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THE HOW-TO HOMEBREW BEER MAGAZINE

SEPTEMBER 2007, VOL.13, NO.5

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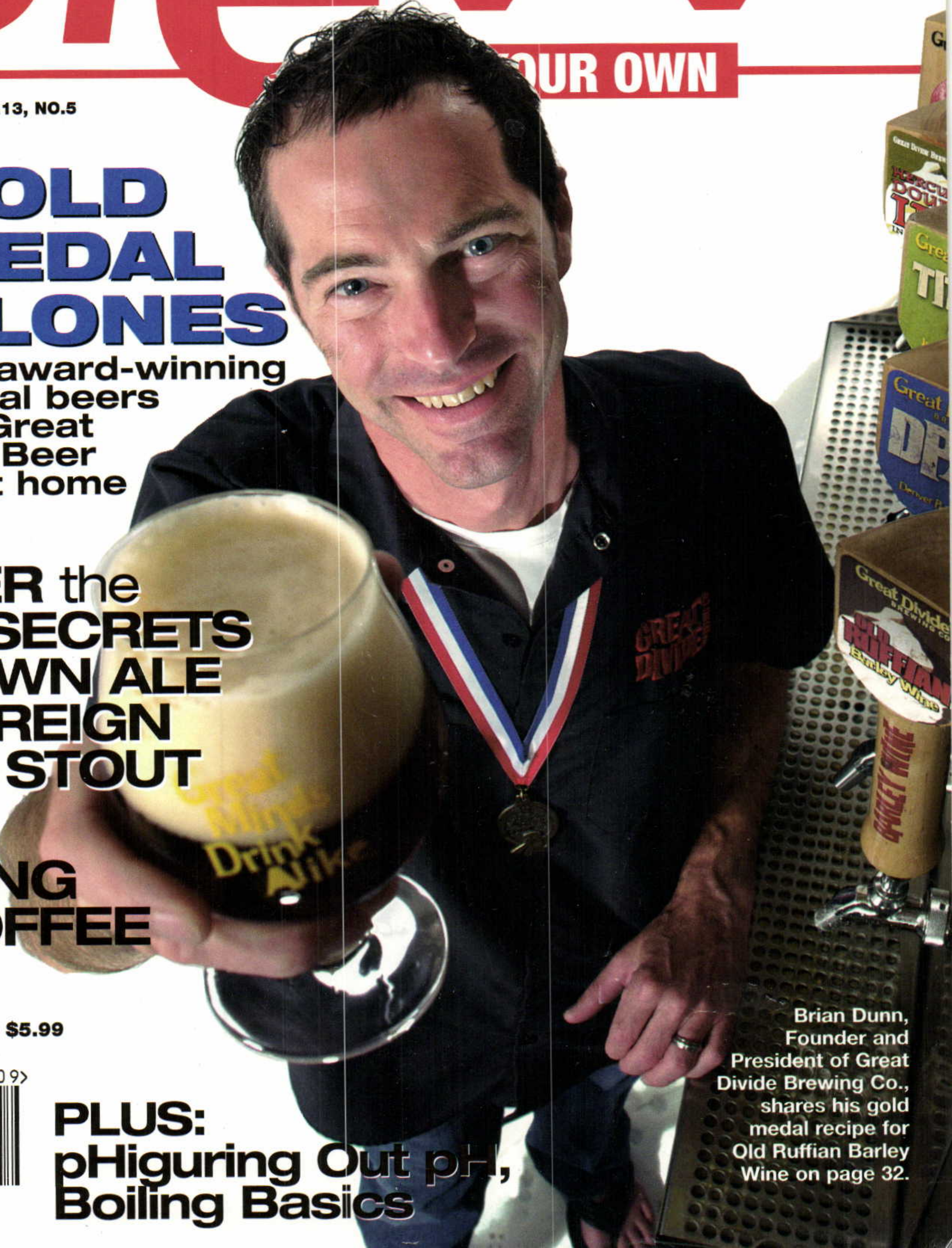

Brian Dunn, Founder and President of Great Divide Brewing Co., shares his gold medal recipe for Old Ruffian Barley Wine on page 32.

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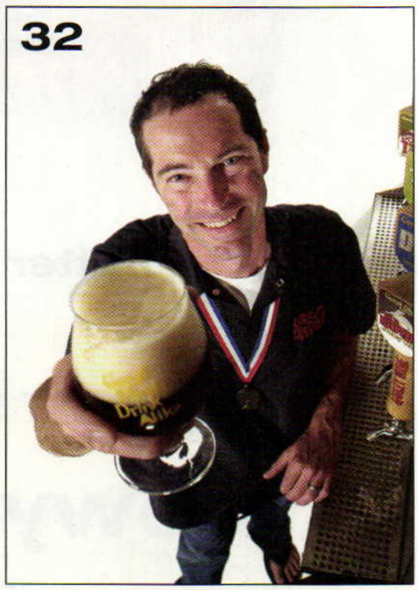
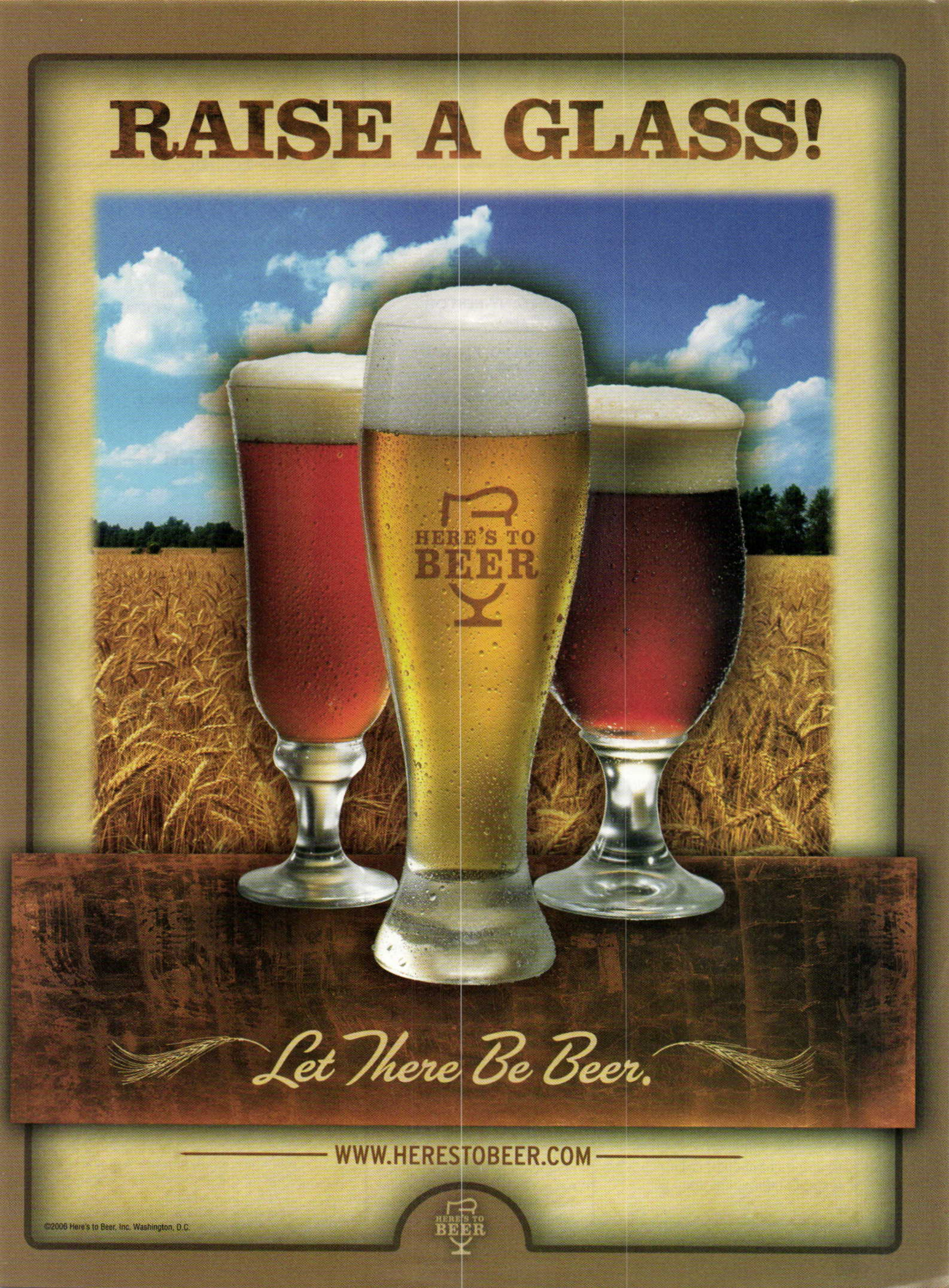


Where to find it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RECIPE INDEX

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

EDITOR
Chris Colby

ART DIRECTOR
Coleen Jewett Heingartner

ASSISTANT EDITOR
Betsy Parks

TECHNICAL EDITOR
Ashton Lewis

CONTRIBUTING WRITERS
Steve Bader, Thom Cannell, Bill Pierce, Marc Martin, Terry Foster, Glenn BurnSilver, Kristin Grant, Forrest Whitesides, Jamil Zainasheff

CONTRIBUTING ARTISTS
Shawn Turner, Jim Woodward

CONTRIBUTING PHOTOGRAPHER
Charles A. Parker

PUBLISHER
Brad Ring

ASSOCIATE PUBLISHER & ADVERTISING DIRECTOR
Kiev Rattee

ADVERTISING SALES COORDINATOR
Dave Green

BOOKKEEPER
Beverly Brown Jensen

OFFICE MANAGER
Andrew Putney

SUBSCRIPTION CUSTOMER SERVICE MANAGER
Linda Marlowe

NEWSSTAND DIRECTOR
Carl Kopf

How to reach us

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

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

Advertising Contact
Kiev Rattee
kiev@byo.com

Editorial Contact
Chris Colby
chris@byo.com

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

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

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Cover Photo: Mark Manger

MaiL

Small Scale I — Yeast

I read your article, "Small Scale Brewing" (July-August 2007), and was very interested in trying this. Space is very limited for me. My concern is that I am having a hard time finding a good selection of dried yeast strains. How would I go about using liquid yeast strains without overpitching?

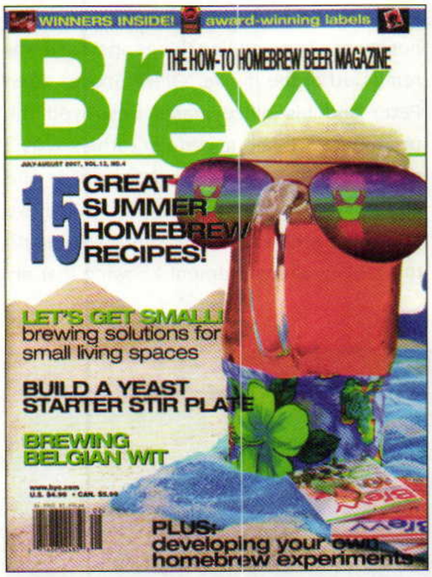
Phil Kifer
via email

Unless you are making an absolutely tiny batch — less than a 2.0 quarts (1.9 L) — we would suggest simply pitching a whole liquid yeast package and not worrying about it. The problems associated with overpitching don't really show up until you are way over the optimal amount, at least four times over. At around 100 billion cells per pack, you have roughly the optimal number of yeast cells to make 2.0 gallons (7.6 L) of average-strength beer using the old "million cells per mL per °Plato" rule for pitching. Thus, you'd be right around double that amount for 1.0 gallon (3.8 L) and quadruple that amount for 0.5 gallons/2 quarts (~2 L) of beer. We make 2.0 quart (1.9 L) yeast starters all the time, pitch a whole pack of liquid yeast and the starter beer tastes fine. Different yeast strains may behave differently, but you could always try it the easy way first, then switch to pitching fewer cells if you think your beer doesn't taste right.

