•When wort chilling, hook up the garden hoses to the wort chiller before you place it into the boiling kettle. This prevents steam from hitting your face and avoids dirty water from leaking or spraying into your kettle.

Nancy Vineyard
The Beverage People
Santa Rosa, California

•To cool partial boils, a lot of books say to mix the boiling wort in the fermenter and then add the cold water. This is thermodynamically backwards and makes reaching pitching temperatures difficult. A far better way is to recognize that in the boiling pot, you have a high temperature differential, a small thermal mass and a conductive container as opposed to trying to cool a plastic bucket filled to five gallons (19 L) of 115 °F (46 °C) wort which can take hours to cool. Just place the pot in a sink of cold water and stir it a bit, changing the water as it heats. After about 30 minutes it will be at body temperature and can be mixed with your cold water in the fermenter, instantly bring it to pitching temperature.

Dan Listermann
Listermann Manufacturing
Cincinnati, Ohio

Follow Procedure and Get Feedback

•If your goal as a new brewer is to try and perfect the process and monitor your brewing results, try making the same recipe or kit over and over again and taste each batch relative to the other. Take copious notes as you brew each batch so you document what you have done differently. As you learn more substitute one ingredient at a time, such as hops or yeast, to notice subtle differences. Brewing the same recipe using different yeast varieties can help you understand their fermentation and flavor characteristics.

Erik Schmid
The Brewmeister
Folsom, California

•In 6,000 years of homebrewing, all the short cuts have been figured out. Follow the instructions.

Jim Leverentz
Leeners You-Make-Kit Brand
Northfield, Ohio

•Get a good opinion. Giving your friends free beer and then asking them what they think about it is not the best way of having your beer critically evaluated.

Byron Burch
The Beverage People
Santa Rosa, California

Bottling

•When using a bottle filler without a spring in the tip, put a wooden spoon under your bottling bucket with the handle sticking out over the edge of the counter. Loop the hose over it, hanging the filler in the "off" position while capping a few bottles or getting a new case.

Bob Peak
The Beverage People
Santa Rosa, California

•If using a bucket for a primary or secondary fermenter, or for bottling, opt for installing or buying one with a spigot mounted at the bottom to avoid having to siphon your beer.

Erik Schmid
The Brewmeister
Folsom, California

BYO Bonus Tip: Keep Oxygen Away

•Yeast need oxygen when they are pitched in order to grow and ferment the wort properly. However, after they have been "fed," you should strive to minimize your wort or beer's exposure to oxygen. Exposure to oxygen while beer ages leads to papery or cardboard-like aromas in beer. And, the presence of oxygen can spur the growth of some beer-spoiling organisms, like Acetobacter, which causes a vinegar-like character in beer contaminated with it. Keep your buckets sealed and fermentation locks filled, rack your beer quietly and use a container without a lot of headspace for conditioning your beer.

Chris Colby
Editor, Brew Your Own *Magazine*

Web extra:

New brewer? Visit our all-new Web site, with a page just for you:
http://www.byo.com/newbrew

by **Glenn BurnSilver**

Photo Courtesy of Dixie Cup

Despite disruptions from Hurricane Ike, the annual Dixie Cup competition in Houston, Texas was still a success in 2008.

Homebrewers love recipes, especially those that have had success at homebrew competitions. With that in mind, *BYO* decided it was time to gather some best of show winning recipes and present them to our readers.

In this recipe compilation, we present contest-winning brews from events that took place in 2008 all over the United States. Featured here are Virg Redman's traditional bock, winner at the California State Fair, Drunk Monk Challenge (Ann Arbor, MI) winners Bob and Kim Barrett for their German Pilsner, Alastair Hewitt's mild, winner of the Boston Homebrew Competition, Maltose Falcons' Mayfaire Competition (Southern California) winner Mike Mraz for his extra pale ale, and Scott DeWalt winner of Dixie Cup (Houston, TX) with his Flanders Red-style wood-aged beer and his maibock, winner at the Alamo City Cerveza Fest in San Antonio.

Looking at this sampling, it's clear that any beer in any style can become the best of show winner. There is no right or wrong beer, only the one that happens to stand out at any given moment.

Photo Courtesy of Drunk Monk Challenge

Judges pore over the entries to the 2008 Drunk Monk Challenge, a competition organized by the DuPage County, Illinois homebrew club the Urban Knaves of Grain.

Case in point, Hewitt's Hop Crisis Mild. "I was surprised it stood up to the other beers on the BOS table though," he says. "I thought something as wimpy as a mild would not stand a chance."

That said, a lot of time and effort is involved in producing these award-winning beers. The Barretts have conjured up over 230 batches (estimated at 1,600 gallons/6,000 L) of beer in the 10 years they have been brewing. Redman enters about 12 competitions a year, while Mraz is vying to becoming California State Homebrewer of the Year. DeWalt is so into brewing competitions (and brewing in general) he's started his own Web site: Texanbrew.com.

All of these winning brewers enter numerous competitions each year and continually fine-tune their recipes. At this level, homebrewing is something of a passion. But, if nothing else, the competitions provide feedback and insight that can be used in creating a future award winner — or at the very least, a fine beverage to consume with friends. So, enjoy the recipes, learn from these brewers and we'll see you in the winner's circle!

AWARD-WINNING Homebrews

6 recipes from the brewhouse to best of show

Photo by Charles A. Parker/Images Plus

AWARD-WINNING Homebrew Recipes

Bob and Kim Barrett, Winners of the Drunk Monk Challenge, Ann Arbor, Michigan March 7-8, 2008.

"We try to find competitions that have a grand prize of brewing your beer at a local brewpub. Ribbons and medals are nice, but there's just something about watching your recipe get ramped up to six or 20 barrels and then helping with the brew on brew day, then climbing into the brew kettle at the end of the day and scrubbing it down that gives you just a really great feeling."

BK Pils

(5 gallons/19 L, all-grain)

OG = 1.046 FG = 1.011
IBU = 33 SRM = 4 ABV = 4.4%

Ingredients

9.5 lbs. (4.3 kg) Durst Pilsner malt
2.2 AAU New Zealand Hallertauer hops (first wort hops)
(0.25 oz./7.1 g of 8.6% alpha acids)
6.5 AAU New Zealand Hallertauer hops (60 mins)
(0.75 oz./21 g of 8.6% alpha acids)
0.5 oz. (14 g) New Zealand Hallertauer hops (0 mins)
White Labs WLP830 (German Lager) yeast (2 qt./2 L starter)

Step by Step

Mash at 151 °F (66 °C) for 35 minutes. Mash at 156 °F (69 °C) for 25 minutes and 168 °F (76 °C) for 10 minutes. The last step is a mash done via decoction; pull one-third of mash and boil it for 10 minutes. Boil wort 70 mins. Cool to 56 °F (13 °C) with immersion chiller, place carboy in 50 °F (10 °C) fridge for a few hours, then pitch yeast. Ferment at 50 °F (10 °C) for 2 weeks. Diacetyl rest at 65 °F (18 °C) for two days. Lager for 4

Photo Courtesy of Dixie Cup

Texan homebrewer Scott DeWalt shows off his Best of Show trophy at the 2008 Dixie Cup. He won for his TexanBrew Flanders. He also won BOS at the Alamo City Cerveza Fest.

6 best of show recipes from coast

weeks at 34 °F (1.1 °C).

BK Pils

(5 gallons/19 L, extract with grains)

OG = 1.046 FG = 1.012
IBU = 33 SRM = 5 ABV = 4.5%

Ingredients

2.0 lbs. (4.3 kg) Durst Pilsner malt
1 lb. 2 oz. light dried malt extract
4.0 lbs. Pilsner malt extract (such as Weyermann's) (late addition)
2.2 AAU New Zealand Hallertauer hops (first wort hops) (0.25 oz./7.1 g of 8.6% alpha acids)
6.5 AAU New Zealand Hallertauer hops (60 mins) (0.75 oz./21 g of 8.6% alpha acids)
0.5 oz. (14 g) New Zealand Hallertauer hops (0 mins)
White Labs WLP830 (German Lager) yeast (2 qt./2 L starter)

Step by Step

Steep crushed grains at 151 °F (66 °C) for 35 minutes in 3.0 qts (2.8 L0 of water. Heat steeping water to 156 °F (68 °C) and hold for 25 minutes, then heat water to 168 °F (76 °C). In your brewpot, combine liquid from steep with dried malt extract and water to make 3 gallons (11 L) and bring to a boil. Add first wort hops as liquid approaches a boil. Boil for 60 minutes, adding remaining hops at times indicated and liquid malt extract for final 15 minutes of the boil. Cool wort and transfer to fermenter. Top up, aerate and pitch yeast. Ferment at 50 °F (10 °C) for 2 weeks. Diacetyl rest for 2 days at 65 °F (18 °C). Lager for 4 weeks at 34 °F (1.1 °C).

Mike Mraz, Winner of Maltose Falcons Mayfaire Competition, California, April 12, 2008.

"Some of the beers I brewed this year were just for a single competition, (but) most of the time I have my regular beers that I brew and have on tap."

Three Blind Mice Pale Ale

(5 gallons/19 L, all-grain)

OG = 1.049 FG = 1.010
IBU = 37 SRM = 4.5 ABV = 5.0%

Ingredients

9.5 lbs. (4.3 kg) 2-row pale malt
0.25 lbs. (0.11 kg) CaraPils®
0.25 lbs. (0.11 kg) wheat malt
0.25 lbs. (0.11 kg) crystal malt (40 °L)
5.25 AAU Chinook hops (60 mins)
(0.44 oz./12 g of alpha acids)
3 AAU Cascade hops (30 mins)
(0.6 oz./17 g of 5% alpha acids)
3 AAU Cascade hops (15 mins)
(0.6 oz./17 g of 5% alpha acids)
0.50 oz. (14 g) Amarillo hops (0 mins)
0.25 oz. (7.1 g) Simcoe hops (0 mins)
0.50 oz. (14 g) Cascade hops (dry hops)
0.25 oz. (7.1 g) Centennial hops
(dry hops)
White Labs WLP001 (California
Ale) yeast

Step by Step

Use 1.2 qts/lb. mash thickness. Mash at 152 °F (67 °C) for 60 minutes, then 168 °F (76 °C) for 10 minutes. Ferment starting at 64 °F (18 °C) and let rise to 68 °F (20 °C). Dry hop for 4 weeks.

Three Blind Mice Pale Ale

(5 gallons/19 L, extract with grains)

OG = 1.049 FG = 1.011
IBU = 37 SRM = 4.5 ABV = 4.9%

Ingredients

1.25 lbs. (0.57 kg) 2-row pale malt
0.25 lbs. (0.11 kg) CaraPils®
0.25 lbs. (0.11 kg) wheat malt
0.25 lbs. (0.11 kg) crystal malt (40 °L)
1.5 lbs. (0.68 kg) light dried malt extract
4.0 lbs. (1.8 kg) light liquid malt extract
(late addition)
5.25 AAU Chinook hops (60 mins)
(0.44 oz./12 g of alpha acids)
3 AAU Cascade hops (30 mins)
(0.6 oz./17 g of 5% alpha acids)
3 AAU Cascade hops (15 mins)
(0.6 oz./17 g of 5% alpha acids)
0.50 oz. (14 g) Amarillo hops (0 mins)
0.25 oz. (7.1 g) Simcoe hops (0 mins)
0.50 oz. (14 g) Cascade hops (dry hops)
0.25 oz. (7.1 g) Centennial hops
(dry hops)
White Labs WLP001 (California
Ale) yeast

Step by Step

Steep crushed malt at 152 °F (67 °C) in 3.0 qts. (2.8 L) of water. Steep for 45 minutes. In brewpot, combine liquid from steep, dried malt extract and water to make 3.0 gallons (11 L). Bring to a boil and boil for 60 minutes, adding hops at times indicated and liquid malt extract for final 15 minutes of the boil. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L), aerate and pitch yeast. Ferment starting at 64 °F (18 °C) and let rise to 68 °F (20 °C). Dry hop for 4 weeks.

Virg Redman, Winner of California State Fair Homebrew Competition, May 2008.

"It's more a labor of love for me. I pay just enough attention to detail to ensure I am brewing what I started out to brew, but if I am not having fun and enjoying myself it ceases to be a hobby. ... That's why I have started to brew more for my taste now instead of being a slave to the style guidelines."