To try to pitch closer to the optimal amount, figure out how many cells you need to pitch — perhaps using an online pitching calculator such as that found at mrmalty.com — and try to pitch an appropriate fraction of the yeast tube or pack. You would not have to be very exact, but you should shake the tube or pack well so that the yeast cells are suspended evenly throughout the package.

Small Scale II — IPA

I was inspired by the article by James Spencer regarding small scale brewing in July-August 2007. I had a tight schedule on my last brew date, so I used his article to whip up a 1-gallon batch of IPA. I was in and out in 2 hours and made it to my son's baseball game that morning. We usually brew all-grain, and the guys who have a tight schedule usually just cancel brewing all together. My friends and I will use these techniques when they are restricted by time and material. This is also a great way to use the remaining ingredients from previous brews. Instead of using six 12-oz. bottles, I lightly primed two 2-quart growlers with three teaspoons of priming sugar each and topped off with



cooled boiled tap water (as the post boil wort volume ended up around 0.9 gallons). I extended the boiling time to 30 minutes, used more DME than James and changed the hops around. To save more time, I'll begin steeping the crystal in an insulated coffee mug on my way out to the brew site.

I am now set for the next party in only two hours of brewing, and two weeks time! Thanks for re-defining micro brewing!

Here's my recipe:

Double D's Double Growler IPA

(1.0 gallon/3.8 L, extract with grains)
OG = 1.062 FG = 1.012
IBU = 52 ABV = 6.7%

Ingredients

1.25 lb. dried malt extract
2.0 oz. caramel malt (60 °L)
0.35 oz. Amarillo hops (30 mins)
0.50 oz. Cascade hops (5 mins)
0.60 oz. Liberty hops (2 mins)
0.35 oz. Willamette whole hops (dry hop)
¼ packet Nottingham dried yeast
(not re-hydrated before pitching)

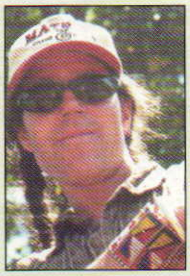
Step by Step

Steep caramel malt. Boil wort for 30 minutes. Cool wort. Pitch yeast and ferment the beer at ale temperatures.

Dan D.
via email

Two growlers in two hours? Not too bad.

ConTribUTors



Glenn BurnSilver is a freelance writer and frequent contributor to *Brew Your Own* magazine. He has authored several collections of homebrew clone recipes, including the "double" and "imperial" clone story in the December 2006 issue.

Glenn lives in Fort Collins, Colorado, just up the road from Denver, where the Great American Beer Festival (GABF) is held every year. In this issue, on page 32, Glenn presents 10 clone recipes for GABF gold medal winning beers.

Terry Foster has written many articles on English ales for *Brew Your Own*, including porter (January - February 2003), old ale (September 2004), mild ale (September 2005) and stout (September 2006). In the May-June 2007 issue, he discussed the English sub-style of IPA.

On page 26 of this issue, Foster writes about brown ale, a style with ancient roots that exists today in a three substyles. In his article, Foster covers the two English sub-styles.

Dan Mouer is an archaeologist by occupation and a homebrewer by avocation. In the January-February 2003 issue of *Brew Your Own*, he brought the two interests together with his story "Colonial Ale," dissecting a historical recipe for an early American ale.

On page 38 of this issue, Dan again combines his knowledge of archaeology with his love of homebrewing in describing archaeological evidence for how ancient beers were brewed.

Breaking Stuff, With Flair

Thank the maker that you have given me a reason for saving my old, out-of-date PCs. They have been sitting in a plastic bag in the garage for quite some time. I saved them as all other pack rats do. You just never know. I am currently pulling out fans and magnets and am building the stir plates as described in the July-August 2007 issue ("Build Your Own Stir Plate"). I decided, however, to remove the magnets with only a screwdriver, hammer and brute force (none of this torx nonsense). I was pulling things apart and was reminded of the movie "Office Space" when Peter and his office mates destroyed the printer and I felt a certain catharsis as I destroyed CD-ROM drives, hard drives and all parts with a malicious intent. I have two bloody knuckles, but they were well worth the feeling of contentment knowing that my stir plate would create yeast cells to make my beer. Keep up the homemade project ideas that require the dismemberment of modern society.

Tony Jones
Rhinelander, Wisconsin

Bloody knuckles from tearing apart old computer peripherals with irrational glee? Wanting to dismember modern society? Sounds like somebody has a case of the Mondays.

We don't currently have any plans for any more bust-this-and-build-that projects, but if you like do-it-yourself projects that combine intact technology and brewing, here's a simple one: If you use a swamp cooler to hold your fermenting carboy, duct tape an Apple iPhone to the cooler lid, with the camera pointed at the fermentation lock. While you're sitting at your computer at work, dial up your iPhone and watch the airlock bubble.

Here's the cost/benefit breakdown: one Apple iPhone, $500; one piece of duct tape, less than one cent; sitting at work watching your airlock bubble through the lens of a $500 gadget that sends an image through miles of cable and perhaps bounced off a satellite in low earth orbit and getting paid to do it all the while . . . priceless.

Out of Control

I enjoyed the article "Brewing Science" in the July-August 2007 issue of *Brew Your Own*. But, doesn't the hypothetical experiment need a control group?

Mike Short
Gadsden, Alabama

Some experiments require control groups, others don't. A control group is an experimental trial that lacks the experimental variable. For example, if you were testing whether or not a new type of yeast nutrient worked, you would need to brew at least one beer without any nutrient as a control. In the experiment described in the article, two yeast strains were being compared. A control group — a beer brewed without yeast — was not needed. However, a beer brewed with a "generic" strain of ale yeast, that did not purport to be good for Norwegian ale, could have been added. The comparison between this strain and the two experimental strains would have allowed Sven and Ole to compare their strains versus "any old ale" strain. But, it would also have been more work.

A Marked Man

The brewer featured in the homebrewer profile on page 8 of the July-August 2007 issue is named Mike Wright, not Mark Wright as he is called in the article. Sorry, Mike.

homebrew PROFILE

(Bad) Ben Holmes • Lenexa, Kansas

I've been an all-grain homebrewer from the start. I used to build equipment for the brewpub industry in the Pacific Northwest as a hobby, back in the mid-Eighties to Nineties. I also did some consulting on water systems, controls and mechanical devices. Many times they couldn't afford to pay me, so they would barter with beer, grain and ingredients. Hence, I had ample reason to start brewing all-grain, instead of "out of the can."

Most of the equipment I built was for Fort Spokane Brewery (which is not with us, anymore) and Hale's Ales. I built everything from semi-automated counter-pressure multiple bottle fillers, to self-designed automated keg lifts. I was pretty good at TIG-welding stainless steel, so I was in demand for brewing applications.

Working for a pharmaceutical company, I also knew a fair amount about reverse osmosis and other types of brewery water systems. When a brewpub or brewery was having fermentation issues, sometimes I would suspect water quality. I knew where to get their water tested for chemical, microbiological and endotoxin profiles for next to nothing or for a few free beers for the lab worker. I now work full-time for a different division of that same company.

Photo Courtesy of Ben Holmes

Ben Holmes (left) with his nephew Andy (middle) and son Matt (right).

In the Midwest, I started growing my own hops at the side of my house and over my deck. I can grow enough for six to eight batches of beer in a good year. I also learned how to do yeast slants a few years ago and keep one very hearty, mixed (and secret) strain of yeast going I call "BadBenomyces cerevisiae."

My 10-gallon (38 L) homebrew system is a hodgepodge setup I can brew well on. My 25-year old son Matt, on the other hand, has professionally brewed before but has a tough time on my system. He's getting the knack, though. He's also my biggest fan and critic. The kid has taste!

I enjoy brewing ales, and only brew lagers a couple of times per year, such as Pilseners in the summer. I enjoy brewing Belgian ales, lambics, and other "experimentally intense" and interesting ales. I formulate all of my own recipes and rarely use the same one twice. I usually formulate a recipe with a certain style in mind as a guideline, but I like expanding the limits of that style along the way. I often brew beers that defy distinct styles or categories. I'm not a fan of strictly following recipes or clone brewing. I brew what can't be bought — Soul Beer. Read more about my homebrewing in my blog at http://badbenkc.blogspot.com/.

My other interests are trail running and ultrarunning and my hobbies are constantly crossing paths. At least once a year I host a Beer Utilization and Reduction Party (B.U.R.P.) to deplete my stock (so I can brew more) and I welcome friends from both worlds. Running and brewing are part of the yin and yang of my life.

byo.com BREW POLL

Do you enter your beers in homebrew competitions?

No: 70%

Yes: 30%

Photo Courtesy of Great American Beer Festival

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

Homebrew CALENDAR

September 1, 2
Hop Madness 2007
Salem, Oregon

A celebration of all things lupulin, including a tour of a hop farm in active harvest and the Best Darn Hoppy Beer Competition. The Madness is a 21+ event, ID required. $10 per adult / $15 per couple, $3 parking. More information, competition guidelines and past winning hoppy recipes are online at www.hopmadness.com.

September 8
Malt Madness Homebrew Competition
Allentown, Pennsylvania

The first annual BJCP sanctioned homebrew competition organized by the Lehigh Valley Homebrewers. Entry deadline is August 30. Visit www.lehighvalleyhomebrewers.org for more information, guidelines and printable entry forms.

September 22
Commander SAAZ
Cocoa Beach, Florida

A MCAB qualifier and second to last event in the Florida homebrew competition circuit. Entries for the homebrew competition accepted from August 15 through September 5. More information at www.saaz.org.

September 22, 23
FOAM Cup 2007
Tulsa, Oklahoma

The fourth of six competitions in the High Plains Brewer of the Year circuit. Entries will be accepted from September 10 through 22 at High Gravity Homebrewing and Winemaking Supplies. More information, entry fees and registration forms are available at http://alemakers.com.

club PROFILE

W.I.Z.A.R.D.s • Worcester, Massachusetts

The Worcester Incorporated Zymurgists Advancing Real Draughts (W.I.Z.A.R.D.s), an AHA registered club, originated in a typical manner: members of a disbanded club

Photo Courtesy of Mike Reilly

Members of the W.I.Z.A.R.D.s homebrew club at a monthly gathering.

continued hanging out together and talking beer after the break-up. Meetings held in member's houses as informal gatherings started attracting other like-minded individuals. Eventually a critical point was reached one night in 1997 at the Plantation Club in Worcester when our crew became more than just a group of friends — we were a club. We chose a fun name that we felt represented the magic of homebrewing as well as the club's sphere of influence.

In its infancy, the club continued meeting in member's houses and in pubs all over the Metro West suburbs of Boston. But soon we settled into a more permanent home at Deja Brew (a brew-on-premises) in Shrewsbury. We meet on the third Tuesday of every month.

Meetings start with business, including discussing upcoming events and setting next quarter's style. But after business comes pleasure and we discuss the latest home and craft brewing news, share homebrewing advice and tips, and (of course) sample beer. Occasionally we welcome guest speakers such as brewers from Harpoon or Nashoba Valley — we even had Charlie Papazian!

We also tour local microbreweries, attend brewers' festivals or crawl through the New England brewpub scene. On a quarterly basis we discuss a specific style of beer and everyone is encouraged to brew an example to bring to the club meetings. January is a "new-brewers" meeting for anyone who received brew kits over the holidays and need help.

Since 1998, our club has hosted a competition for National Homebrew Day with help from our sponsors, Strange Brew and Deja Brew. Traditionally, the best of show has been professionally contract-brewed and put on tap at a local bar.

W.I.Z.A.R.D.'s club members come from all walks of life. We count five professional brewers among our ranks and range in skill from novices to brewers with many years of homebrewing under their belts, from extract brewers to all-grain. That's what makes our club successful — no matter where you are in your homebrewing career, you are welcome. We are brewers helping brewers. Visit us on the Web at: http://www.brewbeer.org/.

homebrew systems that make you DROOL

Jason Meyer • Victoria, British Columbia

1

This brewery was designed to brew large batches in a 500-square-foot apartment. The system is electrically heated and uses the power supply normally attached to the kitchen stove. It produces 20 gallons of finished beer per brew. The kettle and hot liquor tank are each constructed from two Sanke kegs welded end-to-end. The roller mill is made from custom-machined rollers made from schedule 80 mild steel pipe, and is driven by an old clothes-dryer motor. A magnetically coupled centrifugal pump, helical wort chiller and oxygen injection take care of wort transfer and cooling-in.

2

The control panel has infinite heat switches from a kitchen stove to regulate current to the flash immersion heating elements in the kettle and hot liquor tanks. All of this plugs into the 210 volt outlet normally used for the kitchen stove.

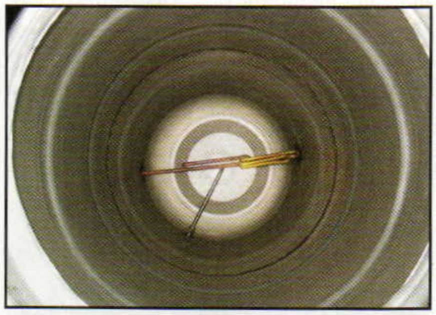
3

The fermentation tank is custom fabricated to fit inside a chest freezer, which is used to control fermentation temperature and "crash cool" post fermentation. A simple thermostat reads the temperature of the tank and cycles the freezer accordingly. This tank is large enough to accommodate the product of two brewing sessions, so generally two brews are used to fill the fermenter, producing a total of 40 gallons of finished beer per fermentation.

4

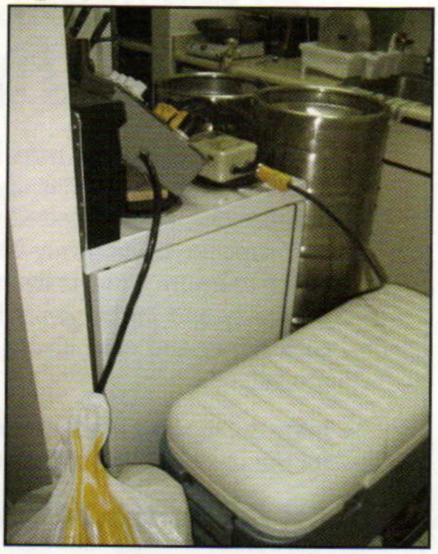
The mash tun is made from a 30 gallon cooler, with the tried-and-true copper manifold design for lautering.

5



This photo of the kettle clearly shows the installation of the two 2500 watt heating elements, as well as a perforated plate false bottom for hop and trub removal.

6



Here is the system at work in the tiny kitchen for which it was designed. It has moved to a more spacious home since then!

replicator

by **Marc Martin**

Dear Replicator,

It has been a little over a year since I graduated from college in Santa Fe, New Mexico. College was a time for enlightenment for me and it is where I had my craft beer "awakening." I studied a lot of things in college, but few as closely as beer. I now find that I can't satisfy my longing for the flavorful and artfully balanced beers of the Ska Brewing Company in Durango, Colorado. This brewery has very limited distribution and their beers were even sometimes hard to find in Santa Fe. Whenever I spotted their Pinstripe Red, I always grabbed some. I don't know when I will ever get back to the Southwest so the only way I will ever taste this beer again is to brew it myself. Please help me get a recipe so I can remember my roots.

Will Gallaspy
Valparaiso, Indiana

You would be hard-pressed to find a person more enthusiastic about their brewery's beers than Dave Thibodeau, one of the co-owners of Ska Brewing Company.

Dave, along with his partners Bill Graham and Matt Vincent began as homebrewers using a notebook of brewing instructions from Dave's father. They dreamed of one day having a real brewery and in 1995 that dream became a reality. Under pressure to name their brewery, they decided to use the name of the music they always listened to while brewing, ska. Even now ska, the precursor to reggae music, can still be heard regularly at the brewery.

Dave reports that Pinstripe Red is their first and oldest commercial beer. Its original name was to be Red Menace and it began as a mistake. They started to brew a blond ale but discovered they had the wrong grains on hand and this fine red ale was born. The locals liked their first effort and it has been offered ever since.

The brewmaster, Jeff Ogden, has been at Ska since 2001 and previously brewed at Coopersmith's in Fort Collins, Colorado and Bowman's Brewing in Laramie, Wyoming. He began as a professional baker and homebrewer and attended some Siebel courses. Jeff says that this beer isn't brewed to fit a particular style and is really closer to an ordinary bitter. In fact it won a gold medal in 2005 at the Colorado State Fair in that category. He describes it as a well-balanced, highly-drinkable beer with a dry finish, medium body and a slight nuttiness. Now Will, you can get busy and "brew your own".

Ska has just started to brew organic beers and also entered the canned market with their excellent ESB. It is also expanding with a brand new, $4 million facility near the current headquarters, which will increase their brewing capacity from 7,000 barrels to 20,000 within a few years. For further information about Ska Brewing Company and their fine beers visit the Web site www.skabrewing.com or call 970-247-5792.

Ska Brewing Co. Pinstripe Red Ale

(5 gallons/ 19 L, extract with grain)

OG = 1.049 FG = 1.009
IBU = 43 SRM = 11
ABV = 5.2 %

Ingredients

3.3 lbs. (1.5 kg) Muntons Light liquid unhopped malt extract
2.0 lbs. (0.9 kg) Muntons Light dried malt extract
12 oz. (.34 kg) Carapils® malt
8.0 oz. (0.23 kg) crystal malt (80 °L)
4.0 oz. (0.11 kg) wheat malt
2.0 oz. (57 g) crystal malt (120 °L)
½ tsp. Irish moss (15 mins)
6 AAU Liberty pellet hops (first wort hop) (1.5 oz./43 g of 4% alpha acid)
6 AAU Liberty pellet hops (60 mins) (1.5 oz./43 g of 4% alpha acid)
5.5 AAU Cascade pellet hops (0 mins) (1.0 oz./28 g of 5.5% alpha acid)
4.5 AAU Tettnanger pellet hops (0 mins) (1.0 oz./28 g of 4.5% alpha acid)
White Labs WLP 005 (British Ale) or Wyeast 1187 (Ringwood Ale) yeast
¾ cup (150 g) of corn sugar (for priming) (if bottling)

Step by Step

Steep the crushed grain in two gallons (7.6 L) of water at 155 °F (68 °C) for 30 minutes. Remove grains from the wort and rinse with two quarts (1.9 L) of hot water.

Add the liquid and dried malt extracts plus the first wort hops and bring to a boil. While boiling, add the remaining hops as per the hopping schedule. During the boil, use this time to thoroughly sanitize a fermenter. Add the yeast nutrient and Irish moss after 45 minutes of boiling.

Add the wort to two gallons (7.6 L) of cold water in the fermenter and top off with cold water up to five gallons (19 L).

Cool the wort to 75 °F (24 °C). Pitch your yeast and aerate the wort heavily. Allow the beer to cool to 68 °F (20 °C). Hold at that temperature until fermentation is complete.

Transfer to a carboy, avoiding any splashing to prevent aerating the beer. Let the beer condition for one week and then bottle or keg. Allow to carbonate and condition for two additional weeks and enjoy your Pinstripe Red Ale.

All-grain option:

This is a single step infusion mash. Replace the malt syrup and dry extract with nine pounds (4 kg) 2-row pale malt grain. The quantities of specialty grains are the same.

Mix the crushed grain with 3.5 gallons (13 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 six gallons (23 L) of wort runoff to boil for 60 minutes. Reduce the first wort and 60-minute hop amounts to 1.2 oz. (34 g) to allow for the higher utilization factor of a full wort boil. The remainder of this recipe is the same as the extract with grain recipe.

Crystal Malts

Versatile grains any brewer can use

by Betsy Parks

By now, you may have heard of crystal malts or used them in a recipe. At first, it's easy to simply add just what a recipe calls for. As you grow as a brewer, however, a basic understanding of crystal malts will expand your range of skills and knowledge and help you develop your own recipes.

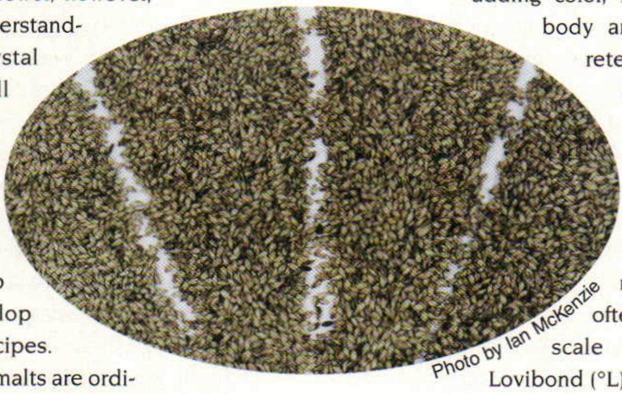


Photo by Ian McKenzie

Crystal malts are ordinary "wet" malted barley grains that are treated differently than those that undergo a normal kilning process. The grains are heated to mash temperatures in a system that prevents moisture from escaping before they are dried. This produces a mixture of fermentable and unfermentable sugars, much like mashing. The malts are then kiln dried, during which time these sugars react with proteins to create a variety of browning (Maillard) reaction products. The malt is cooled after roasting and the finished malt has a distinct crystal-like interior texture.

Because their internal sugars are already converted, crystal malts don't need to be mashed, making them useful for extract brewing, as well as partial mash and all-grain brewing.

Brewers use crystal malts for a range of purposes, most often to add sweet flavors, which is why they are often referred to as caramel malts. They are also used for adding color, mouthfeel or body and aid foam retention.

Crystal malts are roasted to impart different flavor characteristics, measured often by a color scale of degrees Lovibond (°L). The lightest in the color range is best known as dextrin malts or cara-pils, Carapils® and Carafoam®. This category is unique because the malts are used only for adding body, foam retention, mouthfeel and beer stability. They have little effect on color or flavor. Typically, dextrin malts fall somewhere between 5 and 15 °L and are best used in the range of 1 to 5% of the total grains in an all-grain recipe, known as the grain bill. Brewers look to these malts for light-colored beers with sweeter flavors like a pale ale, or recipes that need body like a light beer.

Most crystal malts are darker in color, usually between 10 and 140 °L, and do contribute flavor. Many of the varying names for crystal malts are included in this category such as honey malt, Caramunich®, caravienna or are described as pale, light, medium or dark. As the color increases, the flavor profiles change. Lighter colors impart sweet, caramel flavors, while mid-range levels start to taste like raisins or prunes. Very dark caramels taste roasty. Anything between 10 and 40 °L is suitable for lighter ales and lagers. At around 60 °L, caramels are better for ambers and brown ales. When the color gets above 80 °L, crystal malts are used in red and amber beers for color and flavor or in dark beers, such as stouts and porters, to give some mid-palate sweetness. In a 5-gallon (19-L) batch, caramel malts are often added to a total 5 to 15% of the grain bill.

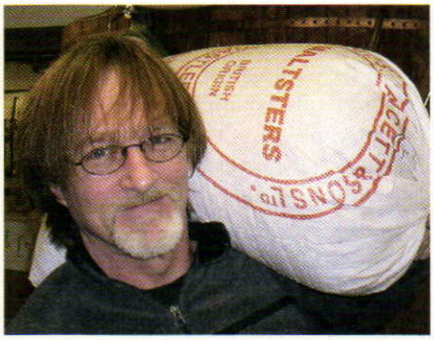
To utilize crystal malts, crush the the grains to expose the sugars to water. Ask your homebrew retailer to crush them for you or buy them pre-crushed. For all-grain brewing, you can crush them with the rest of the grains and brew as usual, making sure the smaller crystal grains and larger grains are equally crushed. For extract brewing, place the crushed grains in a nylon or muslin grain bag and add it to your brewing water at around 150 to 170 °F (65 to 77 °C). Use around a pound per bag for the best extraction. Steep for 15 to 30 minutes, or as directed, to dissolve as much available sugar as possible. You can also rinse the bag with 1 quart (1 L) of 170 °F (77 °C) water to extract any remaining sugars. Once the grain is removed, the wort is ready for the extract.