Traditional Bock

(5 gallons/19 L, partial mash)

OG = 1.090 FG = 1.030
IBU = 24 SRM = 17 ABV = 8.8%

Ingredients

3 lbs. 4 oz. (1.5 kg) light liquid
malt extract
7.0 lbs. (3.2 kg) Munich malt
4.5 lbs. (2.0 kg) German Pilsner malt
2.5 lbs. (1.1 kg) Vienna malt
1.0 lb. (0.45 kg) honey malt
0.5 lbs. (0.23 kg) crystal malt (60 °L)
4.0 oz. (0.11 kg) crystal malt (40 °L)
2.0 oz. (57 g) crystal malt (120 °L)
4 AAU Hallertauer Hersbrucker hops
(60 min)
(1.0 oz./28 g of 4% alpha acids)
4.8 AAU Hallertauer hops (30 min)
(1.0 oz./28 g of 4.8% alpha acids)
1 Whirlfloc tablet (20 min)
White Labs WLP833 (German Bock
Lager) yeast
Safale S-23 dried yeast

Step by Step

Mash temperature was 154 °F (68 °C). Used fly sparge method. Boil time was 60 minutes. Pitched both yeast strains (no starter). Primary ferment for 3 weeks at 52 °F (11 °C). Lager for 3 weeks at 38 °F (3.3 °C). Carbonate to 2.4 volumes CO_2.

Traditional Bock

(5 gallons/19 L, all-grain)

OG = 1.090 FG = 1.030
IBU = 24 SRM = 17 ABV = 8.8%

Ingredients

7.0 lbs. (3.2 kg) Munich malt
8.0 lbs. (3.6 kg) German Pilsner malt

"I have started to brew more for my

California State Fair

2.5 lbs. (1.1 kg) Vienna malt
1.0 lb. (0.45 kg) honey malt
0.5 lbs. (0.23 kg) crystal malt (60 °L)
4.0 oz. (0.11 kg) crystal malt (40 °L)
2.0 oz. (57 g) crystal malt (120 °L)
4 AAU Hallertauer Hersbrucker hops (60 min)
(1.0 oz./28 g of 4% alpha acids)
4.8 AAU Hallertauer hops (30 min)
(1.0 oz./28 g of 4.8% alpha acids)
1 Whirlfloc tablet (20 min)
White Labs WLP833 (German Bock Lager) yeast
Safale S-23 dried yeast

Step by Step

Mash temperature was 154 °F (68 °C). Used fly sparge method. Collect about 8 gallons (30 L) and boil until volume is reduced to 5 gallons (19 L) . Primary ferment for 3 weeks at 52 °F (11 °C). Lager for 3 weeks at 38 °F (3.3 °C). Carbonate to 2.4 volumes CO_2.

Alastair Hewitt, Winner of Boston Homebrew Competition, March 1, 2008.

"I enjoy the challenge and the creative side of developing new recipes. Since there are so many different ways something can turn out, I am always surprised. There are many ways to make improvements and this also keeps it interesting."

Hop Crisis Mild

(5 gallons/19 L, all-grain)

OG = 1.038 FG = 1.012
IBU = 14 SRM = 18 ABV = 3.5%

Ingredients

5.8 lbs. (2.6 kg) British 2-row malt
1.0 lb. (0.45 kg) British crystal malt (145–165 °L)
(Simpson's Extra Dark Crystal)
5 oz. (140 mL) Lyle's Black Treacle
3.1 AAU East Kent Golding whole hops (90 mins)
(0.63 oz./18 g of 5% alpha acids)
0.21 oz. East Kent Goldings whole hops (15 mins)
Wyeast 1318 (London Ale III) yeast

Step by Step

Single step mash in 2.1 gallons (7.9 L) at 154 °F (68 °C) for 75 minutes. Sparge with 3.3 gallons (13 L) and then top up to 6.7 gallons (25 L). (Don't over-sparge, lower efficiency is better for this.) 90 minute boil, cool and collect 5 gallons (19 L). Pitch yeast and ferment 68 °F (20 °C). I did about 10 days in primary and racked straight to keg.

Hop Crisis Mild

(5 gallons/19 L, extract with grains)

OG = 1.038 FG = 1.012
IBU = 14 SRM = 18 ABV = 3.5%

Ingredients

1.0 lbs. (0.45 kg) British 2-row malt
1.0 lb. (0.45 kg) British crystal malt (145–165 °L)
(Simpson's Extra Dark Crystal)
1.0 lb. (0.45 kg) light dried malt extract
2 lb. 10 oz. light liquid malt extract (late addition)
5 oz. (140 mL) Lyle's Black Treacle
3.1 AAU East Kent Golding whole hops (90 mins)
(0.63 oz./18 g of 5% alpha acids)
0.21 oz. East Kent Goldings whole hops (15 mins)
Wyeast 1318 (London Ale III) yeast

Step by Step

Steep crushed malt at 154 °F (68 °C) in 3.0 qts. (2.8 L) of water for 45 minutes. In brewpot, combine liquid from steep, dried malt extract and water to make 3.0 gallons (11 L). Bring to a boil and boil for 60 minutes, adding hops at times indicated. Add liquid malt extract and treacle for final 15 minutes of the boil. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L), aerate and pitch yeast. Ferment at 68 °F (20 °C).

Scott L DeWalt, Winner of the Dixie Cup Homebrew Competition, Houston, Texas Oct. 17-18, 2008.

"What I've found is the base beer, as long as it is close in color and relatively nondescript in flavor, does not have the impact the yeast, bacteria and barrel have."

TexanBrew Flanders

(5 gallons/19 L, all-grain)

OG = 1.052 IBU = 0 SRM = 16

Ingredients

6 lb. 14 oz. (3.1 kg) 2-row pale malt

Photo Courtesy of Drunk Monk Challenge

As in previous years, the Drunk Monk Challenge featured the Menace of the Monastery (MOM), a special category consisting of styles which are monastic in origin: Belgian blonde, dubbel, tripel, pale, strong golden and strong dark ales as well as German doppelbock.

2.0 lbs. (0.91 kg) Munich malt
1.5 lbs. (0.68 kg) crystal malt (60 °L)
0.5 lbs. (0.23 kg) wheat malt
0.3 lbs. (0.14 kg) Special B malt
2.0 oz. (57 g) debittered hops (60 mins)
White Labs WLP001 (California Ale) yeast
Wyeast 3763 (Roselare Blend)

Step by Step

Mash at 157 °F (69 °C) for 60 minutes. Boil for 60 minutes. Pitch WLP001 and ferment at 65 °F (18 °C) through completion. Wyeast Roselare blend (seasonal strain) is put in the barrel with the finished beer. The beer is aged in the barrel for at least one year; mine is going on 2.5.

TexanBrew Flanders

(5 gallons/19 L, partial mash)

OG = 1.052 IBU = 0
SRM = 16

Ingredients

1.7 lbs. (0.77 kg) Munich malt
1.5 lbs. (0.68 kg) crystal malt (60 °L)
0.5 lbs. (0.23 kg) wheat malt
0.3 lbs. (0.14 kg) Special B malt
1.0 lb. (0.45 kg) light dried malt extract
4.0 lbs. (1.8 kg) light liquid malt extract (late addition)
2.0 oz. (57 g) debittered hops (60 mins)
White Labs WLP001 (California Ale) yeast
Wyeast 3763 (Roselare Blend)

Step by Step

Partial mash malts at 157 °F (69 °C) in 5.5 qts. (5.2 L) of water. Mash for 45 minutes. In brewpot, combine wort from mash, dried malt extract and water to make 3.0 gallons (11 L). Bring to a boil and boil for 60 minutes, adding hops at times indicated and liquid malt extract for final 15 minutes of the boil. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L), aerate and pitch yeast. Ferment at 65 °F (18 °C) with ale yeast. Add Roselare blend to beer in secondary (preferably in a barrel).

"I enjoy the challenge and creative side of developing new recipes."

Scott L DeWalt, Winner of the Alamo City Cerveza Fest, San Antonio, TX, Aug. 15–16, 2008.

"It is so hard to keep from draining the kegs before (this maibock) has had time to fully mature. The young beer is quite tasty; however, time and patience, though terrible rewards themselves, do pay off."

TexanBrew Maibock

(5 gallons/19 L, all-grain)

OG = 1.073 IBU = 24 SRM = 24

Ingredients

8.0 lbs. (3.6 kg) Pilsner malt
3.75 lbs. (1.7 kg) Vienna malt
2.0 lbs. (0.91 kg) Munich malt
1.0 lb. (0.45 kg) aromatic malt
0.5 lbs. (0.23 kg) CaraPils® malt
4 AAU Hallertauer hops (60 mins)
(1.0 oz./28 kg of 45 alpha acids)
5.3 AAU Perle hops (30 mins)
(0.75 oz./21 g of 7% alpha acids)
White Labs WLP833 (German Bock Lager) yeast

Step by Step

Mash at 154 °F (68 °C) for 90 minutes. Boil for 90 minutes. Ferment four weeks at 50 °F (10 °C). No diacetyl rest.

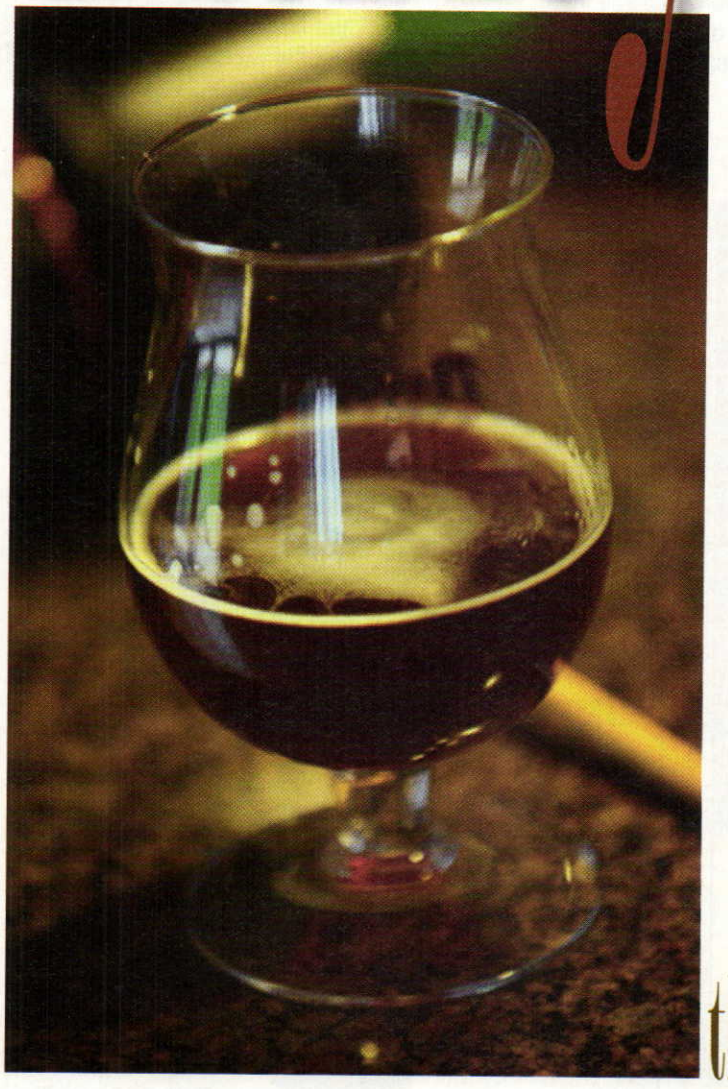
Notes on Recipes

All recipes were scaled to 5 gallons (19 L), when necessary. (Half of these recipes were originally brewed at a 10-gallon/38-L scale.) Likewise, when necessary, recipes were altered to match *BYO* standard assumptions for extract efficiency (we assume 65%) and hop utilization (the curve passes through 25% utilization at 60 minutes boil time). If needed, the amounts of pale malt or bittering hops were changed. (In most cases, changes were minor.) The amounts of specialty malts, sugars and late addition hops were not changed.