Body of Water

How chemistry impacts beer styles

by Betsy Parks

Like you, beer is composed of mostly water. So for the health (well, taste) of your brew, it is wise to get a grasp on how it can affect different styles. This issue, three professional brewers from around the U.S. offer their solutions for some common aqueous occurrences.



GREG NOONAN founded the renowned Vermont Pub & Brewery of Burlington, Vermont in 1988. He is the author of several brewing books, including "Brewing Lager Beer" (Brewers Publications, 1996).

Homebrewers who want to analyze their water and make measured treatments will find it isn't really much trouble at all.

The kits to test hardness and alkalinity are available from aquarium supply retailers and calculators and spreadsheets are available online that will do the math for you. If you like the beer you are brewing, don't worry about it. Add gypsum to styles that call for hard water, and adjust amounts by taste. If your water is alkaline, sometimes described as having "temporary hardness," add some lactic or phosphoric acid to brighten the beer's flavor and brew a clearer, cleaner-flavored brew.

Alkalinity should be the biggest concern for all brewers. High pH is the indicator, acid addition is the correction. For all-grain brewers, mash alkalinity is a problem if your mash pH is usually above 5.3. Alkalinity not only reduces sugar extraction and increases tannin leeching from the grains, but also negatively affects the flavor of your beer. If your mash pH is over 5.3 or your wort at the end of the boil is over pH 5.1, your beer will taste better with water adjustments.

Calcium and magnesium lower mash pH, and some alkalinity can be overcome by gypsum or calcium chloride additions. IPA is awful brewed with alkaline water, but a gypsum addition enhances the hop flavor and overcomes the alkaline harshness. It also reduces soapy flavors and gives a cleaner, more defined bitterness.

A little calcium chloride accentuates maltiness and reduces the perception of sweetness a bit. Scotch ales really benefit from some calcium chloride.

Web extra:

Check out Greg Noonan's water treatment calculator at: **byo.com/brewwater**

KEITH VILLA, master brewer at Blue Moon Brewing Company, has been a homebrewer since 1983 and holds a Ph.D in brewing from the University of Brussels. He fronts product development at Coors, where he's been a professional brewer for 21 years.

There are a few main water concerns for homebrewing. First, is the aroma or taste. The water should be cleaned up using a carbon filter and any other filtration that would be appropriate. Second is the hardness, which should be removed using a water softener. Third, is water chemistry. The chemistry should be adjusted to be as close as possible to the water from the city in which the desired style originated. For example, if a homebrewer chooses to brew a Dortmunder style of beer and has very soft water, then he or she would have to add the appropriate amount of table salt, gypsum, chalk and epsom salts to get the correct ion concentration. The water chemistry of the classic cities is available on the Internet or in back issues of most brewing journals.

If you are a beginning brewer, you probably don't need a water report. Just run it through a carbon filter, then through a softener if it is hard, and start brewing. If you are an advanced brewer then a water report is necessary so that you can see how the water will affect the brew. For example, water with a high sulfate content might be good for brewing a pale ale, but it would be bad for brewing a Pilsner.

I would, however, advise obtaining a copy of your municipal water analysis. These are usually free of charge and contain all the chemistry of the water. Water can then be adjusted to brew certain styles by adding the appropriate salts. If, for some reason, the water analysis shows that it is inappropriate for brewing a certain style of beer, purchase distilled water or spring water and use it for brewing after adjusting the salt ion content, if necessary.

Try to remember that one teaspoon of the following salts into 5 U.S. gallons (19 L) of water adds the corresponding parts per million (ppm) of ions: table salt (110 ppm Na^+ + 170 ppm Cl^-); gypsum (59 ppm Ca^{+2} + 142 ppm SO_4^-); chalk (39 ppm Ca^{+2} + 57 ppm CO_3^-); and epsom salts (25 ppm Mg^{+2} + 99 ppm $SO4^-$).

BUTTE CREEK BREWING CO.
Chico, California

KRAIG BRIDGEFORD is the Assistant Brewer at Butte Creek Brewing Company in Chico, California. Under the direction of Brewmaster Larry Berlin, Butte Creek brews award-winning organic beers like their 2006 GABF gold-medal Organic Pilsner.

I find it of the upmost importance to know what your water is made of in order to brew consistent, high-quality beer. If you want to brew true to style you need to know your water and the water source of the style you're brewing and adjust yours to match as closely as possible. If you check out famous styles and where they were created, you will find that the beer was successful because the mash pH was in the proper range due to the acidity of the malts used and the mineral content of the water. For example, Guinness is a success due to the high content of bicarbonate in the water and dark acidic malt.

Because Butte Creek is an organic brewery, our options for water changes are limited. We can use lactic acid, calcium chloride and calcium bicarbonate but they must be organic. The water in Chico is slightly alkaline because we have a high bicarbonate to calcium ratio. So for reasons such as mash and boil pH, yeast health and beer stability we want more calcium in our water.

We rely on annual reports from the water company and base our treatment on the yearly averages. We also check our pH frequently to maintain our target range.

For lightly-colored beers we need a combination of lactic acid and calcium chloride to get the pH in the 5.1 to 5.5 range. Because a light beer lacks acidic specialty malts, more acidity is needed to achieve the proper pH. If you use too much calcium chloride the beer will taste medicinal, so you can supplement it with lactic acid to get the pH down.

For beers that are in the 13 to 19 SRM range, we could get away with using nothing and rely on the specialty malts to achieve the proper pH, but because we have so little calcium in our water it is always good to bump it up to a more acceptable level.

When brewing dark beer that's naturally acidic, causing the beer to become sharp and astringent, we can use chalk, which is calcium carbonate. This helps bring the pH up to the proper range and supplies needed calcium. The problem with chalk is that calcium and bicarbonate fight against each other, with bicarbonate being stronger. It takes 3.5 parts of calcium to neutralize one part of bicarbonate.

Water treatment isn't 100% accurate; you have wiggle room but it's important to be in the proper parameters. Every source is different and water treatment has to account for that.

Abridged All-grain

How to achieve better head retention

by Ashton Lewis

Taking a breather?

In the March-April 2007 BYO, you described a mash technique while discussing the differences between commercial and homebrewers. You wrote of pub brewers who mash in and "take a short breather" and begin wort collection. I got the gist of it and tried it out on a recent batch. My short breather was 20 minutes before I did a recirculation and runoff. Yield was the same as when I previously rested my mash for 90 minutes. I definitely cut 70 minutes off my brew day just guessing at how to do this technique. Is it possible to get a full description as well as clarification of a "short breather"?

Bob Haisen,
Dearborn, Michigan

There are some brewing topics I address because I have been asked, and some subjects I opine about whether asked to or not. And there are some things I tend to avoid. Technique is heavily influenced by opinion and personal preference. Unless there is something really "wrong" with a particular technique, I tend to keep my mouth shut. Perhaps I have failed our readers by biting my tongue and I will attempt to redeem myself today!

There are some techniques that many all-grain homebrewers practice that are at best a waste of time, and at worst may have a detrimental affect on beer flavor. One is mashing time. It seems that almost all recipes call for an infusion mash time ranging from 60-90 minutes and recipes using multi-temperature mashes are usually a bit longer.

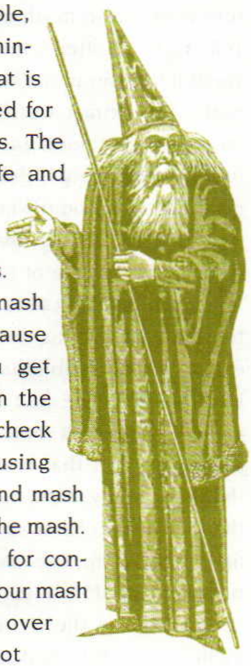
The truth is that malts these days are considerably different than malts from the past. Malt modification is usually very good, even with most European malt, and the enzymatic strength of certain barley malts (mainly 2-row varieties from North America) has increased over the past 30 years. This means that the goals of mashing can often times be accomplished in much shorter time periods when modern barley malts are used in brewing.

When I say "modern" I am referring to malts made from new barley varieties that have been bred to address the requirements of the modern brewer. I have pointed out numerous times that Klages barley is no longer grown, yet brewers still equate U.S. 2-row barley with Klages. I remember in the early 1990's going to annual barley crop reports given by Great Western Malting Company and hearing then how few acres were seeded with Klages. Things change with brewing raw materials and unless brewers remain up-to-date with current trends, brewing literature quickly becomes dated. Harrington, BA1202 and AC Metcalf are the varieties that really replaced Klages in the West.

Most brewers want to accomplish a few primary goals during mashing. The first is to convert starch into fermentable and unfermentable sugars that end up giving beer the potential for alcohol and some residual carbohydrate that lends body and character to beer. The second goal is to yield as much of this extract as possible. Undermodified malt contains intact cell wall constituents (beta glucans and proteins) that make this secondary goal more difficult and is the reason that more intensive mashing methods are used when brewing with undermodified malt. The third goal, which is really an extension of extract yield, is to make extract recovery easy.

When brewing with North American 2-row and 6-row barley malts the brewer can usually assume two truths. The first is that there are plenty of enzymes present in the malt to easily convert the starch in the malt plus additional starch from adjuncts (e.g., rice and corn). The second truth is that the malt is probably well modified. Assumptions are often times dangerous, but these two can usually be taken to the bank. The large brewers who buy and specify the majority of North American barley malt require high enzyme content and uniform modification and that's what their suppliers produce.

Assuming you are brewing with North American barley malt you have two basic options. You can choose to mash for 60–90 minutes because that's what 95% or more of most brewing recipes dictate. Or you can mash for a shorter time period, for example, between 20–45 minutes, because that is all that is required for many beer styles. The long mash is safe and you are assured to have no conversion problems. The shorter mash times may cause problems if you get too aggressive on the low end, do not check for conversion using the iodine test and mash off at the end of the mash. But if you check for conversion, reduce your mash time gradually over time and do not mash off, you can successfully shorten your mash times with no problems.

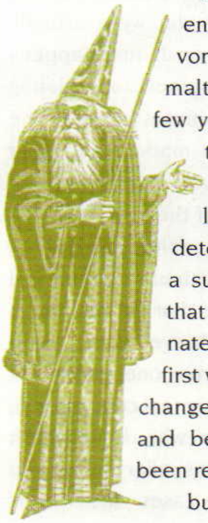


I'll pause here and put some practical thoughts into this based on what you did with your recent brew. You mashed for 20 minutes and then recirculated the wort to clarify it before collection. I'll assume this recirculation took 20 minutes. If you did not raise the mash temperature above about 158 °F (70 °C) you were actually mashing for 40 minutes. It just happens that you were mashing and recirculating during the same 20 minutes interval. The second comment you made about your experiment is that your yield did not change. Yield is one of the keys to mashing I list above and since the yield did not change from your 90 minute mashes you can logically conclude that 90 minutes is not required to achieve good yield (although the result from one trial is not enough data to draw any real conclusions).

Many pub brewers who do not mash off use a mash duration similar to what you used and in some cases the "short breather" is as short as ten minutes. Again, it is important to understand from a biochemical view that the enzymes active in the mash do not recognize stages of mashing like "mash rest," "recirculate" and "sparge." Enzymatic reaction rates are primarily affected by temperature, pH and substrate/enzyme concentration. As long as the conditions for enzymatic reactions allow enzyme activity the mash continues.

Even in mashes where the temperature is raised to mash off (usually around 168 °F/76 °C) after a relatively short conversion hold around 158 °F (70 °C) is complete, the extract yield is good and fermentable wort flows easily from the mash tun. In other words, the primary goals of mashing are accomplished.