Where possible, *BYO* has supplied a conversion to an extract, partial mash or all-grain equivalent recipe. In each pair of recipes, the first is the beer as originally brewed and the second is the converted recipe. *BYO* would also like to thank all the brewers for sharing their award-winning recipes!

by **Terry Foster**

Barleywine



the stranger in the corner

Saturday night in a pub in South London and I'm drinking a pint of Youngs Bitter with my friends. It's the first beer I've ever bought in a pub, because now I'm eighteen and it's legal for me to drink in public. But not everybody is drinking pints of draught beer, for an older character who stands in a corner at the end of the bar has just ordered a bottle. Not an ordinary bottle either, because it is tiny; and the contents are poured by the barman into a small goblet, not a normal straight-sided glass. I thought it must be some kind of exotic spirit, which would be weird because we didn't do exotic in South London in those days. When the barman came our way, I asked him what this mysterious fluid could be. He told me it was a sort of strong beer, which was why it came in a small bottle, known as a "nip" containing only a third of a pint, and that it was called a barleywine. "What on earth is a barleywine?" I said to my friends, but none of them knew.

I found out eventually, but it took some time, for we lads didn't want to be seen in public with an old man's drink. Even when I did finally try it my then untutored palate couldn't handle it, and it remained "exotic" to me for quite a while. It wasn't what you would call highly popular, and indeed not all breweries had a barleywine in their port-

ORIGINATING FROM STRONG ALES AND ENCOMPASSING A BROAD RANGE OF CHARACTERISTICS, BARLEYWINE IS AN ELUSIVE STYLE.

Photo Courtesy of Encyclo Wine

"There is a reference to 'barley wine' being brewed in the Fourth Century, and the term 'malt wine' was in use in Britain in the Eighteenth Century."

folio. All those I came across were served only in nips, and never on draught. It was a somewhat elusive brew, for not all pubs stocked it; those that did often brought it in from another brewer. And when I became interested in defining beer styles and in delving into the history of them, I found barleywine to still be elusive.

There is a reference to "barley wine" being brewed in Armenia in the Fourth Century, and the term "malt wine" was in use in Britain in the Eighteenth Century. "Barley wine" surfaced again in the early 1800's, but it appears only to have been a marketing tool in beer's fight against the encroachment of wine on the British dining scene. The term seems to have come into vogue as a style descriptor only in the early Twentieth Century, though referring as it did to all beers above about 8% ABV, it was pretty much a catch-all term. It included pale and dark beers, which could be highly-hopped, low-hopped, malty and sweet, dry and bitter, or anything in between. Of course, the same could be said for our modern style guidelines.

The reason for this broad definition was that barleywines were direct descendants of the strong ales that had been around for centuries. Indeed, in the Eighteenth Century the "strong" would have been a redundant term for all ale was strong. Anything else was either small beer, or porter. This came out of the process of brewing used in those days, when sparging was not practiced and it was common to use two or three mashes of the same batch of malt. The first, high-gravity runnings were taken for ale, and subsequent runnings of wort became the small beers at much lower gravity. Sometimes, the brewer might use an extra amount of malt, so that the ale was even stronger, in which case it might be called October Ale, or Stingo, Chancellor Ale (which I wrote about in the May-June 2006 issue of BYO) or have a regional designation, such as Dorchester Ale, Nottingham Ale, or Welsh Ale.

In those days it was common for the great houses of the gentry to have their own brewhouse, and to make their own beer to satisfy the needs of both the lord (or squire), and the army of staff needed to run the premises. Of course, the staff got the small beer and the master the ale, which would be kept in cask one or two years, and then drunk in small amounts, as we would drink a liqueur today. They would use special glasses, often of fancy design, and frequently etched with barley and hop motifs, and able to contain little more than a few mouthfuls of the beer.

As Britain moved into the Nineteenth Century, private brewing declined, and the tastes of everyday drinkers turned to "running" beers, that is those that were not long-stored, but rather drunk within a few weeks of brewing. Partly because of this, and partly because the hydrometer gave brewers a way of measuring strength, ale alcohol levels declined. And as the pale, bitter IPAs became ever more popular, sweet, strong beers became much less common. Strong ales received a further blow in 1880 when beer tax began to be applied on the basis of the beer's original gravity, and they became ever more expensive. Perhaps what saved them from extinction was the fact that bottling of beers became more widespread about this time. This, coupled with the adoption of the barleywine label gave these beers a clearer identity and established them as a niche market. Some of them still survive in Britain's session-beer dominated market today, such as Orkney Skull Splitter, Fuller's Vintage Ale, and both Thomas Hardy Ale and Gale's Prize Old Ale also fit this style. And of course there are some brewed here at US micros, such as Rogue's Old Crustacean, Smuttynose Barleywine Style Ale and Sierra Nevada Bigfoot Barleywine Style Ale.

Photo by Arthur Roe www.burton2000.co.uk

In 1903, the Bass Brewery began labelling their "No 1." brew as a barleywine. It was made from the first runnings of a mash. The beer was discontinued in 1995.

Which brings us to the question of specifications for the style, and that is just where that old elusiveness shows up again. The Beer Judge Certification Program (BJCP) gives an ABV of 8.4–12.0%, but a number of English barleywines are brewed down to 7%. And, even odder is that fact that I have seen Samuel Adams Utopias (25% ABV) and Millennium (20%) called barleywines. Add to this the fact that the BJCP lists two separate versions, namely English and American, which differ primarily in bitterness levels, then pile on that the BJCP style guidelines for imperial, or double IPA substantially overlap those for barleywine, and we can see that there is no definition that is universally agreed upon or that cleanly separates barleywine from similar styles of beer.

I do not see a reason for two separate specifications other than for competition purposes. As far as we are concerned, I'll give a somewhat broader range of starting gravities, and even color (for reasons I'll explain later). This will give a wide spectrum of beers falling under this designation, from light to dark in color, malty sweet to dry, and from moderately high to very high in alcohol:

BARLEYWINE BY THE NUMBERS

OG	1.075–1.130
FG	1.020–1.035
SRM	11–35
IBU	40–100
ABV	6.5–13.0%

Brewing Barleywine

The first question to answer for an all-grain brewer is how much do I want to make? That's because the size of your mash tun is the crucial factor with a beer that requires so much malt. If your set-up is for brewing 5.0 gallons (19 L) of "normal" beer, you won't be able to make much more than 2–3 gallons (7.6–11 L) of barleywine. For example (using the BYO standard yield), to make 5.0 gallons (19 L) of wort at OG 1.100 your mash tun would need to hold 21 lb. (9.5 kg) of pale malt, plus up to 30 qt. (28 L) of water. That would not fit into my mash tun, so I generally make only 3.0 gallons (11 L) of this beer, and I recommend that you make a careful check of your mash tun capacity before you start.

You can, of course, make this beer by

BARLEYWINE RECIPES

HARD HAT BARLEYWINE

(3 gallons/11 L, all-grain)

OG = 1.084 FG = 1.025
IBU= 70 SRM = 17 ABV = 7.8%

Ingredients

10.5 lb (4.8 kg) Muntons 2-row pale malt
14 AAU Magnum hops (90 mins) (1.0 oz./28 g at 14% alpha acids)
1.0 oz. (28 g) U.S. Fuggles hops (0 mins)
½ tsp. Irish moss
White Labs WLP500 (Trappist Ale) or Wyeast 3787 (Trappist High Gravity) yeast (2–4 qt./2–4 L yeast starter)

Step by Step

Mash in at 148–150 °F (64–65.6 °C), using about 1.2–1.4 quarts (4.5–5.3 L) of water per pound of grain. After 90 minutes, run off the first 2.0 gallons (7.6 L) and set aside; these should have an SG of 1.070–1.080 (17.1–19.3 °P). Sparge to collect a further 4–5 gallons (15–19 L), but no more. Measure the total volume and SG of the second wort. Calculate total gravity by multiplying the volume of each wort times its gravity (in "gravity points" (GP) — that is 1.080 = 80 GP) then add these two numbers. Divide this by 84, and you will have the final volume you need in order to have OG of 1.084 (20.4 °P).

Take the second wort and boil until the SG is around 1.060–1.070 (14.7–77.1 °P), then add the first wort. Boil vigorously for 1 hour or so, add the Magnum hops and boil for another hour or so, or until you have reached the desired final volume. Add the Irish moss 10–20 minutes before the end of the boil. As you turn off the heat, add the finishing Fuggles hops; adjust the volume with cold, sterile water if required.

Cool to no less than 70 °F (21 °C), and pitch with the yeast starter, as described above; don't forget to oxygenate for 3–4 minutes after pitching. When primary fermentation appears to be complete, rack the beer to a secondary fermenter. Rack again after 2–3 weeks, preferably into a stainless steel soda keg, and leave to mature in a cool dark place. If you want to bottle the beer, this is best done by means of a counter-pressure filler. You don't want to add priming sugar to the bottles, as there may still be a slow fermentation taking place. Over a maturation period of a year or so this can result in very high bottle pressures.

IRON GLOVE BARLEYWINE

(3 gallons/11 L, extract with grains)

OG = 1.099 FG = 1.035
IBU = 80 SRM = 28 ABV = 8.5%

Ingredients

8.0 lb (3.6 kg) Muntons light liquid malt extract
1.0 lb (0.45 kg) crystal malt (20 °L)
17 AAU Amarillo hops (90 mins) (2.0 oz/56 g at 8% alpha acids)
1.0 oz. (28 g) Amarillo hops (0 mins)
2.0 oz (56 g) Amarillo hops (dry hop in secondary)
½ tsp. Irish moss
White Labs WLP007 (Dry English Ale) or Wyeast 1214 (Belgian Abbey) yeast (2–4 qt./2–4 L yeast starter)

Step by Step

Heat 0.5 gallons (1.9 L) water to around 170 °F (77 °C), and add the crystal malt; keep at this temperature for 30 minutes, then strain out the grains. Add water to a total of 3.5 gallons (13 L) and carefully dissolve 4.0 lb. (1.8 kg) of the malt extract, bring to a boil and add the bittering hops. After 1 hour, turn off the heat and very carefully dissolve the remainder of the malt extract. Then turn on the heat and boil for a final 15 minutes, adding Irish moss for the last 10 minutes, and the flavor hops when you turn off the heat. Cool wort and transfer to fermenter. Aerate wort and pitch yeast from yeast starter(s). Ferment and mature as described in the all-grain recipe. Add the dry hops to the secondary, using a sterilized, weighted muslin bag, and remove on racking to the stainless steel keg, proceeding from there as above for maturation.

DUNKLEOSTEUS (ENGLISH-STYLE BARLEYWINE)

by Chris Colby

(5 gallons/19 L, all-grain with supplemental extract)

OG = 1.122 FG = 1.026
IBU = 51 SRM = 15 ABV = 12.4%

Here's a 5.0-gallon (19-L) big barleywine recipe that doesn't require a huge mash tun or an extremely extended boil.

Ingredients

14.0 lbs (6.4 kg) British pale ale malt (Maris Otter)
0.66 lbs. (0.30 kg) English crystal malt (60 °L)
3.5 lbs. (1.6 kg) Muntons Light dried malt extract
2.0 lbs. (0.91 kg) sucrose (or invert sugar)
¼ tsp. yeast nutrients
1 tsp. Irish moss
15 AAU East Kent Goldings hops (60 mins) (3.0 oz./85 g of 5.0% alpha acids)
2.5 AAU Fuggles hops (20 mins) (0.5 oz./14 g of 5.0% alpha acids)
0.33 oz./9.4 g Fuggles hops (0 mins)
Wyeast 1968 (London ESB) or White Labs WLP002 (English Ale) yeast (4 qt./~4 L yeast starter)

Step by Step

Mash grains at 152 °F (66 °C) for 1 hour. Mash out to 168 °F (76 °C). Recirculate the wort for 20 minutes. Runoff wort, sparging with water hot enough to keep grain bed temperature just under 170 °F (77 °C). Collect about 7.0 gallons (26 L) of wort and boil down to 5 gallons (19 L). Add dried malt extract with 30 minutes left in boil. Add hops according to the schedule given in the recipe. Add Irish moss with 15 minutes remaining in the boil. After the boil, chill the wort to 68 °F (20 °C), aerate well and pitch sediment from yeast starter. Let ferment at 68 °F (20 °C). Rack to secondary, add sugar and yeast nutrient and let sit for two weeks at 65–68 °F (18–20 °C). If possible, bulk condition at 40–45 °F (4.4–7.2 °C) for two to three months. Bottle or keg, minimizing any splashing or other aeration of the beer.

the time-honored procedure of using only the first high-gravity runnings from the mash. This works in commercial breweries, but may not in a home brewery unless you have a mash tun large enough to yield sufficient pre-boil wort. However, if you want to make the beer as pale as possible, this is a better way than the next procedure.