I stated earlier that, at best, long mashing is a waste of time and, at worst, long mashing can cause problems. I want to elaborate on this and briefly give two examples of problems stemming from long mashes. The first is that if you are using enzyme-rich malt you may end up producing wort that is more fermentable than you really want, resulting in a beer that has a thin character. One way to brew light beer is to use an extended mash between 145–150 °F (63–65 °C). The best selling beer in the United States — Bud Light — uses this method and their mashes last over three hours. If you want really fermentable wort, this method accomplishes your goals, but if you don't want this type of wort, then the method is not a good fit for you and your beer. This is an extreme example, but illustrates how mashing time does far more than simply make for a negative iodine reaction.



Mash time also influences the amount of flavor extracted from the malt during mashing. A few years ago we reduced the mash time used for our helles-style lager and immediately detected the absence of a subtle grainy off-flavor that we wanted to eliminate from this brew. At first we suspected that the change in mash schedule and beer flavor may have been related through a fluke, but repetition validated the relationship. Five months later, we bagged a gold medal at the GABF in the European-style Pilsener category.

I'll quickly finish with two more opinions about technique without much elaboration. Opinion #1: Many brewers recirculate their wort after mashing for an arbitrary time period that at times unnecessarily adds time to the brew day. You want to get the weak wort (weak because of water usually used to cover the false bottom) from the bottom of the mash tun back to the top of the mash before collecting wort and to get the wort reasonably clear. If you can do this in five minutes instead of 20, more time is not required to accomplish this brewing objective.

Opinion #2: Many brewers collect their wort over a period of about 90 minutes because pundit-brewers state as fact that short wort collection times reduce yield. In contrasting fact, most commercial brewers try to collect their wort as quickly as possible because the lauter tun is the most expensive vessel in the brewhouse and is also the bottleneck to production speed. These brewers are keenly aware of extract yield and short wort collection time is usually limited by lauter tun design and not the ability to achieve good yields. When I was a brewing student at UC Davis, I brewed a lot of beer on a 5-gallon pilot brewhouse. Our wort collection times usually lasted between 30 and 45 minutes and yield was always quite good.

This answer was rather long, but it's possible the five to ten minutes it took to read may shave two hours from your all-grain brew day. Hopefully this was a good investment of time!

Keeping your head up

I've been trying to improve the head retention of my batches and have not had much luck. I recently brewed a dry stout with wheat malt and flaked oats, and I also increased the corn sugar amount for priming with visions of a thick, creamy, long-lasting head. But alas, it was not to be. When I pour the beer into my Murphy's Irish Stout pint glass, I initially get a nice head, but this disappears within 30 seconds. After a minute or so, the beer actually appears completely flat. Is yeast presence a major head retention inhibitor? Also, I read Chris Colby's piece "Balanced Recipe Formulation" (March-April 2007) where he states that adding wheat to a recipe in an effort to improve head retention should not be substituted for sound brewing practices. What exactly are those brewing practices and what are the things that would increase or decrease head retention?

Chris Adams
Miami, Florida

Good foam is something that many brewers like on their brews for aesthetic and mouthfeel reasons. Foam looks appetizing on top of a pint of brew and also adds texture to the beer when drinking. Some draught beers have really creamy foams created by using nitrogen to froth up the beer. We use nitrogen for certan styles at Springfield Brewing Company and I love the effect on some beers, but getting great foam on a nitrogen-dispensed beer is much easier than from a carbonated beer.

There are several things that can cause beer foam to be less than remarkable. Some of the real foam killers frequently seen in brewing are compounds that actively cause beer foam to collapse. Most of these substances have one thing in common and that is that they congregate on the surface of the beer and compete for space with beer foam at the gas-liquid interface.

Lipids (fats and oils) and surface-active cleaners/sanitizers are two types of substances that really do damage to foam. While lipids usually do not come from brewing ingredients, they are frequently found on beer glasses that have either been soiled by lipstick or dirty dishwater. This is really more common than most people think when drinking beer at a bar. You can also transfer grease to a beer glass when you are munching on oily snacks — for example, peanuts or potato chips — while sipping a beer.

Most soaps and sanitizers have surfactants to aid in their effectiveness and residuals of these compounds can cause foam problems. This is one reason that it is so important to rinse cleaners from brewing tools. If you use non-rinse sanitizers, it is very important to make sure that your sanitizer of choice does not damage beer foam. If you are not sure whether you're using a sanitizer that damages foam you can do an easy test. Rinse one glass with water and one glass with sanitizer. Allow both glasses to drain upside down for 15–30 seconds so the surface is not completely dry. Pour a half bottle of beer from the same bottle in a similar fashion into both glasses to ensure foam formation and watch. If the foam in the glass rinsed with sanitizer crumbles like the Berlin Wall you're using a wicked sanitizer!

The beer itself has intrinsic properties that dictate the ability for good foam formation. In my experience with foam, the most important foam positive constituents of beer are proteinaceous compounds from the malt. Although the use of under-modified malt in brewing comes with a whole set of issues and is really hard to find, the breakdown of barley proteins during germination is limited and there is a relatively large amount of foam-positive protein in the malt. In contrast, well- and over-modified malts are fairly common and protein degradation in these malts is more extensive during malting (protein degradation is one of the key parameters used to gauge modification).

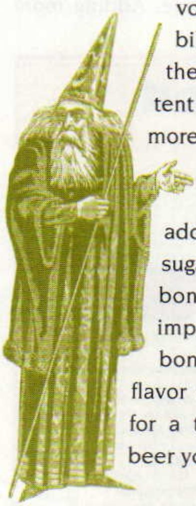
The bottom line is that malt modification affects foam and most of the pale malt on the market today is well-modified and has less foam positive proteinaceous goodies than lesser modified malt. Some brewers have strong feelings about the importance of proteolytic activity during mashing; there are those who know it happens and how it affects beer and those who know that it really doesn't happen and see it as a waste of time. Believers in proteolytic activity during mashing caution against a long rest around 122 °F (50 °C) because it can reduce the foam quality of the resulting beer.

Adding some wheat malt to a brew can make up for the deficit in foam-positive proteins from barley malt because wheat malt contains much more foam positive compounds compared to barley malt. Although many recipes call for a small amount of wheat malt (about 5%) intended to improve foam, I have never found that this small amount does much for the beer. Our best seller is an unfiltered American-style wheat beer made using about 50% wheat malt and about 7% raw wheat. This beer has a very different foam appearance and stability compared to our all-barley malt beers.

Our unfiltered wheat also contains yeast and I have never noticed much of a change in foam stability over time after bottling. Yeast can cause problems with beer foam over long storage periods because when yeast die and autolyze, enzymes spill into the beer. Proteolytic enzymes are included in this spilling and degrade foaming proteins in the beer. As you mention in your question, Belgian beers are known for really nice foam, and they are normally bottled conditioned. I do not think your foam problems come from yeast in the bottle.

In addition to protein, hops are also considered foam positive because beers brewed with almost no hops have poorer foam stability compared to beers brewed with perceptible bitterness. This is more of a laboratory-type observation and most beers have enough hops to benefit from their foam positive nature. Adding more hops to improve foam affects flavor and while it is true that really hoppy beers often have good foam I cannot recommend using hops as a foam enhancer and a solution to bad foam in general.

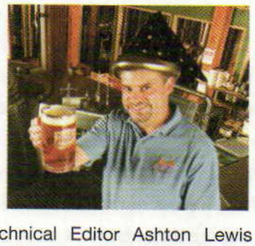
The gas content of beer, normally carbon dioxide, clearly influences foam because there would be no foam without gas evolution upon dispense. Carbon dioxide content primarily influences foam volume and not foam stability. So if you increase the carbon dioxide content of beer, you may have more foam initially but the rate of collapse will not be affected. Like adding more hops I don't suggest adjusting your carbonation rate based on improving foam; the carbonation content affects flavor and you should shoot for a target in-line with the beer you are brewing.



Some beer glasses contain little etched spots in the bottom that act as nucleation sites for bubbles to form. This causes the continual formation of foam while the beer sits in the glass and new foam formed replaces foam that has collapsed. Some people add a few pieces of coarse salt to the beer and these little chunks of salt do the same thing as the special etched spots. Samuel Adams (Boston Beer Company) recently came out with a special glass they developed to enhance the presentation of their beers and one of the design features is a little etched spot in the bottom.

There are some ingredients used in certain brews that are believed to either be outright foam negative or at least have the potential to be foam negative. One common theme of such ingredients is the presence of lipids and examples include flaked oats, chocolate, coffee, vanilla, nuts and other nutty brewing ingredients. Although these ingredients contain more oil than malted barley (sometimes considerably), they do not necessarily cause foam problems. They can, however, and brewers need to look out for problems when using such ingredients. Your stout contains flaked oats and many brewers believe that oats cause foam problems.

I think what Chris Colby meant when he stated that adding a bit of wheat malt should not be a substitute for sound brewing practice is that there is not a silver bullet to brewing beer with good foam. All the factors that affect foam must be considered to appease the foam gods.



BYO Technical Editor Ashton Lewis has been answering homebrew questions as his alter ego Mr. Wizard for the last 12 years. Do you have a question for him? Send inquiries to *Brew Your Own*, 5053 Main Street, Suite A, Manchester Center, VT 05255 or send your e-mail to wiz@byo.com. If you submit your question by e-mail, please include your full name and hometown. In every issue, the Wizard will select a few questions for publication. Unfortunately, he can't respond personally. Sorry!

Foreign Extra Stout

Big, rich and curiously refreshing

by Jamil Zainasheff

It was at least 90 °F (32 °C) and 90% humidity as I neared the end of my walk from one hot, dusty end of Barbados to the other. Thankfully, I spotted a roadside stand and even from a considerable distance, I could tell the bottles lining the bar were not the pale lagers common to most Caribbean islands. As I got closer to the ramshackle stand, I could see that these were bottles of Guinness Foreign Extra Stout. I was still fairly new to the world of craft brew, but I had read about this style in one of Michael Jackson's books. I knew that it was a unique beer brewed for tropical markets but I had never tried it. I thought it was quite odd that they'd sell a big, rich, roasty beer (something I'd drink on a frosty night at home) in a place that required wearing shorts year-round.

photo by Jim Witmer

But hey, I was a budding beer geek and I wanted one, even if it was served a little warm. As I sat on the rickety barstool under the rusty tin roof sipping my beer, I began to appreciate the genius behind this style of beer in a hot climate. The beer wasn't freezing cold and it wasn't crisp and light. To this day I'm not 100% sure if it was the dryness of the roasted malt, the dilating effect of the alcohol on my blood vessels, or some other beery magic that occurs when you're hot, tired and thirsty, but I can vouch for the fact that the beer was indeed refreshing.

Too many stouts?

There are six different stout styles defined in the Beer Judge Certification Program Style Guidelines (www.bjcp.org/stylecenter.html) and a common question is what exactly distinguishes one style of stout from another? How do I know if the recipe I created will make a mediocre sweet stout or an excellent foreign extra stout?

Many people think all stouts are the same. While the different sub-styles share many key attributes, there is still plenty to differentiate them. For example, all stouts are very dark beers and they all have roasted grain notes. They all have alcohol, fruity esters, hop bitterness, hop character and residual sweetness too, but it is the prominence or subtlety of these attributes that differentiate one style from another.