My normal approach is to simply run-off, sparge and boil the whole wort, as for a normal beer. This is straightforward in both procedure and in the calculations needed to hit target gravity, but can be tedious depending upon what OG you are aiming for, and on what rate of evaporation you achieve in the boil. A downside of this approach is that the beer will be at the darker end of the color specification; but a plus is that it will be well-caramelized, an important flavor characteristic in barleywine. A variation on this procedure, which requires less boiling, is to boil until you have an SG of, say 1.070, and add malt extract to bring it up to the final gravity, followed by a short boil.

By far the simplest approach to brewing these big beers is to extract brew, because you can reach target gravity without long boiling this way. Further, if you hold back one-half to one-third of the extract and add it towards the end of the boil, you can achieve adequate hop utilization when boiling less than the full volume of wort. A short boil can be a problem though; because the beer will have less caramel flavor. So you might want to consider using some specialty grains, such as crystal malt or Special B.

Ingredients

Classically, strong ales were made using only pale malt, and all-grain brewers will get good results doing the same. Two-row pale malt is best, and either US or British can be used. You may add specialty malts such as crystal, Munich, Victory and so on, but it is debatable whether you will gain much from doing so. With so much malt there already, plus the colors and flavors developed during boiling, I would argue that you get as much flavor as you can handle, without looking for something extra by adding other malts.

As I intimated above, the reverse may be true in extract brewing, and you may well want to use up to a pound of crystal malt (infused in the usual way) for a three-

gallon brew. You might also use a longer than normal boil, say 1.5–2 hours, so as to generate more caramel; be careful though, as this can result in a thinner-tasting beer. If you want the beer to be at the darker end of the range, amber extract may be your choice, whereas if you want to brew the lighter-colored version, then pale extract will be required.

You can use all kinds of hops in these brews, depending on your taste. Traditional barleywines would use English hops, such as Fuggles, Goldings, First Gold or Target. If you want to go for something more American, then Cascade, Chinook, or my favorite, Amarillo would be more appropriate. Of course, in the current climate, you may have to substitute for these. For bittering go for the higher alpha-acid varieties, so that you use less and therefore lose less of your expensive high-gravity wort in the trub. Also note that most commercial barleywines use a calculated figure for IBU, rather than an analytical one. And I am doubtful that it is possible to achieve 100 IBU at OG 1.100, because of solubility limits; however, I have not actually seen any published results on this. Further, perceived bitterness in such a big beer will very much depend on the final gravity (FG).

If you want hop aroma and flavor, you can achieve this in the normal manner by late or post-boil additions. A slightly different flavor will be obtained if you dry-hop in the fermenter, but this is often the best way to get hop character into the beer; Amarillo, or perhaps Columbus should work well in this. Whichever way you go, reckon on adding up to twice the amount you might normally use, or the flavor can easily get lost in all the maltiness.

Fermentation

A good level of attenuation is everything in the successful brewing of barleywine; if you can't achieve that, all you will have is alcoholic syrup. At the lower end of the OG range, a good ale yeast such as the Whitbread strain, or even an Irish ale yeast can be made to work well. For higher starting gravities, a yeast strain specifically selected to handle them, such as White Labs WLP007 (Dry English Ale) yeast is preferable, but I have had best results with Trappist ale yeast, such as White Labs WLP500 (Trappist Ale) or Wyeast 1214 (Belgian Ale) yeast. If you are seeking to avoid fruity esters, as much as is possible in a high-gravity ale, White Labs WLP001 (California Ale), Wyeast 1056 (American Ale) or Safale US-05 yeast is a good choice.

You must make a yeast starter for this beer. Without it, you will likely suffer a sluggish fermentation and not reach a reasonable final gravity, yielding an overly sweet, syrup-like brew. To make a starter, I take two packs or two vials, and add each

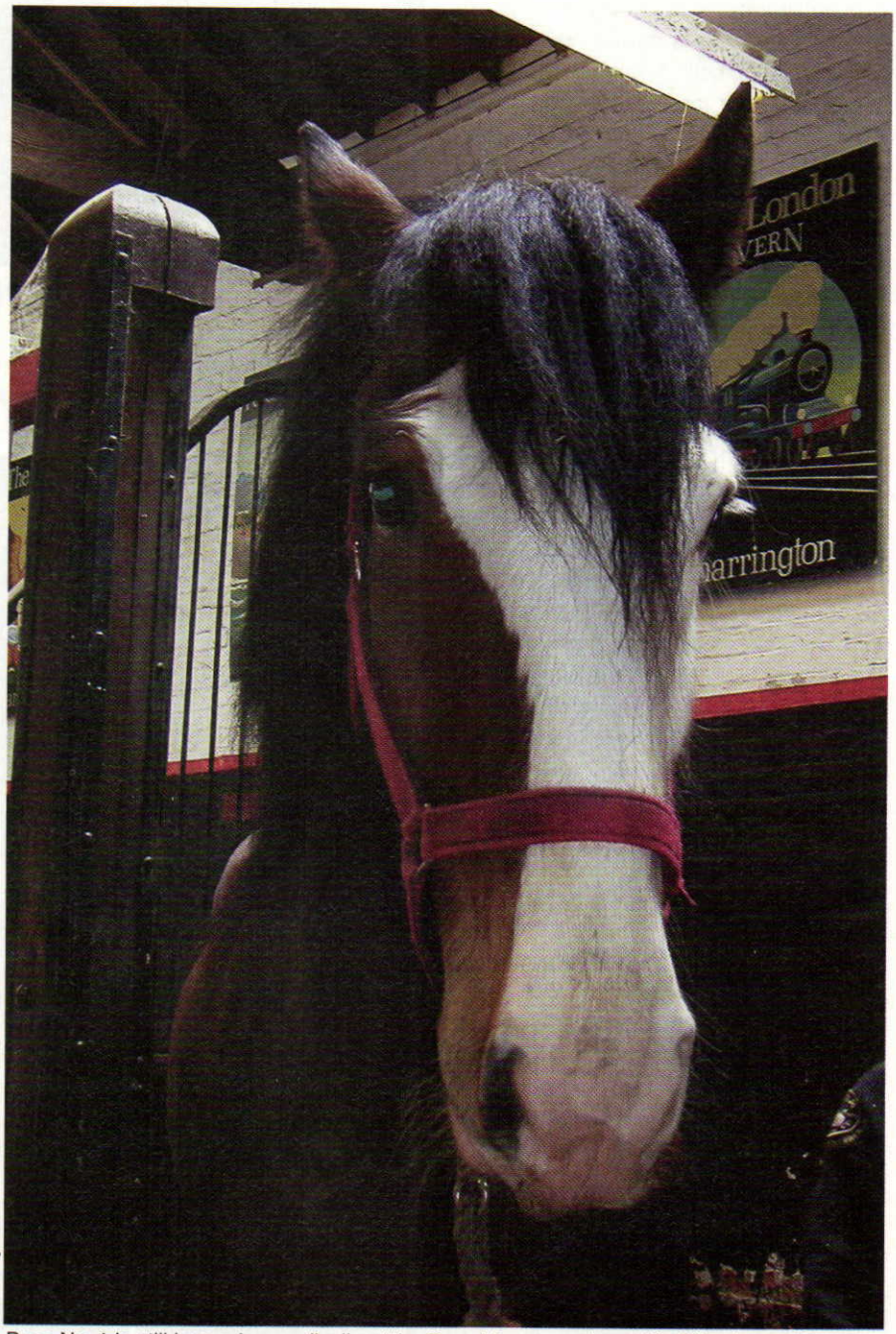


Photo by Arthur Roe www.burton2000.co.uk

Bass No. 1 is still brewed sporadically at the Bass Museum, where this Shire horse lives. When not munching hay, he dreams of brewing a batch of barleywine.

to 1 pint (0.47 L) of wort at 1.040 (10.0 °P), oxygenate the mix and keep warm. When actively fermenting, I scale each of these up to 1.0 qt (0.95 L), oxygenate and keep warm. Do this 3–4 days in advance so that the second stage is actively fermenting when the barleywine wort is ready for pitching. (You can also pitch a single pack or vial to 2–4 qts./2–4 L of wort at SG 1.020–1.040.)

When pitching, pour off most of the liquid from the starter and add to the wort, which should be thoroughly oxygenated for 3–4 minutes. Pitching is probably best done when the wort is at 70–75 °F (21–24 °C), which is a good temperature to maintain throughout fermentation to ensure high attenuation. If this results in some ester formation, it does not matter, for that will be just a little more variety in an already complex beer.

Post-Fermentation

Give the beer a secondary fermentation for up to a month before bottling, and make sure that fermentation has ceased before doing so. Ideally, after secondary keep it in a stainless steel soda keg and either serve it from there, or carbonate it in the keg then bottle it, using a counter-pressure filler. If you don't carbonate it this way, don't prime before bottling, but add some fresh yeast, bearing in mind that there may be little extra fermentation, and the beer may be under-carbonated.

Conclusion

The very elusiveness of this style gives you lots of opportunity to experiment. Barleywine is not an easy beer to brew, but if you do it well you will be rewarded. Because it is so high in alcohol you'll sip it rather than drink it and as you do you will enjoy its warmth and complexity. Keep some bottles aside and taste one or two each year over a period, and see just how it changes with time. It is not a beer you will produce often, but it makes a very good once a year special.

Terry Foster is a frequent contributor to Brew Your Own.

by **Kristen England**

brown MALT

It has been known as blown, porter and snap malt, but homebrewers know it as brown malt, if they know it at all. Its mellow roast character, cheeky bitterness and acrid finish has warmed the cockles of many an Englishman over the centuries. It was once a malt of choice for many dark brews, especially porters and stouts. However, improvements in malting technology — including the development of pale base malts with better yields and dark specialty malts with more color — led to its decline. And it almost faded into brewing history. Almost. Today, a few maltsters — including Crisp, Thomas Fawcett and Sons, Hugh Baird and Beeston — produce brown malt and many homebrewers are discovering what made this lightly-roasted malt so popular in the past. Brown malt is back.

Historical

What we think of as brown malt has been around in many different incarnations from its inception. Today's brown malt is different but not terribly so. Brown malt was called so because it was relatively browner than the other malts and produced a brownish beer. The original brown malt had enough enzymatic activity to convert itself and was used for centuries as the base of many beer styles. As the hydrometer came into common use, it was found that pale malt produced more extract per pound and was much less expensive to make. To further brown malt's demise, heavy levies were imposed on malt during the French Revolution (C.E. 1789–1799). The greater amount of fermentables that could be drawn off a given quarter of malt made brewers focus on finding alternatives to brown malt's character.

During the mid-Nineteenth Century, brown malt was still widely used but was being specifically employed for its character (e.g. as a specialty grain) rather than its fermentable product. Using less brown malt reduced the character of the beer and it was left for the brewers to develop other ways to mimic the flavors and color of brown malt. Most were sugar-based (blackening of sugar), but some were roasted malt husk products, as we see in use today. Most of these increased the color, but did little to produce the

Photo Courtesy of Muntons

back from the brink

astringency that one gets from brown malt. Brewers used many different spices ranging from coriander to grains of paradise, but more prominently licorice. Sugar-based molasses and treacle products and a malt-derived concoction called *essentia bine* were the most common for adding both flavor and color to the beers. The death knell for brown malt was sounded with the creation of black patent malt in 1817. Although its use continued into the Twentieth Century, most brown malt had been replaced either by black malt or by various sugar substitutes.

Malting

Most brown malt made over the last 200 years has been of the non-enzymatic type. Originally brown malt was made from green malt. The green malt was removed from the withering floor (e.g., germination floor) earlier than regular ale malts. It was then spread out thinly over the tile floor of the kiln and heated moderately until approximately half the moisture was removed. The malt was then "blown," the process by which brown malt receives all its peculiar qualities in the kiln. Simply, escaping steam puffs up the kernel and the continued high heat sets the kernel. This is accomplished by adding either straw or hardwood (oak or beech) to the kiln so the temperature climbs to over 200 °F (93 °C). This process was more expensive than making pale malt, due to fuel and labor. On top of this, it reduced the extract by approximately 20%.

Brown malts were originally dried with straw, wood and fern. Straw dried was by far the best, being used for only the best malt. Wood had a tendency to lend a harsh smoke quality and lesser quality malt was usually used for the wood-dried brown malt. It was common practice to use a great quantity of hops and to age the beer made with wood-dried brown malt 9–12 months to rid the beer of the unwanted smoke character. Fern dried malt was the worst, lending a tarry character to the malt, but for a period of time it was the most widely used because it was cheap and plentiful. This leads us to a very specific question. Did brown malt have a predominant smoke character? The accounts are quite

brown malt recipes

Fuller's London Porter clone

(5 gallons/19 L, all-grain)

OG = 1.054 FG = 1.015
IBU = 30 SRM = 46
ABV = 5.0%

Of all porters on the market, this one is by far my favorite. The beer exudes dark jammy fruits and roasted, nutty aromas and flavors. The Fuggle hops provide a deep earthy finish that blends intoxicatingly well with the dry bite of the brown malt on the finish. The touch of sweetness in this beer ensures that this beer balances out to one perfect dram.

Ingredients

7.5 lb. (3.4 kg) Halcyon pale malt
1.5 lb. (0.68 kg) brown malt
1.0 lb. (0.45 kg) English crystal malt (75 °L)
0.75 lb. (0.34 kg) chocolate malt
6.25 AAU Fuggle hops (60 mins) (1.3 oz./38 g of 4.7% alpha acids)
0.67oz. (19 g) Fuggle hops (15 mins)
Wyeast 1968 (London ESB) and White Labs WLP002 (English Ale) yeast (1.5 qt./1.5 L yeast starter)

Step by Step

Mash at 153 °F (67 °C) for 60 minutes at mash thickness of 1.3 qt./lb. Boil for 60 minutes. Cool wort, transfer to fermenter and pitch yeast from the yeast starter. Ferment at 62 °F (17 °C).

Fuller's London Porter clone

(5 gallons/19 L, partial mash)

OG = 1.054 FG = 1.015
IBU = 30 SRM = 46 ABV = 5.0%

Ingredients

0.75 lb. (0.34 kg) Halcyon pale malt
1.5 lb. (0.68 kg) brown malt
1.0 lb. (0.45 kg) English crystal malt (75 °L)
0.75 lb. (0.34 kg) chocolate malt
1.0 lb. (0.45 kg) Muntons Light dried malt extract
4.0 lbs. (1.8 kg) Muntons Light liquid malt extract (late addition)
6.25 AAU Fuggle hops (60 mins) (1.3 oz./38 g of 4.7% alpha acids)
0.67oz. (19 g) Fuggle hops (15 mins)
Wyeast 1968 (London ESB) and White Labs WLP002 (English Ale) yeast (1.5 qt./1.5 L yeast starter)

Step by Step

Partial mash grains at 153 °F (67 °C) for 45 minutes. Collect partial mash wort, add water to make 3.0 gallons (11 L), stir in dried malt extract and bring to a boil. Boil for 60 minutes, adding hops at times indicated in ingredient list. Stir in liquid malt extract for final 15 minutes of boil. Cool wort and transfer to fermenter. Top up to 5 gallons (10) with cool water and aerate wort. Pitch yeast and ferment at 62 °F (17 °C).

Hook Norton Double Stout clone

(5 gallons/19 L, all-grain)

OG = 1.051 FG = 1.013
IBU = 30 SRM = 43
ABV = 4.9%

The "double stout" in this beer's name is not indicative of a strong beer. Actually, it's quite low in gravity and makes a particularly good session pint. What the double means to me is that this beer literally has double the flavor of other low gravity stouts. East Kent Goldings hops lend a spicy character to the nose which blends in perfectly well with its rich, thick toasty body. The deep roast edges finish into a crisp dryness that ensures this beer's utter drinkability. You better get this beer fast because it's only seasonally available January through February!

Ingredients

3.0 lb. (1.4 kg) mild malt
3.0 lb. (1.4 kg) English pale malt
2.0 lb. (0.91 kg) brown malt
1.0 lb. (0.45 kg) No. 1 invert sugar
13 oz. (0.37 kg) black malt
5.6 AAU Challenger hops (75 mins) (0.75 oz./21 g of 7.5% alpha hops)
0.25 oz. (7.1 g) Fuggle hops (15 mins)
0.25 oz. (7.1 g) East Kent Goldings hops (15 mins)
0.25 oz. (7.1 g) East Kent Goldings hops (dry hopped)
Wyeast 1318 (London III) yeast (1 qt./1 L yeast starter)

Step by Step

Mash at 156 °F (69 °C) for 120 minutes at a mash thickness of 1.15 qt./lb. Boil wort for 90 minutes, adding sugar for final 15 minues of boil. Ferment at 68 °F (20 °C).

Partial mash option:

Omit pale malt, reduce mild malt to 1 lb. 3 oz. (0.53 kg) and add 3 lb. 10 oz. (1.6 kg) Muntons Light liquid malt extract. Partial mash grains at 156 °F (69 °C) for 45 minutes. Collect partial mash wort, add water to make 3.0 gallons (11 L), and bring to a boil. Boil for 60 minutes, adding hops at times indicated in ingredient list. Stir in liquid malt extract for final 15 minutes of boil. Cool wort and transfer to fermenter. Top up to 5 gallons (10) with cool water and aerate wort. Pitch yeast and ferment at 68 °F (20 °C).

1850 Imperial Brown Stout

(5 gallons/19 L, all-grain)

OG = 1.111 FG = 1.019
IBU = 13 SRM = 50 ABV = 12%

Imperial brown stout was the precursor to the well known Russian Imperial stouts people have grown to love. This beer is based on numerous imperial brown stouts of the time, taking the best from all. The most interesting thing about these beers is the fact that nearly half of all black malt used was added directly to the copper.

Ingredients

13 lb. (5.9 kg) pale malt
3.0 lb. (1.4 kg) brown malt
2.0 lb. (0.91 kg) amber malt
2.0 lb. (0.91 kg) Piloncillo sugar
0.75 lb. (0.34 kg) black malt
28 AAU Challenger hops (120 mins) (4 oz./113 g of 7% alpha acids)
18 AAU East Kent Goldings hops (30 mins) (4 oz./113 g of 4.5% alpha acids)
0.67oz. (19 g) East Kent Goldings hops (dry hops)
Wyeast 1028 (London Ale) yeast

Step by Step

Mash at 158 °F (70 °C) for 120 minutes at 1.32 qt./lb. Boil for 120 minutes. Half of black malt is added to the boil (in a hop bag). Ferment at 65 °F (18 °C).

As an option, you may wish to add *Brettanomyces anomalous (B. clausenii)* to secondary fermenter. Let bulk age on *Brett* for at least 6–8 months, then bottle.

spotty, but it seems that beers made with brown malt did not have an overt smoke character. On the other hand, the smaller brewers who malted their own grains did seem to have a smoke character in their brown malts.

As the use of coke became prominent, the way brown malt was produced and its character changed. The invention of the drum roaster nearly completes the progression of brown malt to its current form. It was roasted in a perforated cylinder in a cast iron casing. A low coke fire was employed and turned slowly and held at approximately 220 °F (104 °C). After steam escapes, the fire is increased, the malt is blown and the kilning continued until the desired temperature (320 °F/160 °C) was reached. Today's brown malt is made in a much simpler way. It's made in a direct heated rotating drum where the heat is brought up to around 266 °F (130 °C). The final time and temperature are based on the specifications of the customer. The malt is no longer blown, so will have less of the acrid bitterness that was once associated with the malt. Modern brown malts range in colors from 50–75 °L.

Historical Use

As was stated before, brown malt first began as a base malt that was used up to 100% in some beers. That being said, brown malt made its biggest contribution in porter and stout brewing. But was it used more in porter or stout because they are completely different, right? Historically, there really is no blanket statement that can be made between the difference of porter and stout. Stout most definitely derived from porter, but wasn't always a "stouter" version of porter (although most definitely could be). More specifically there were brown stouts and black porters! This came as an utter shock to me as I thought the things that I read, taught and consequently preached, were thoroughly researched. Much to my dismay this is not the case. Throughout the 1800's brewing manuals used these terms as equivalents and verbiage depended on the author's opinion and by brewery. Styles are only meant to be a snapshot in time and change as does everything in popular culture.

A mid-Nineteenth Century recipe book gave numerous ways to make porter and stout from a miscellany of sources. One beer was called a bottling porter/brown stout. It had a starting gravity of 1.056 and called for a grist ratio of 2 parts pale malt, 1.5 parts brown malt and 1.5 parts amber malt. In the case of a beer called a "good porter," the proportions were 1 part pale malt and 1/79 part black patent malt, with a target original gravity of 1.058. In the case of the beer called a brown stout (OG 1.064), the proportions were 1 part pale malt and 1/70 black patent malt. Another example took a different approach. The recipe for "best brown stout" called for 5 gallons (19 L) of "good porter," mixed with 1.5 lb. (0.68 kg) black treacle, 4 oz. colorant (caramel) and 1 oz. Isinglass (a fining agent commonly used in wines). Finally, the book gave a recipe for *essentia bine*, which called for taking 1 lb. of liquid malt extract and heating

it until it thickened, turned black and tasted bitter. This amount was to be added to 5 gallons (19 L) of good porter.

Brown malt has gotten a bad rap for numerous years. I am very happy to see that today's brewers are much more open-minded and willing to experiment than their insular predecessors. If you open your mind and try experimenting with brown malt, you, like I, will fall in love with this irreplaceable ingredient.

Recipes

Different amounts of brown malt will lend different character depending on what else is around it. In small amounts in a moderate gravity porter it lends a dryness and touch of cocoa. When used along with black malt in a low gravity stout it adds tremendous amount of depth and mouth filling roast. Brown malt is unique in the fact that it can be used to mimic the character of darker malts. It can be used as a replacement for roasted barley when used in very high quantities. This amount of brown malt added to an imperial stout will also add a large amount of dextrins (body) to the beer, something that roasted barley does not do. Although usually used in porters and stouts, brown malt was also used in brown "keeping" ales. These were usually high gravity, well hopped beers that were meant to age and not be consumed young. Brown malt in these recipes accentuates the hop dryness and kept the beer from being sweet.

This is the fourth article about dark malts Kristen England has written for BYO.

Further Reading

The Complete Practical Brewer; Or Plain, Accurate, and Thorough Instructions in the Art of Brewing Ale, Beer and Porter by Marcus Lafayette Byrn. 1852.

Practical Studies in Fermentation: Being Contributions to the Life History of Micro-organisms by Emil Christian Hansen, Alex K Miller, Alexander Kenneth Miller. 1896.

Fermented Liquors: A Treatise on Brewing, Distilling, Rectifying, and manufacturing of sugars, wines and spirits and all know liquors, including cider and vinegar By Lewis Feuchtwanger. 1858.

Brewing and Distillation by Thomas Thomson and William Stewart. 1849.

A theoretical and practical treatise on malting and brewing by George Adolphus Wigney. 1835.

"The philosophical magazine." Alexander Tilloch. 1808.

Malt and Malting. An Historical, Scientific, and Practical Treatise by Henry Stopes. 1885.

A Practical Treatise on Brewing by William Black. 1866.

The Brewer's Analysis by R. Douglas Baily. 1907.

Malts and Malting by Dennis Edward Briggs. 1998.

"A cyclopædia of six thousand practical receipts, and collateral information in the arts, manufactures, and trades, including medicine, pharmacy and domestic economy" by Arnold James Cooley. 1850.

Better Together

How to choose hop combinations

by Jon Stika

There are many ingredients that brewers use to flavor and season their beer, from orange peel and coriander to black pepper and grains of paradise. But the gold standard remains the humble hop. Hops have long served many purposes in beer. They provide bitterness to balance the sweetness of malt, and add myriad flavors and aromas. When choosing which hop or combination of hops to include in a particular beer there are several questions that come to mind. What type and degree of bitterness, flavor and aroma is desired in the beer to be brewed? How are the bitterness, flavor and aroma derived from hops? What style of beer is being brewed, or am I leaving style guidelines behind to create something of my own?

Photo Courtesy of Hops From England

With all the different varieties of hops available, it can be hard to decide which hops to combine when developing a recipe. Knowing their characteristics can help.

Style and flavor

The many styles of beer have evolved for many reasons; however, they each have a flavor profile where the ingredients complement each other to deliver a pleasurable brew. On the other hand, many hops can also clash if given the chance. My brother Joel, a professional chef, once quipped about creating "chocolate-covered fish sticks" which, understandably, never came to be. Some things just don't belong together, on your plate or in your glass. Understanding how hops deliver their goods to your glass can help you be creative yet complementary of the rest of the flavors in your beer.