Foreign extra stout has a moderate to high roasted grain flavor and aroma, reminiscent of coffee and chocolate. It can have some light burnt notes, but it will not have as dry and sharp of a roast character as a dry stout. Foreign extra stout is also a much bigger beer than dry stout. It is usually bigger than oatmeal stout and sweet stout too. It can be big enough to have a

EXTRA STOUT by the numbers

OG =	1.056–1.075 (13.8–18.2 °P)
FG =	1.010–1.018 (2.6–4.6 °P)
SRM =	30–40+ (59–79+ EBC)
IBU =	30–70
ABV =	5.5–8.0% (4.3–6.3% ABW)

RECIPE

Moonless Tropical Night

(5 gallons/19 L, all-grain)

OG = 1.071 (17.4 °P)
FG = 1.017 (4.4 °P)
IBU = 45 SRM = 46 ABV = 7.1%

Ingredients

12.5 lb. (5.67 kg) British pale ale malt (3 °L)
0.75 lb. (340 g) black roasted barley (500 °L)
10 oz. (284 g) crystal malt (4°L)
10 oz. (284 g) crystal malt (80 °L)
0.5 lb. (227 g) chocolate malt (420 °L)
12 AAU Kent Goldings hops (60 min.) (2.4 oz/68 g at 5% alpha acids)
Wyeast 1028 (London Ale), White Labs WLP013 (London Ale) or Danstar Nottingham yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts (6 L) of water to 1 pound (0.5 kg) of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until the conversion is complete, about 60 minutes.

Raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (25 L) and the gravity is 1.055 (13.5°P).

The total wort boil time is 90 minutes. Add the hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil. Chill the wort rapidly to 67

recipe continued from page 19

°F (19 °C), let the break material settle, rack to the fermenter and aerate thoroughly.

Pitch 12 grams (0.4 oz.) of properly rehydrated dry yeast or use two liquid yeast packages. Alternatively, make a three-liter (3-qt.) starter using one package of liquid yeast. Ferment at 67 °F (19 °C), raising the temperature to 70 °F (21 °C) during the last ⅓ of fermentation to help reduce diacetyl and assure complete attenuation. Allow the lees to settle and the brew to mature without pressure for another two days after fermentation appears finished.

Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of two to two and a half volumes.

Moonless Tropical Night

(5 gallons/19 L, extract with grains)

OG = 1.071 (17.4 °P)
FG = 1.017 (4.4 °P)
IBU = 45 SRM = 46 ABV = 7.1%

Ingredients

8.4 lb. (3.8 kg) English Pale Ale liquid malt extract (3.5 °L)
0.75 lb. (340 g) black roasted barley (500 °L)
10 oz. (284 g) crystal malt (40 °L)
10 oz. (284 g) crystal malt (80 °L)
0.5 lb. (227 g) chocolate malt (420 °L)
12 AAU Kent Goldings hops (60 min.) (2.4 oz/68 g at 5% alpha acids)
White Labs WLP013 (London Ale), Wyeast 1028 (London Ale) or Danstar Nottingham

Step by Step

Mill or coarsely crack the specialty malts. Mix them well and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about two gallons (~8 liters) of water at roughly 170 °F (77 °C) for about 30 minutes.

Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the steeping bags.

Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 L) and a gravity of 1.061 (14.9 °P). Stir thoroughly to help dissolve the extract and bring the liquid to a boil.

Once the wort is boiling, add the bittering hops. The total wort boil time is one hour after adding the bittering hops. Add Irish moss or other kettle finings at 15 minutes.

Chill the wort to 67 °F (19 °C). Aerate thoroughly and pitch 12 grams of properly rehydrated dry yeast or use two liquid yeast packages. Alternatively, make a three-liter (3-qt.) starter using one package of liquid yeast.

Follow fermentation and packaging instructions for the all-grain version.

Photo by Charles A. Parker/Images Plus

gentle warming from the alcohol, but keep in mind that this should not be as big as Russian imperial stout and the alcohol should still be subtle. Foreign extra stout has very little to no hop flavor or aroma, while Russian imperial stout and American-style stout both tend to have a noticeable late hop character.

Even within the foreign extra stout style, there are two common variants. The style ranges from a medium-bodied, drier, less estery, more roasty, more bitter export type to a full-bodied, sweeter, fruitier tropical type with a smoother roast character. While the tropical type can have a high level of fruit esters, the export type tends to be more restrained, with some examples quite clean. In the end, the foreign extra stout style is very similar to either a scaled-up dry stout (export type) or a scaled up sweet stout (tropical type).

In competitions, I think many beer judges tend to favor the sweeter, fuller tropical style. The presence of higher alcohols, a little sweetness, dark malts and some esters from fermentation lend dried fruit or dark fruit notes to these beers and that bit of character helps it stand out a little. Of course, this can be overdone and in a flight of estery beers with lots of alcohol, the cleaner, less aggressive beer can stand out too, so don't over do it.

That stouty goodness

I prefer to use British pale ale malt as the base for foreign extra stout. This more highly-kilned malt adds a background biscuity-malty note that fills out the malt profile of the beer. While you can substitute domestic two-row malt, it has a lighter character better suited to American stout. If you must use domestic two-row, you might want to add a touch (5% or less) of specialty grains, such as biscuit or Victory malt to create a slightly more interesting malt profile. Extract brewers should also try to use a British pale ale-based extract.

The roast, chocolate and coffee character of the style comes from the use of highly-kilned grain. While it has been said that the flavor difference between black malt and roasted barley is small, my preference and the general opinion has always been that brewing stout requires unmalted, roasted barley. About 10% of the grist should be highly-kilned grains. A 50/50 mix of highly-kilned and lighter kilned grain, like roast barley and chocolate malt, strikes a nice balance of sharper roasted notes and less burnt coffee/chocolate notes. Playing with the ratio of lighter and darker grains is a nice way to add a subtle difference to your beer.

When making tropical-type stout, a fair portion of crystal malt (up to 10% of the grist) adds the required background sweetness. Just like the highly kilned grain, I like to split my crystal malt between darker and lighter varieties. A darker crystal malt (~80 °L) provides a slight raisin/fig note. A mid-color crystal malt (~40 °L) gives the beer a bit of caramel flavor and some residual sweetness. If you're trying to make more of an export type, you'll want less crystal malt for a drier finish. For export-type stout, keeping the crystal malt to a maximum of 5% of the grist will help. Eliminating the mid-color crystal malt altogether and going just with a darker crystal malt also tends to leave less of a perception of sweetness in the finished beer.

A number of traditional commercial examples include some simple sugar, which boosts the alcohol without increasing the body or malt character. Sugar isn't really needed, unless you're having trouble reaching a proper level of attenuation with the yeast that you are using. In which case, replacing a small portion of the base malt with sugar can help the beer finish a bit drier. Since this is a beer that can carry a touch of residual sweetness, I think it's rarely necessary to use sugar in this style.

Measured hop bitterness is substantial in foreign extra stout, with the perceived level of bitterness often higher in the export type than the tropical type. While the measured IBU level can be higher in the export type as well, the difference in perceived bitterness between the two types is often due to the higher residual sweetness in tropical-type stouts.

The bitterness to starting gravity (IBU divided by OG) ratio for this style can range from a modest 0.5 to a bold 1.0. For the sweeter tropical type 0.6 to 0.7 is a good range and you can increase that if using a lower attenuating yeast or making an export-type stout. Be aware that highly bitter or hoppy versions are going to be more like American-style stouts than good foreign extra stouts.

There isn't a lot of hop flavor in foreign extra stout and hop aroma is often non-existent or very low. In the drier export type, a little hop flavor can peek through, but it is still restrained and tends to come from fairly mellow hop varieties, such as Kent Goldings. Even though there can be some hop flavor in this style, there is no need to add late hop additions. Much of the hop flavor comes from using lower alpha hops to create a high level of bitterness. Using a large amount of low alpha acid hops for bittering can add a subtle hop flavor to the beer. Keep in mind when developing any beer recipe that the flavor of the hops used for bittering often comes through in the flavor of the beer, so choose style-appropriate hop strains for bittering additions.

Much of the character of this beer comes from the yeast. In the Caribbean, where lager breweries reign, most examples of this style are brewed with lager yeast at warm temperatures. If you're looking to clone a particular beer you enjoyed while in the Caribbean, lager yeast will be the key. A good Pilsner yeast at a temperature around 60 to 65 °F (16 to 18 °C) should get you close. While lager yeast is common in tropical-type stout, I prefer an English or Irish yeast strain when brewing the sweeter, fruitier tropical version of this style. These yeasts tend to be moderate to low attenuating, leaving a little more residual sugar and an ester profile that I prefer over the warm-fermented lager yeast. Wyeast 1028 (London Ale), White Labs WLP013 (London Ale), Wyeast 1084 (Irish Ale), White Labs WLP004 (Irish Ale) or Danstar Nottingham dry yeast are all good choices for this style. If you want a sweeter finish, use Wyeast 1968 (London ESB Ale), White Labs WLP002 (English Ale) or Fermentis Safale S-04, but these less attenuating strains can be a little too sweet for export-type stouts.

I prefer to use a cleaner and more attenuating yeast for the export version. Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis Safale US-05 will make a drier, cleaner version. In fact, it can be a bit too clean if fermented on the cool side (67 °F/19 °C or lower). If you're going to use a neutral yeast like this, ferment at a slightly warmer temperature range, around 69 °F (21 °C). Since this yeast will attenuate a bit more, the beer is going to seem slightly roastier too. If you want an even drier export version, you'll need to either replace some base malt with simple sugar (adding 10% table sugar is fine) or find another yeast that can finish even drier.

This beer style should not have much diacetyl. If you're using a yeast prone to diacetyl production, you might need to perform a diacetyl rest near the last part of fermentation. To perform a diacetyl rest, warm your beer up a few degrees over the fermentation temperature for the last one-third of fermentation.

If you can't control the temperature for a diacetyl rest, don't worry and don't be in a rush to package the beer. Keep the beer at fermentation temperature until it appears that fermentation is complete and then let it rest for a few additional days. If given enough time, healthy yeast will usually reduce the diacetyl in a beer to very low levels.

Most water in the United States is fairly hard, with enough buffering capacity to brew good stout. If you happen to have water very low in buffering capacity and you are an all-grain brewer, you might need to add calcium carbonate or other brewing salts to the mash to help buffer the acidity of the roasted grains.

Whether you choose to brew an export or tropical-type stout, I recommend drinking one when you're extra hot and tired. I'm sure you'll find it just as refreshing as I did.

Jamil Zainasheff discusses brewing tips and brewing beer styles as the host of the popular Jamil Show on The Brewing Network, www.thebrewingnetwork.com/jamil.php and writes "Style Profile" in every issue of Brew Your Own.

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BROWN ale

by **Terry Foster**

Photo by Charles A. Parker/Images Plus

Brown ale is not easy to define in terms of its being a style. It was for centuries the most common form of beer, in Europe as well as Britain, since until fairly late in the 18th Century it was difficult and expensive to make pale malt. As a result, virtually all beers were brown, no matter how they were hopped or how strong they were. Other beers became distinct styles — such as pale ales, porter (itself really a brown ale) and mild ale — but nothing emerged that was specifically called brown ale until the very early 20th Century, when Mann's introduced its now-famous low-gravity beer of that name. This was followed some 25 years later when Newcastle Brown Ale came on the market, at a significantly higher original gravity.

Other brewers tried to get into the market by bottling their mild ale under the name brown ale, making mild itself a brown ale, in retrospect. Yet others produced brown ales over quite a range of gravities, before the style went into almost terminal decline, as did mild in Britain. Then, of course, at the end of the 20th Century, American micros got into the act and re-invented brown ale. American browns were generally bigger and hoppier than any of the extant British versions. So now we have not one but three types listed by Beer Judge Certification Program (BJCP), namely, Southern English, Northern English and American Brown Ale!

In this article, I will discuss the two English examples. (For more information on mild ale, see my article in the September 2005 issue.)

(Story continued on page 28)

BROWN ALE RECIPES

Southern Brown Ale — A Man's Beer

(5 gallons/19 L, all-grain)

OG = 1.033 FG = 1.011
IBU = 22 SRM = 33 ABV = 2.8%

Ingredients

5.5 lb. (2.5 kg) mild ale malt
12 oz. (0.34 kg) wheat malt
10 oz. (0.28 kg) crystal malt (120 °L)
2.0 oz. (57 g) roast barley
6 AAU Fuggles hops (90 mins)
(1.5 oz./42 g at 4.0% alpha acids)
Wyeast 1028 (London Ale) yeast
½ cup dried malt extract (for priming)

Step by Step

Use a single-step infusion mash at (around 154–155 °F/67.8–68.3 °C) for 1–1.5 hours. Sparge one hour, with water no hotter than 175 °F (80 °C), until run-off reaches SG 1.010–1.012. Boil 90 minutes, with bittering hops added at the start. Strain, or siphon off from the hops, and adjust wort volume with cold water, and cool to about 70 °F (21 °C). Pitch with yeast starter, and allow to ferment. By 5–7 days, final gravity should have been reached; rack into a glass fermenter. One week later, rack again, prime with DME, and rack into keg or bottles.

Southern Brown Ale — The Little Londoner

(5 gallons/19 L, extract w/ grains)

OG = 1.034 FG = 1.011–1.012
IBU = 24 SRM = 33 ABV = 2.8%

Ingredients

4 lb. 4 oz (1.9 kg) light liquid malt extract
(such as Muntons or John Bull)
8.0 oz (0.23 kg) crystal malt (120 °L)
2.0 oz (57 g) roast barley
6.3 AAU Kent Goldings hops (90 mins)
(1.4oz/40g at 4.5% alpha acids)
White Labs WLP 013 (London Ale) yeast
½ cup dried malt extract (for priming)

Step by Step

Add crystal malt and roast barley to 1 gallon (3.8 L) water, bring to about 150–160 °F (66–71°C), hold for ½ hour and strain off grains. Add water to about 3 gallons (11 L), and bring to a boil. Turn off heat and add malt extract, stirring well to ensure the extracts dissolve properly. Bring to a boil, add the bittering hops, and boil one hour. Strain, or siphon off from the hops, and add cold water sufficient to obtain the starting gravity. Cool to around 70 °F (21 °C), pitch with yeast starter, and allow to ferment. By 5–7 days, final gravity should have been reached; rack into a glass fermenter. One week later, rack again, prime with DME or corn sugar.

Heavy Hand Hank

(5 gallons/19 L, all-grain)

OG = 1.041 FG = 1.017
IBU = 23 SRM = 61 ABV = 3.1%

Ingredients

3.6 lb. (1.6 kg) Maris Otter pale malt
3.6 lb. (1.6 kg) brown malt
4.0 oz (0.114 kg) flaked oats
13 oz (0.37 kg) Belgian Biscuit
7.0 oz (0.2 kg) crystal malt (120 °L)
6 AAU Fuggles hops (90 mins)
(1.5 oz/42g at 4.0% alpha acids)
2 AAU Fuggles hops (15 mins)
(1.0 oz/28 g at 4.0% alpha acids)
2 AAU Fuggles hops (0 mins)
(1.0 oz/28 g at 4.0% alpha acids)
Wyeast 1028 (London Ale) yeast
½ cup dried malt extract (for priming)

Step by Step

Use a single-step infusion mash at (around 154–156 °F/68–69 °C) for 1–1.5 hours. Sparge one hour, with water no hotter than 175 °F (80 °C), until run-off reaches SG 1.010–1.012. Boil 90 minutes, with bittering hops added at the start, and remaining hops as per above schedule. Strain, or siphon off from the hops, and adjust wort volume with cold water, and cool to about 70 °F (21 °C). Pitch with yeast starter, and allow to ferment. By 5-7 days, final gravity should have been reached; rack into a glass fermenter. One week later, rack again, prime with DME, and rack into keg or bottles.

Northern Brown Ale — Crossing The Tees

(5 gallons/19 L, extract w/ grains)

OG = 1.047 FG = 1.012
IBU = 28 SRM = 27 ABV = 4.5%

Ingredients

6.0 lb. (2.7 kg) light liquid malt extract
(such as Muntons or John Bull)
10 oz. (0.28 kg) crystal malt (120 °L)
7.5 AAU Willamette hops (90 mins)
(1.5oz/42g at 5.0% alpha acids)
Wyeast 1084 (Irish Ale) yeast
½ cup dried malt extract (for priming)

Step by Step

Add crystal malt to 1.0 gallon (3.8 L) water, bring to about 150–160 °F (66–71°C), hold for ½ hour and strain off grains. Add water to about 3.0 gallons (11 L), and bring to a boil. Turn off heat and add malt extract, stirring well to ensure the extracts dissolve properly. Bring to a boil, add the bittering hops, and boil one hour. Strain, or siphon off from the hops, and add cold water sufficient to obtain the starting gravity. Cool to around 70 °F (21 °C), pitch with yeast starter, and allow to ferment. If possible, keep temperature at, or even slightly above 70 °F (21 °C). By 5–7 days, final gravity should have been reached; rack into a glass fermenter. One week later, rack again, prime with DME or corn sugar, and rack into keg or bottles.

Northern Brown Ale — Geordie Surprise

(5 gallons/19 L, all-grain)

OG = 1.050 FG = 1.013
IBU = 32 SRM = 24 ABV = 4.8%

Ingredients

9.7 lb. (4.4 kg) Maris Otter pale malt
12 oz. (0.34 kg) crystal malt (120 °L)
8.4 AAU Target hops (90 mins)
(0.8 oz/23 g at 10.5% alpha acids)
White Labs WLP023 (Burton Ale) yeast
½ cup dried malt extract (for priming)

Step by Step

Use a single-step infusion mash at (around 150–152 °F/66–67 °C) for 1–1.5 hours. Boil 90 minutes, with bittering hops added at the start. Cool to about 70 °F (21 °C), pitch with yeast starter, and allow to ferment. If possible, keep temperature at, or even slightly above 70 °F (21 °C). By 5–7 days, final gravity should have been reached; rack into a glass fermenter. One week later, rack again, prime with DME, and rack into keg or bottles.

BROWN ALE by the numbers:

Southern Brown Ale
OG: 1.030–1.040 FG: 1.012–1.015
IBU: 15–24 SRM: 17–34 ABV: 2.7–3.2%

Northern Brown Ale
OG: 1.045–1.054 FG: 1.011–1.014
IBU: 25–35 SRM: 14–25 ABV: 4.4–5.2%

Style Notes

I have given a range of parameters for Southern brown ale, but there is really only one commercial example of any note and that is Mann's Brown Ale. This comes in at 2.8% ABV, around 1.033 OG. It was brewed in East London, by Mann Crossman Paulin (a company with a Putney brewery just 20 yards from where my father was born, which may have something to do with my lifelong interest in beer and brewing!). The company was taken over by Watney's in 1958, forming the giant Watney Mann Company. The East London Brewery was soon closed and Mann's Brown Ale was brewed at various sites around the country. It ended up in the hands of Refresh UK and is currently brewed at Burtonwood in Cheshire, ironically in the Northwest of England.

Mann's Brown Ale is a dark-brown, predominantly sweet, bottled beer; it was created as such and was never simply a bottling of draught mild ale. When it was first produced, it was advertised as "the sweetest beer in London." With the rise in popularity of dry, hoppy, pale ales, it is hardly surprising that such a sweet beer should have only a niche market today. But, there is more to it than just sweetness, for with its relatively full palate and a hint of roast malt, it is still quite complex for a low-gravity session beer.

There are several extant examples of Northern brown ale, such as Samuel Smith's Nut Brown Ale, and, of course, Newcastle Brown Ale. The latter was first brewed in 1927, and is undoubtedly the leader in this field today. Northern Brown Ales are quite different from the Southern version, being stronger, paler, drier, and with a definite (though not marked) hop bitterness. Newcastle Brown is sold in bottle and also on draught, though not in a cask-conditioned form.

The beer had the distinction of obtaining a Protected Geographical

Indication from The European Union in 2000, meaning that it could only be produced in Newcastle, and not otherwise imitated. Unfortunately, the brewers, Scottish and Newcastle — the only remaining British-owned major brewery in Britain! — have now relinquished this distinction, having closed the Tyne brewery in Newcastle in favor of another brewery some distance outside of the city. Another interesting fact is that the man who developed Newcastle Brown, actually started work at the Tyne Brewery because it was run by no less than Thomas Watson Lovibond, inventor of the eponymous color scale!

Southern Brown Malts

The base malt for a Southern brown ale can be English pale, or US 2-row, although English mild ale malt is preferable. The original, Mann's Brown Ale, also used a small proportion of wheat (10% of the total grist) and, more importantly, roasted barley for flavor and color. For extract brewers, ignore the wheat, go with a pale extract and steep some roast barley if you want to get close to Mann's version. I would also suggest that both extract and all-grain brewers should use a high color crystal malt (120 °L), at the rate of up to 1.0 lb. (0.45 kg) per 5-gallon (19-L) brew. This will add some needed sweetness to the beer, as well as color.

In the New Haven, Connecticut brewpub, BruRm @Bar, we recently brewed a version of Southern brown ale, in which we departed from these basic rules, although our aim was to produce a beer which met the style in terms of flavor. This used a grist made up of equal amounts of pale and brown malts, along with 3% oats, 9% Belgian biscuit and 5% dark crystal malt (120 °L). The use of brown malt takes this beer back closer to the roots of brown ale, and adds its own unique flavor, while the other malts and the oats add complexity and contribute to sweetness. This beer, called Heavy Hand Hank, weighed in at an original gravity of 1.041 (10.2 °P), but finished at 1.017 (4.3 °P), making it around 3.1 % ABV. (See the recipe on page 27.)

You need to mash at relatively high infusion mash temperatures (around 154–155 °F/67.8–68.3 °C) to ensure the required residual sweetness. This is particularly essential if you want to go the authentic route and roast barley is your only roasted malt. Extract brewers might want to add some maltodextrin, depending upon what final gravity your sample of extract will give.

Northern Brown Ale Malts

English Pale malt, or US 2-row pale, serve as the main source of fermentables, but again, a mild malt is preferable. Newcastle Brown is paler and drier than the Southern version, and uses only crystal malt with the pale malt base. With most of the color coming from the crystal, it should be dark, 80 °L, or preferably 120 °L, at ½ to 1.0 lb. (0.23–0.45 kg) per 5 gallons (19 L). Mashing is typically carried out at 150–152 °F (65.6–66.7 °C). If you want to move to a darker, slightly more complex version of brown ale, you can also add a little roasted barley (up to 4 oz./113 g in 5 gallons/19 L), as does Samuel Smith's in their Nut Brown Ale. A good variation in my book is to use an equal amount of chocolate malt in place of the roast barley.

Extract brewers will find the best approach is to use a light extract, along with some steeped dark crystal malt. Again, if you want to move away from the (relatively) paler color of Newcastle Brown, try a brown ale extract (though there are only a couple on the market). Perhaps better, though, is to go with the amber extract, and as for the all-grain brew, steep up to 4 oz. (113 g) roast barley or chocolate malt along with the crystal malt.

Hops

Commercial examples of these beers have only low levels of bitterness and virtually no hop character or aroma. The classic English Fuggles (my favorite) and Goldings are just right for these beers, though Target, Willamette, Liberty and Northern Brewer all give good results. If you are just going for bitterness, then add all the hops at the start of the boil. However, it is very easy for these beers to appear one-dimensional, and I consider that they benefit from a little more bitterness than the originals, and also from having some noticeable hop character. For the latter, just add 0.5–1.0 oz. (14–28 g) of the above varieties per 5 gallons (19 L) of wort at the end of the boil.

Water

Southern brown ale is really a London beer and so was traditionally made from relatively calcium-poor water, with significant carbonate content. Therefore, you might add up to 1 tsp. per 5 gallons (19 L) of calcium carbonate to your mash if you have very soft water.

Northern Brown Ale, in contrast, is generally brewed with moderately hard water, low in carbonates.

As usual, for extract beers, there is no need to treat the water, as this has been done by the extract manufacturer.