Bitterness

Most of the bitterness contributed by hops occurs during the boil. This is a simple yet important point to remember. Using a variety of hops with a high alpha acid content does not guarantee lots of bitterness. During the boiling process alpha acids in hops are isomerized (the configuration of the molecules are rearranged without changing their content). The resulting isomers, or iso-alpha acids, are more water soluble, stable and bitter than the original alpha acid found in the hop before the boil. Hops boiled for a long period of time (i.e. an hour) will have their alpha acid isomerized into bitter iso-alpha acid to a greater extent than hops boiled for a short period of time (i.e. five or ten minutes). Hops that are not boiled at all will contribute little bitterness to the beer, but can provide many other flavors and aromas (more about that later).

There are two major alpha acids that occur in hops; humulone and cohumulone (adhumulone, prehumulone and posthumulone make up a small percentage of the total alpha acids and have a correspondingly lesser impact on bitterness and flavor). Generally speaking, humulone contributes a "soft" bitterness, while cohumulone lends a somewhat "sharper" bitterness in beer.

Most European "noble" hops such as Hallertauer and Tettnanger have a relatively low level of cohumulone, typically less than 25% of the total alpha acid content. Whereas Cascade hops (an English/Russian cross) may have in the neighborhood of 40% of total alpha acid represented by cohumulone. This subtle difference between the type of bitterness produced by humulone and cohumulone in "kettle hops" (hops used in the boil) may be a consideration when choosing hop varieties for a particular recipe.

Lest you think that cohumulone is not a good thing to have in beer, cohumulone has been linked to the favorable retention of beer foam. Please see the references at the end of this article for sources of detailed hop chemistry that include information on alpha acids.

In addition to alpha acids, beta acids contained in hops also contribute bitterness to beer. However, rather than isomerization, beta acids undergo oxidation during aging prior to use or in the boil to produce their bitterness. Ounce for ounce (or gram for gram) oxidized beta acids are not as bitter as isomerized alpha acid and so provide a lesser, yet significant, contribution to overall bitterness.

Though beta acids take a back seat to alpha acids in their relative impact on beer bitterness, it is important to note that alpha acids are not the only contribu-

tor to bitterness when evaluating hops used in a brew.

Flavor and aroma

It is difficult to separate the elements of flavor and aroma as they are inextricably linked with how our brain processes the senses of taste and smell. However, as brewers we can control the impact that hops will have on our tongue and our nose by when and how we incorporate a particular hop into a recipe.

The closer hops are included prior to serving a beer, the greater their contribution to aroma in the beer. Dogfish Head Craft Brewery of Milton, Delaware has gone as far as inventing a device known as a Randall, which is a cylinder packed with whole hops that the beer passes through between the keg and glass to maximize hop aroma in the beer.

A similar device to the Randall is a hopback, which allows beer to pass through a charge of hops between the boil kettle and a wort chiller prior to the beer being fermented. A hopback will result in a beer with more hop flavor and less aroma than beer that is dry-hopped (a practice of adding hops to the secondary fermenter) or passed through a Randall.

"It is difficult to separate the elements of flavor and aroma as they are inextricably linked with how our brain processes the senses of taste and smell."

Many flavors and aromas from hops come from the essential oils contained in the lupulin glands (the yellow powdery stuff) of hops. There are over thirty essential oils in hops that have been identified as contributing to beer flavor and aroma. Those of primary interest include; humulene, myrcene, caryophyllene and farnesene. It is these same terpene-type of compounds that produce many flavors and aromas enjoyed in wine. These essential oils are relatively volatile and can therefore be lost from boiling wort. If the goal is to retain aroma from hops, they should be added near the end of the boil, to a hopback, or added as dry hops in the secondary fermenter.

Humulene is the essential oil most prominent in the European "noble" hops, which gives them their signature aroma. After more than several minutes in the boil, humulene lends a spicy and herbal

flavor (think Saaz) to the finished beer.

The myrcene content of American hop varieties is essentially the same as European "noble" hops, but because the Europeans historically processed and stored hops differently than the Americans, noble hops were often considered to contain less myrcene. Myrcene lends a strong citrusy aroma (think Cascade) when added late in the boil, in a hopback, or most prominently as a dry hop in the secondary fermenter. When high myrcene-containing hops are boiled in wort they provide pine and citrus flavors. Incidentally, myrcene is highly prized by the perfume industry. No wonder you can smell that pale ale as it comes out of the tap from across the bar!

Caryophyllene is an essential oil in a variety of plants including hemp, caraway, cloves, basil, oregano, pepper, rosemary and cinnamon. While the precise impact on beer aroma from caryophyllene is not well defined, the list of plants just mentioned may provide some clues to a fertile imagination. When used for a significant period in the boil, caryophyllene produces flavors similar to humulene.

"... staying within the bounds of hop pedigree (and therefore similar alpha acid and essential oil characteristics) may be a good place to start..."

Farnesene usually comprises a small amount of the total essential oil in hops but is more prevalent in European "noble" hop varieties than American hop varieties. The effect of farnesene on beer flavor is not well understood, but two naturally occurring isomers are known to produce the odors associated with green apple and sweet gardenia.

Hop selection and heritage

Armed with this basic understanding of where and how the bitterness, flavor and aroma of hops comes from, one can delve into the information of hop alpha acid, beta acid, essential oil, etc. (provided in the references at the end of this article) to have an idea what to expect when using different varieties of hops. As a general guideline, staying within the bounds of hop pedigree (and therefore similar alpha acid and essential oil characteristics) may be a good place to start if you plan to

experiment with combining different varieties of hops.

Most of the hops used in brewing can be traced back to Germany, England and other parts of Europe, and America. These groupings by geographical origin usually correlate to similarities of alpha acid and essential oil content and chemistry, and not surprisingly, beer styles. Therefore, many English types of ale rely on Admiral, Bramling Cross, Fuggle, Kent Golding, Northdown and other hops that originated in the United Kingdom. Likewise, many German beers were built around Hallertauer, Tettnanger and Spalter hops, and Czech beers were designed with Bor, Saaz and Styrian hops.

American brewers have borrowed these techniques from across the Atlantic, depending on the heritage of the brewer, but we have since developed styles of our own with hop varieties such as Amarillo, Cascade, Cluster and others.

Choose your own

Now that you know some of the components that make up a hop's characteristics, it's time to start putting it all together. Keep in mind that staying within a similar hop pedigree or geographical place of origin can help prevent making a potentially incompatible combination of hops with an undesirable beer flavor profile. However, by using information on hop chemistry and pedigree, the artistic brewer can employ his/her imagination to create a truly unique and satisfying beer outside of normal beer style guidelines.

By combining an understanding of how hops contribute bitterness, flavor and aroma with knowledge of the various hop pedigrees and their signature chemistry, you can experiment with lots of different hop combinations to create a signature beer of your own.

References

Detailed information on the alpha acid content, flavor and aroma producing oils, pedigree of individual hop varieties can be found online. Visit *Brew Your Own*'s new online hop chart (see right), refer to the *Best of* BYO *Hop Lover's Guide* or check out some of these hop outlets' Web sites:

Freshops:
http://www.freshops.com/usda_hop_desc2.html and
http://www.freshops.com/hvariety.html

HopUnion:
http://www.hopunion.com/hop-components.shtml

USAHops:
http://www.usahops.org/index.cfm?fuseaction=page&pageID=18

Jon Stika is an avid homebrewer from North Dakota. He frequently writes "Techniques" for Brew Your Own.

Web extra:

Check out BYO's all new homebrew hop chart at:
http://www.byo.com/resources/hops

Hop Character

Polyphenols, BUs and dry hopping

by John Palmer

A couple months ago I wrote about what an International Bitterness Unit (IBU) really measures, the effects of hop aging, and the implications that it has to planning the hop character in your beer. The gist of that column was that an IBU is actually 50X the amount of light absorbed by a solvent-extracted beer sample containing all the "bitter stuff" that is chemically similar to isomerized alpha acid, but also includes oxidized beta acids, non-iso-alpha, hop polyphenols and flavanoids. This also meant that, historically, a beer's quoted BU number quantified a variety of bitter substances in beer, which collectively would have a different character than one of today's beers built with today's high-alpha hop varieties.

Dry hopping or using a hopback can introduce raw alpha acids and increase the beer's BU. It won't, however, change the actual perceived bitterness of the finished beer.

Today's beers would typically have a more singular and sharper bitterness character compared to a beer brewed 40 years ago with the same measured BU level. Of course, no one was brewing 80 BU beers forty years ago, but they were brewing Pilsners and bitters with 20–40 BUs and the overall character would have been softer. By the way, the United States are apparently the only country that refers to this as an "International" unit, everyone else just calls it a BU.

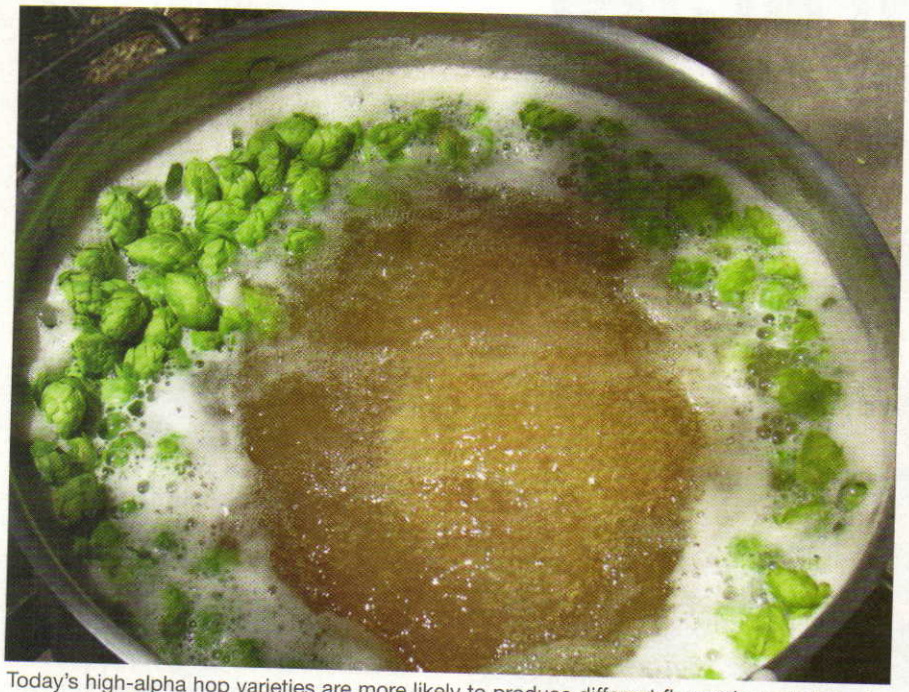
I have found a couple of journal articles since I wrote that article that shed further light on what comprises hop character, especially in a dry-hopped beer. First, let's talk about hop polyphenols. In the previous article, I said:

". . . the goal of the measurement was not to necessarily measure iso-alpha, but to measure perceived bitterness — comprised of iso-alpha and stuff. The "and stuff" is known to include bitter oxidized beta acids, decomposition products of alpha and beta acids (not bitter), and some hop polyphenols (thought to be bitter) like xanthohumol."

Are hop polyphenols bitter or astringent or both? Bitter is an actual flavor that

Table 1:
Partial Summary of Table 3 from J.ASBC 66(3): 174-183, 2008. Treatment

(iso-alpha-polyphenols)	Iso-Alpha (mg/L)	Polyphenols (mg/L)	BU
0-0	1.6	66	3
0-100	1.9	149	16
0-200	2	276	26
10-0	11.9	67	10
10-100	12.9	167	25
10-200	12.5	257	40



Today's high-alpha hop varieties are more likely to produce different flavor characteristics in modern versions of classic beer styles, including sharper bitterness.

is detected by the tongue, but astringency is not. Astringency is a physical mouthfeel caused by the association and precipitation of large polyphenols with proline-rich proteins in the saliva. The precipitation of these compounds coats the mouth and tongue, resulting in a sensation of dryness and inhibition of taste. In the *Journal of the American Society of Brewing Chemists* (J.ASBC), 66(3): 174–183, 2008, McLaughlin et. al., published "Bitterness-Modifying Properties of Hop Polyphenols Extracted from Spent Hop Material," in which they dosed an American light lager (3 BUs) with five levels of added iso-alpha and polyphenols, measured the resultant BUs and had the beers evaluated by two test panels as well. The experimental samples consisted of kegs dosed with either zero or 10 mg/L of iso-alpha acid extract, and zero, 100 or 200 mg/L of hop-derived polyphenols. The beers where then analyzed for BU (ASBC method), total polyphenol and flavanoid content (EBC method), alpha acids and iso-alpha acids (HPLC). A partial summary of their results are shown in Table 1. A negligible amount (< 1 mg/L) of un-iso-alpha was present in all the dosed beers, and this data was not included for brevity. In other words, the dosing extracts were essentially pure iso-alpha and/or hop polyphenols. A caveat is

that the dosings were prepared solutions and were measured and added by volume, and that each condition was added to a different keg, and thus there is some variation in the constituent measurements between kegs.

First, look at the numbers for the base beer: nothing added and 3 BUs consisting of 1.6 mg/L of iso-alpha and 66 mg/L of polyphenols. In the second condition, 100 mg/L of polyphenols are added and the BUs jump up to 16. Doubling the amount of polyphenols in the third condition increased the measured polyphenols count from 66 to 276, and moves the BUs to 26. A similar behavior is seen in the second group of dosings where 10 mg/L of iso-alpha are added to the three levels of polyphenol addition. The iso-alpha levels increase in-step with each addition as do the polyphenol levels, although there is a little more variation in that measurement than with iso-alpha. The punch line to the whole experiment though is the BU measurement of the last beer (10–200) — it measures 40 BUs even though it contains only 12.5 mg/L of iso-alpha!

"High BU levels, particularly from large additions of low-alpha hops in the boil, can put a lot of polyphenol in the beer."

An eleven member tasting panel partially confirmed those results, ranking the beers from most bitter to least, averaged over three repetitions, as: 10–200, 1–100, 0–200, 10–0, 0–100, 0–0. This ranking is interesting in that there appears to be a synergistic affect between iso-alpha and polyphenol so that the combination is more bitter than iso-alpha alone. It also appears that 0–100 mg/L is less bitter to the palate than 10–0, even though the BUs indicated the reverse. (Note: the tasting panel had been trained to differentiate between bitterness and astringency before the tastings.)

Now, you might be thinking to yourself, "So what, I don't add hop polyphenol extract to my beer . . ." Ah, but you probably do. The polyphenol additions in the study were based on typical levels of polyphenols that can be found in high-adjunct lagers (60–140 mg/L), and highly-hopped American Northwest craft-brewed ales (160–400 mg/L). High BU levels, particularly from large additions of low-alpha hops in the boil, can put a lot of polyphenol in the beer. Dry hopping can result in quite a bit of polyphenol being extracted from the hops into your beer as well if you leave the hops in the keg or fermenter for an extended length of time (>1 week). Polyphenols are haze formers and many West Coast brewers claim that a lack

of haze in a West Coast pale ale or IPA means that you didn't have enough hops in the recipe.

There have been many discussions among homebrewers in recent years about dry hopping and perceived bitterness. One group might assert that no isomerization occurs because the hops are not boiled, that there will not be any bitterness contribution, only aroma and flavor. Another group might say that some small amount of isomerization is occuring, that there is a perceivable difference in bitterness, and that this difference is reflected in the BU measurements of dry hopped beers. In fact they are both right and both wrong. Alpha acids will isomerize at fermentation temperatures, but only at a negligible rate. As noted above, the hop polyphenol levels in highly-hopped northwestern ales can be as high as 400 mg/L, and based on the results of the tasting panel, this will have a definite effect on the perceived bitterness. The BUs for dry-hopped beers do increase, and this rise is due to polyphenol and raw alpha acid carried into the beer. This raises another question for homebrewers using hopbacks or dry-hopping their brews, "Do un-isomerized alpha acids add bitterness to beer?"

According to the Fritsch and Shellhammer paper, "Alpha Acids Do Not Contribute Bitterness to Lager Beer," in J.ASBC 65(1): 26–28, 2007, a triangle test of 11 taste panelists, wearing nose plugs, determined that there was no significant difference between a control beer, and beers dosed with 14 and 28 mg/L of 90.9% pure alpha acids. The nose plugs were necessary because the people could discern more hoppy aromas in the dosed beers, and could thus taste the added alpha. Interestingly, in a subsequent tasting the panelists were blindfolded and tasted the dosed beers without noseplugs, but they could not reach a consensus on which beer was the most bitter, which further validated this result. The conclusion of the authors was that un-isomerized alpha acid does not add bitterness to beer. The increase in flavors and aromas noted by the panel in the dosed beers may be due to the 9% of non-alpha acid material in the extract, so this study did not determine whether alpha acid has other flavors besides bitter.

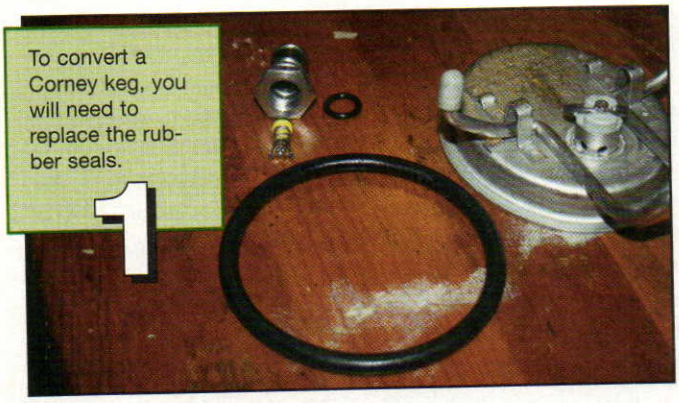
In conclusion, we have determined that hop polyphenols do occur at high levels in craft brewed beer, that hop polyphenols are significantly bitter, and that raw alpha acids may come from dry hopping or hopbacks will increase the BU but not the actual perceived bitterness. We can use this information to help plan the kind of hop character we want in our beers. Using a lot of low-alpha hops, such as East Kent Goldings or Cascades, will tend to contribute more polyphenol to the beer than a high alpha/high oil variety such as Centennial or Simcoe. If you are going to dry hop with a classic aroma variety, you should use a greater quantity but limit the contact time with the beer to a few days to get the maximum aroma and flavor impact while minimizing the amount of polyphenol extracted.

John Palmer writes "Advanced Homebrewing" for every issue of BYO. Read his blog at byo.com/blogs/John-Palmers-Blog.html

Double Duty

Fermenting in a Cornelius keg

Story and photos by Forrest Whitesides



To convert a Corney keg, you will need to replace the rubber seals. 1

For those of you that keg your homebrew, chances are you've got at least one Cornelius keg sitting empty at any given time. Why not put them to good use as primary and/or secondary fermenters? And for those that don't keg but are considering it in the future, picking up a keg or two for fermenting is a great way to start building up the equipment you'll need for a kegerator. Used Cornelius kegs cost about $30 to $40, and with about $10 more in fittings and tubing you can have a 5-gallon (19-L) stainless steel fermenting vessel. The advantages of using a keg are that it's light-tight, has built-in handles for easy transport and if you have a kegerator you can use your CO_2 system to rack the beer in a completely closed environment with no siphoning.

Keg acquisition and preparation

Most local homebrew shops sell used Cornelius kegs at very reasonable prices. Five-gallon (19-L) kegs are most common and are also the cheapest. There are also 2.5-gallon (9.5-L), 3-gallon (11-L), and even 10- and 15-gallon (38- and 57-L) Cornelius kegs, but all of these are far less common and cost several times that of a standard 5-gallon (19-L) keg.

If you're new to Cornelius kegs, the first thing you'll want to do after buying a used keg is clean it thoroughly and also replace all of the rubber seals. These kegs were used almost exclusively to serve various types of soda and the only parts you cannot clean well enough to remove the residual soda taste are the rubber seals. A full complement of replacement seals costs about $5. It takes just a few minutes to swap out seals. This step in preparing a used keg is non-negotiable — do not skip it! I also replace the poppet valves on used kegs, but this is not necessary so long as the keg is holding pressure. I'm just paranoid.

Thoroughly rinse the inside of your keg to clear out whatever might have been in there (usually a small amount of sanitizing solution). Mix up 5 gallons (19 L) of a solution of B-Brite or other oxygen-based cleaner (like Oxi-Clean) in a bucket and pour off some of it in a small plastic container (Tupperware or similar). Use a ⅜-inch deep socket or crescent wrench to loosen and remove the gas-in and liquid-out posts. Remove and discard the rubber seals on the posts. Remove the poppet valves from the posts. Now remove and discard the large rubber seal around the keg lid, and also unscrew the relief valve from the lid. Also remove both dip tubes, and, again, discard the rubber o-rings (Figure 1 shows several of these parts).

Take all of that (posts, poppets, lid, dip tubes, and relief valve) and drop it in the small container of cleaning solution. While the keg parts are soaking, pour the bucket full of cleaning solution into the keg and let that sit as well. For cleaning purposes you may find it easier to reinsert the liquid side dip tube in the keg, as it is quite long. Letting everything have a good soak for 15 minutes or so loosens up any residual gunk that might be present.

After the soak, add the new rubber seals to the posts, lid, and dip tubes. Apply a very thin coat of "keg lube" to the new rubber parts before installing. This will help keep the rubber from drying out, as well as aid in keeping an airtight seal when the keg is under pressure. (Keg lube is a food-grade lubricant and is available from most homebrew shops that stock draft equipment.)

With the keg still full of cleaning solution, reinsert the dip tubes and reattach and tighten down the posts (remember to reinsert the poppet valves into posts before screwing them onto the keg). Attach and lock the lid and reset the relief valve. Give the keg a good shake for 30 seconds to a minute to ensure full cleanser contact on all interior parts. On brew day, follow this same basic procedure to clean the keg. You'll also need to sanitize the keg with your sanitizer of choice.

During fermentation, attach the "Gas In" disconnect to the "in" post on the keg. 2

Get the gas out

Kegs are airtight by design, and obviously we need a way to let out the CO_2 created during fermentation. This can be accomplished in a very simple, straightforward manner with minimal expense and using existing keg components. Here's a list of what you'll need:

- **a "Gas In" disconnect fitting with hose barb**
- **a metal hose clamp (this is optional)**
- **a short length of tubing**
- **a glass or plastic container (such as an old jar or growler)**
- **anti-foaming agent**

For fermentation, remove the gas side's short dip tube. Attach the "Gas In" disconnect to the "in" post on the keg (Figure 2). Now slip the tubing onto the hose barb of the disconnect (Figure 3). Fill your jar or growler about half full with a solution of the sanitizer of your choice. Insert the other end of the tubing in the growler and you're ready to go (Figure 4).

What about blowoff?

You probably noticed that this setup looks very similar to a typical "blowoff" arrangement used with a carboy. While it does look similar, the small diameter of the keg fittings and tubing will not work very well for the bits of hops and coagulated gunk common in the foam that is ejected during high kräusen. This is especially true of vigorous fermentations with top-cropping yeast strains, such as Wyeast's 3333 German Wheat, for example. To avoid a big blowoff there are a few tricks we can use. Plus you can remove the "guts" of both the tank gas fitting and the gas in disconnect, which will allow the passage of kräusen and hop particles unless you've used whole flower hops, which can still clog the pipe and cause major problems.

The volume of the keg is 5 gallons (19 L), and that means to avoid problems we need to put a little less than that into it for fermentation. Shoot for about 4.5 gallons (17 L) into the keg. By using a lot less wort than that, we can avoid blowoff entirely. But that's not a desirable option for 5-gallon (19-L) batches. So instead of fermenting a smaller volume of beer, use a food-grade anti-foaming agent called Fermcap-S to reduce the amount of kräusen present during the height of fermentation. Fermcap-S is widely available at many homebrew shops and mail-order suppliers. The active ingredient is dimethylpolysiloxane, which is also used to make the active ingredient in some over-the-counter drugs, like Gas-X (simethicone). Use three or four drops per gallon (3.8 L) of beer to help eliminate that big foamy head of kräusen and keep the gas disconnect clear of particulate matter. Add the Fermcap-S directly into the keg after you've transferred the cooled wort but before you pitch the yeast. The Fermcap-S will settle out after primary fermentation and will be left behind after racking.

If you already brew larger batches or would like to try going bigger, splitting the batch into two or more 5-gallon (19-L) Cornelius kegs is a great way to go. Start off with a batch size of between 8 and 9 gallons (30 and 34 L) and then split them into two kegs. This also lets you try the same recipe with multiple yeast strains for testing and comparison.

Racking with gas

One of the most convenient features of using a keg for fermenting is that you can use CO_2 to transfer beer from primary to secondary. This process is closed and does not rely on gravity or siphoning. To do this, some brewers like to cut about ¾ of an inch (2 cm) off the end of the liquid dip tube to avoid picking up yeast from the bottom of the keg. Others just bend the dip tube away from the center-bottom of the keg. I leave my dip tubes fully intact and just discard the first few ounces of cloudy, yeasty beer that comes out when the transfer starts. The choice is yours as all methods work fine.

Whether you plan to transfer to a carboy or a keg, you'll want to avoid transferring the trub at the bottom of the fermenter. To do that, hook up a CO_2 cylinder to the "Gas in" disconnect and adjust the regulator to minimum pressure. Connect some tubing to the "Liquid out" disconnect and slip the other end into a jar or other container. Slowly turn on the gas and watch as the yeast and trub are ejected. Keep an eye on the discharge and turn the gas off as soon as the effluent clears up. And now on to racking.

If you secondary in a carboy, use a carboy cap with a racking cane through the center opening and remove the covering cap on the other stem. Connect the racking cane to the "Liquid out" disconnect on the keg with some beverage tubing. Depending on how snug the connections are (or aren't), you may want to use hose clamps to secure the tubing. Connect a CO_2 cylinder to the "Gas in" side of the keg, and you're ready to transfer (Figure 5).

Set the CO_2 regulator at the minimum PSI possible before opening the valve. Only a very small amount of pressure is needed to push the beer, and any more than just a little could make a big mess or unduly agitate the beer. You may not be able to hear any gas entering the keg, and it may take several seconds for the

beer to begin to flow. You also may not see the pressure register on the regulator gauge, but that's okay. Once enough pressure builds up in the keg, the beer will flow out into the carboy.

You can also use the same basic procedure above to transfer directly to another keg. Connect the "Liquid out" on one keg to the "Liquid out" on the other keg. Be sure to open the relief valve on the receiving keg to allow the displaced air in the keg to vent. When transferring to another keg, you can go a little higher on the CO_2 pressure to speed up the transfer.

5 You can rack from the keg to a carboy by attaching a CO_2 cylinder to the "Gas In" side of the keg.

Racking with gravity

If you don't have a kegerator setup up and running, you can use a simple siphon to transfer from the keg to a carboy or another keg for secondary fermentation (or directly to the bottling bucket if you do extended primary fermentations). Just use a racking cane in the keg and start a siphon. Nice and easy.

Kegs as secondary fermenters

Cornelius kegs also make excellent secondary fermenters. Just transfer the beer to a keg after primary, close the lid, and pressurize it with about 15 to 20 PSI to make sure the lid seal seats properly. Every few days, vent the keg via the pressure release valve. There will be some residual fermentation going on that will create a small amount of CO_2, as well as some leftover CO_2 that was dissolved during primary fermentation. Not venting this excess gas won't be a huge problem because the keg is rated for pressure far beyond what will occur in secondary fermentation, but too much pressure may cause some yeast strains to prematurely flocculate. This is a bigger issue in primary fermentation, but could conceivably have a negative impact on bulk aging.

Forrest Whitesides brews and kegs beer and plays guitar in Hopatcong, NJ. He enjoys Belgian brews and American barleywines. He writes "Projects" for every issue of BYO.

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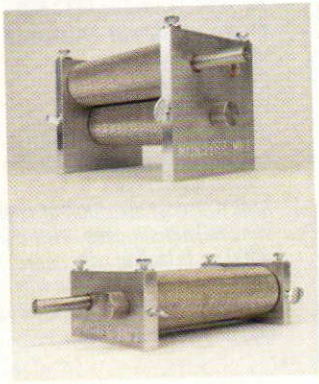

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Homebrewing and emergency preparedness

Christian Smerz • Houston, Texas

"Evacuate!" That was the word I awoke to on September 21, 1989 as massive Hurricane Hugo bore down on Charleston, South Carolina and my college campus. After two weeks of an impromptu furlough from fall semester I returned to Charleston and my alma mater to begin cleanup and to resume my sophomore year.

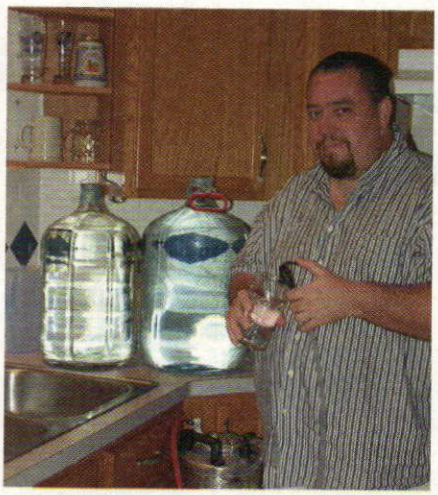
The devastation was complete with buildings demolished, ancient trees uprooted and large scale power outages. But the one significant impact of the storm that I remember most was the tainted water. Due to loss of water pressure and damaged pumps, the water supply had been compromised. To combat the potentially harmful effects of the water, large quantities of iodine were added to the supply. The smell and taste permeated everything. It was always present from the showers, to our taps, to the instant food prepared in the college cafeteria. Nothing says home cooking like a helping of iodine mashed potatoes served with — you guessed it — iodine gravy. After a couple of weeks the water was deemed safe and it slowly returned to normal.

As fate, destiny, personal decisions or just dumb luck would have it, I now live in Houston, Texas. I have also embraced the wonderful hobby of homebrewing, and am often reminded of those days in Charleston by the smell of Iodophor as I cleanse my brewing equipment.

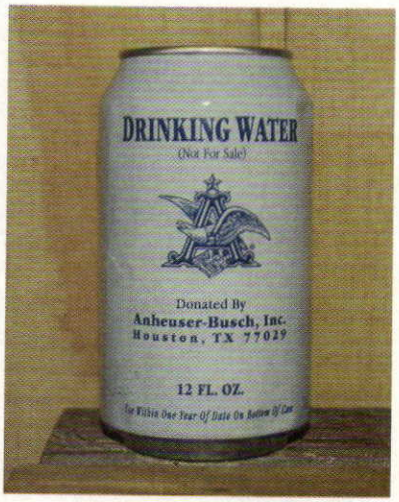
In the aftermath of Hurricane Katrina, the Houston area was swamped with displaced residents of Louisiana and I volunteered to provide emergency communication support at the Astrodome. While there I witnessed donations rolling in from numerous organizations and businesses. The one that caught my attention was the water provided by Anheuser-Busch. They have a large brewery here in Houston and they canned drinking water and supplied it to the relief effort. This triggered an idea: if a large-scale brewery can use its equipment to supply water in a crisis, why can't my little home brewery do the same. And so my family hurricane preparedness plan was thus amended.

It has been 19 years since Hugo came ashore and I as I wrote this story I watched 24-hour coverage of a very large hurricane in the Gulf of Mexico named Ike. "Evacuate!" was being echoed once again, but fortunately (or not) it didn't affect my area. Nonetheless, power outages and hurricane force winds were forecasted for my neighborhood. And yes, it has been said that we should be prepared for the loss of water pressure and possibly contaminated drinking water. It was time to invoke the hurricane preparedness plan.

This is not a complicated process, it is simply re-tasking the brewery from providing beer to providing water. I begin by thoroughly cleansing one of my empty Cornelius kegs and the tap line. Once complete I fill the keg with drinking water and top off with a blast of CO_2. I also clean and fill my two empty carboys with drinking water and seal them up. I clean and sanitize my racking cane and tube and it's all set. The idea is simple: use the keg and CO_2 to provide drinking water and replenish with the water in the carboys. The other commodity to take advantage of is my chest freezer that I use for lagering. I remove the temperature controller and set it to the coldest setting. I begin making ice using just about anything that will hold water then fill as many coolers as possible with the ice.



When hurricanes strike Christian's area, he brews water instead of beer.



During Hurricane Katrina, Anheuser-Busch donated drinking water to displaced people.

Ike did not disappoint. Almost on cue the power went out once the winds began to pick up. It was a very long and nerve racking night with the house making sounds I have never heard before. We listened to the beating for about eight hours before it began to let up. Once again the devastation was complete. Roof shingles littered my yard, my backyard fence was gone and my pin oak tree in the front yard was practically touching the ground due to a two foot crack in the trunk. We heard the news that power could be out for as much as two weeks and that the city did lose water pressure. All residents were under a boil order if they were going to use the water. Of course having an electric stove would make this a bit difficult. Ah yes, the brewery to the rescue again, if it came to having to boil water we have my propane burner and stock pots to aid in the task.

About a week after Ike made landfall, the boil order was lifted. All told we used about half the original keg leaving me with two carboys of perfectly good drinking water. What should an enterprising homebrewer do in such a situation? Why brew of course. I'm thinking a commemorative IPA or Ike Pale Ale.

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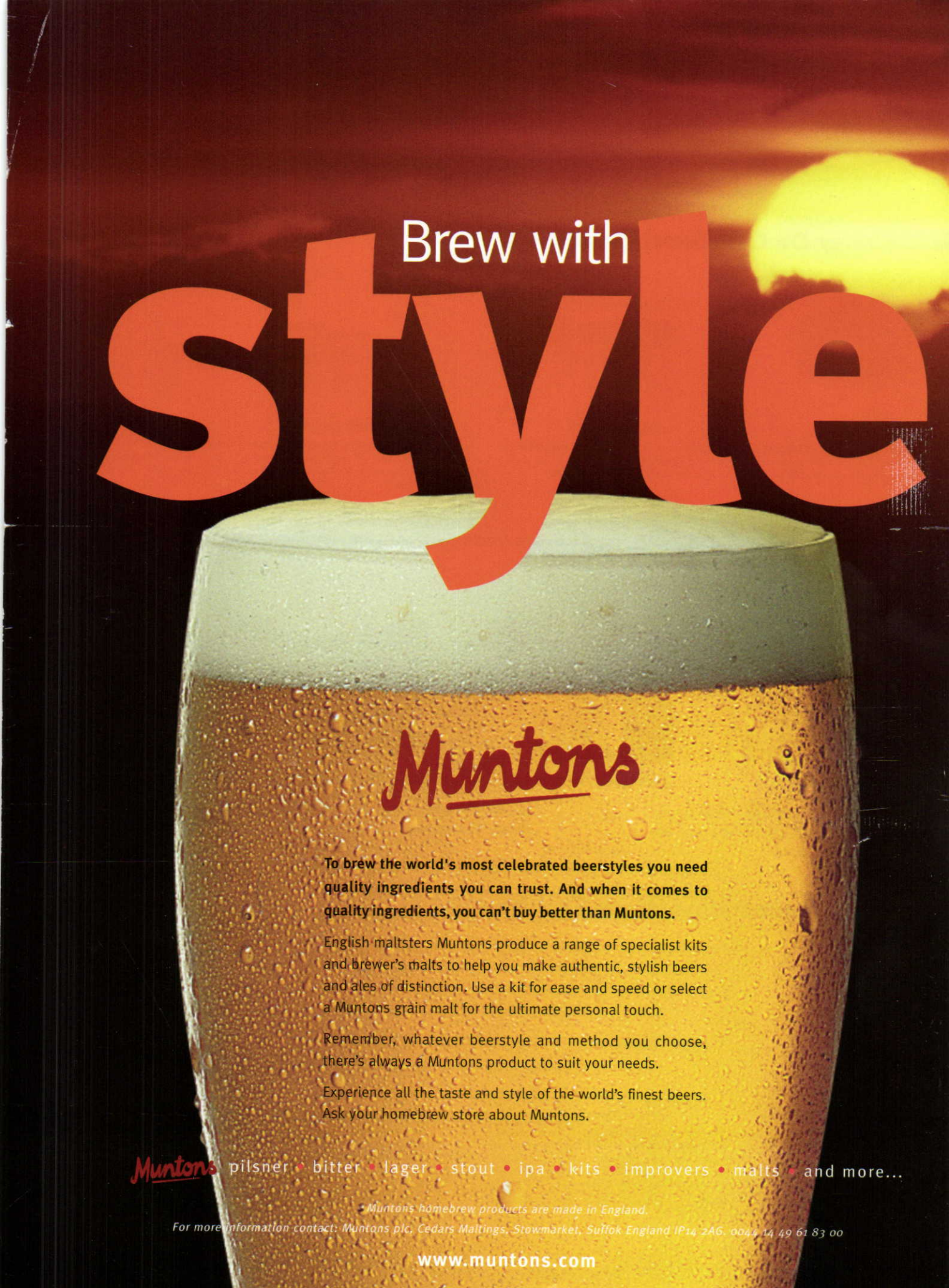
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