Brown Ale Yeast

The standard English Ale yeasts will all work reasonably well for the Southern brown style, but there are a couple of things to look out for. The sweetness comes from using a relatively high mash temperature (plus the fact that low-enzyme English malts are used), but the brewers "hold" this sweetness by pasteurizing the beer in the bottle. You cannot, of course, do this at home, and you should therefore look for a highly flocculant yeast that produces a low level of apparent attenuation.

Wyeast 1028 (London Ale) fits this bill nicely and White Labs WLP013 (London Ale) would be good, too. It would be best to go for a relatively low fermentation temperature — say around 65 °F (18 °C), and dropping it down to 50 °F (10 °C) once the primary fermentation is finished — if you have the ability to do so.

Northern brown ale is of a higher gravity than its Southern cousin, and is not meant to be as sweet. However, there is another consideration; Newcastle Brown, and a rival Double Maxim (also from the Northeast of England), both have a definite fruity character, from esters produced during fermentation. White Labs WLP023 (Burton Ale) yeast will do this admirably, as will Wyeast 1084 (Irish Ale). In this case, ferment at around 70 °F (21 °C), so as to encourage ester formation. Note that, according to Michael Jackson, Newcastle Brown is actually a blend of two different beers, one weaker and one higher in gravity than that of the finished product. This permits the brewers to achieve a higher level of esters than if the beer were brewed at working gravity.

Conclusion

It could be argued that both types of Brown Ale are quite modest, gentle beers, not particularly noted for either big flavors, or for complexity. That is not necessarily a disadvantage, for these are meant to be session beers (especially the Southern version).

Besides, I have tried to show you how you can give this style a little extra interest, without reducing drinkability. I can tell you we had no problem in selling Heavy Hand Hank to the sophisticated Yale crowd!

Don't forget, before we had all the plethora of styles available today, we had only Brown Ale. In that sense Brown Ale is the Mother and Father of them all. So get started on your's today!

Terry Foster is a frequent contributor to Brew Your Own *magazine.*

10 GABF CLONES

by Glenn BurnSilver

"The beer landscape in the United States was, well, let's say it was an empty landscape," Charlie Papazian says with a slight laugh, referring to the microbrew prospects in the U.S. in the early 1980s when the annual Great American Beer Festival (GABF) was first envisioned. "It was by and large an empty landscape as far as flavor, diversity and having choices."

When the first GABF was held, in 1982, only 20 breweries attended — and only three of those were micro-breweries. In fact, there were only 44 breweries operating nationally. "We were just doing good with getting some porters and stouts and a stray India pale ale," Papazian continues.

Twenty-five years on, the beer climate in the United States has warmed significantly. In 2006, 385 breweries attended the GABF, offering more than 1,600 beers for tasting. For American breweries, winning a gold at the GABF is about as good as it gets. Brewmasters work hard to create a beer that is not only balanced and flavorful, but something that also stands out in a crowded field.

In 2006, judging took place in 69 beer categories like American-Style Pale Ale and American-Style IPA. This year's GABF will be held October 11 – 13 in Denver. And while the judges won't reveal the reasons behind their selections, the brewmasters who provided the recipes for this article hope you agree that each is gold medal worthy.

Old Ruffian
Great Divide Brewing Co.

Barley Wine-Style Ale (5 gallons/19 L, all-grain)

OG = 1.105 FG = 1.026
IBU = 90 SRM = 16
ABV = 10.2%

Pitching the proper amount of yeast is crucial to successfully brewing a high-gravity beer like barleywine. Underpitching can cause yeast to become stressed and tired, which can often times lead to a very slow, or even stuck fermentation.

— Brian Dunn, Founder and President

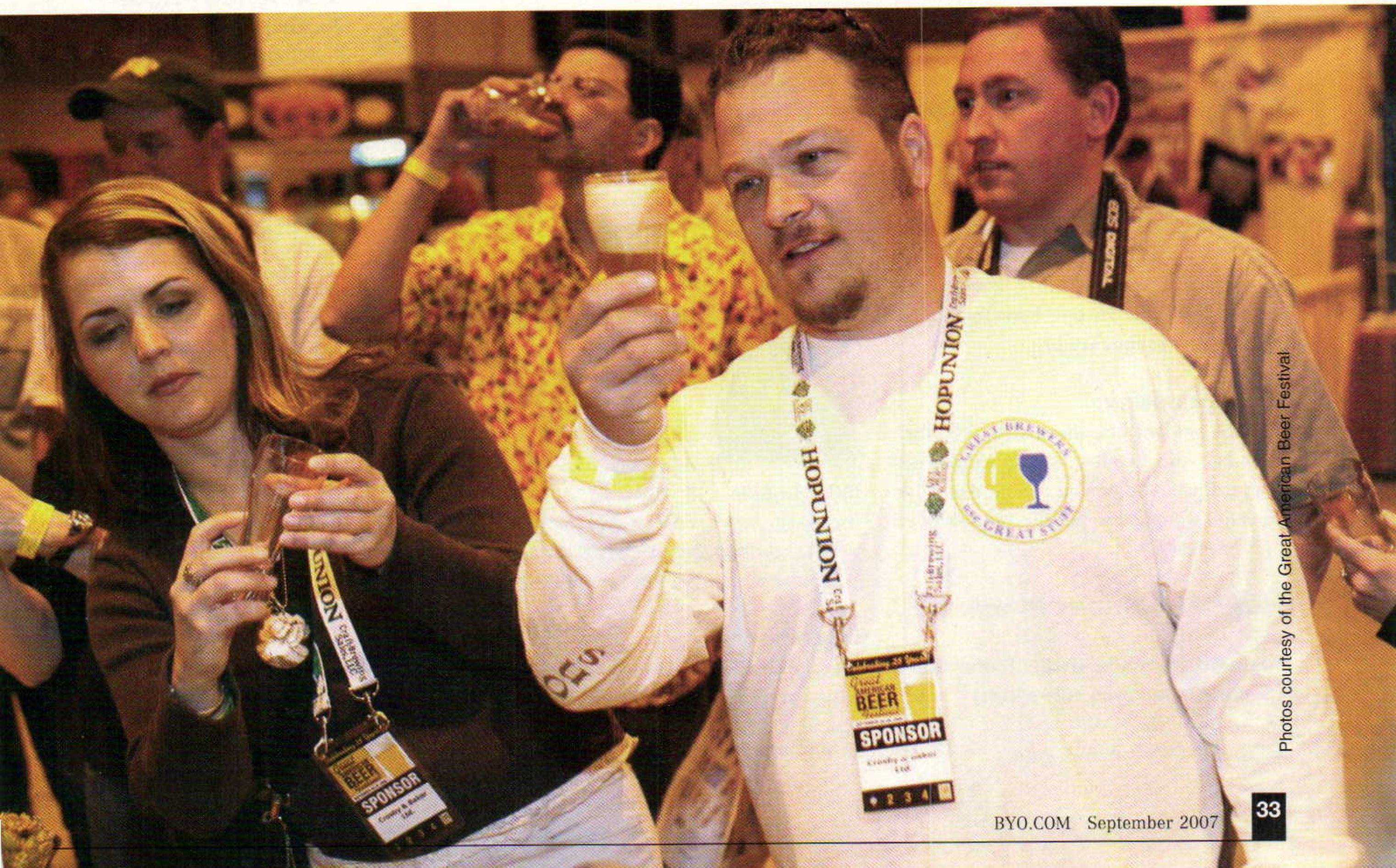
Ingredients

20.75 lbs. (9.4 kg) American 2-row pale malt
0.50 lb. (0.23 kg) crystal malt (75 °L)
0.50 lb (0.23 kg) Victory malt
0.25 lbs. (0.11 kg) flaked wheat
36 AAU Chinook hops (60 mins) (3.0 oz./85 g of 12% alpha acids)
16 AAU Amarillo hops (30 mins) (2.0 oz./57 g of 8% alpha acids)
24 AAU Amarillo hops (5 mins) (3.0 oz./85 g of 8% alpha acids)
White Labs WLP051 (California V) or Wyeast 1272 (American II) yeast (5 quarts/~5 L yeast starter)

Step by Step

This is a very big beer. See below for four options for generating your wort. In all cases, use a single infusion mash (or steep) at 154 °F (68 °C), held for 45–60 minutes. Add hops with 60 minutes, 30 minutes and 5 minutes left in the boil, as indicated in the ingredient list. Pitch the yeast from your yeast starter, aerate very well and hold fermentation temperature at 66 °F (19 °C). Keg the beer when fermentation is complete and beer has fallen clear.

'06 GOLD MEDAL WINNERS



Photos courtesy of the Great American Beer Festival

Long boil option:

Mash grains listed in ingredient list with 28 quarts (26 L) of mash liquor. After mash, recirculate wort until clear. Collect wort until the specific gravity of the final runnings falls below 1.010. (This may be up to 12 gallons (45 L), depending on a number of variables.) Keep your sparge water heated such that your grain bed temperature creeps up to 168 °F (76 °C) near the end of wort collection. Boil wort to reduce volume to 6.0 gallons (23 L). Add first dose of hops and boil them for an hour, aiming for 5.0 gallons (19 L) of post-boil wort.

First wort option:

Add enough pale malt to your mash tun so that you can run off 6.0 gallons (23 L) of first wort without adding sparge water. For this you will need between 26.75 lbs. to 32.5 lbs. (12-15 kg) of pale malt (in addition to the specialty malts and flaked wheat), depending on how much water your grains normally absorb. You will need roughly 9.0–10 gallons (34–38 L) of mash liquor (and 12–14 gallons (45–53 L) of mash tun space to hold it all). Your 6.0 gallons (23 L) of pre-boil wort should have a specific gravity of 1.085–1.090. Boil for one hour to reduce wort to a volume of 5.0 gallons (19 L). [Note: You can (and should) sparge the grain bed to collect wort for a second beer.]

Full mash plus extract option:

Reduce the amount of pale malt to 10.75 lbs. (4.9 kg). Mash all grains in 15 quarts (14 L) of mash liquor. Collect 6.0 gallons (23 L) of wort and stir in 5.25 lbs. (2.4 L) of light dried malt extract to raise pre-boil wort gravity to 1.085–1.090. Boil for one hour to reduce volume to 5 gallons (19 L).

Extract option:

Reduce amount of pale malt to 0.75 lbs. (0.34 kg). Add 10.6 lbs. (4.8 kg) light dried malt extract at beginning of boil. You must do a full-wort boil to get the proper level of bitterness.

Hophead Imperial IPA

Bend Brewing Co.

American-Style India Pale Ale (5 gallons/19 L, all-grain)

OG = 1.073 FG = 1.017
IBU = 100 SRM = 6 ABV = 8%

The secret to a good Imperial IPA is dry-hopping. It can make or break this style. It is very important to have a huge aroma that leads you into the beer, complementing the inherent bitterness.

— Tonya Cornett, Brewmaster

Ingredients

14 lb. 10 oz. (6.6 kg) 2-row pale malt
8.0 oz. (0.23 kg) crystal malt (30 °L)
1.1 oz. (31 g) Saaz hops (first wort hops)
19 AAU Chinook hops (90 mins)
(1.6 oz./44 g of 12% alpha acids)
1.8 oz. (51 g) Northern Brewer hops
(5 mins)
1.8 oz. (51 g) Cascade hops
(5 mins after knockout)
1.5 oz. (43 g) Cascade hops (dry hop)
Wyeast 1968 (London ESB) or
White Labs WLP002 (English Ale) yeast
(2.5 qt./~2.5 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

Mash at 155 °F (68 °C) for 60 minutes. Boil for 90 minutes. Ferment at 68 °F (20 °C). Dry hop for 7 days.

Extract option:

Reduce amount of pale malt to 1.5 lb. (0.68 kg). Add 7.1 lbs. (3.2 kg) light dried malt extract at beginning of boil. You will need to perform a full-wort boil to get the specified level of bitterness.

Tumble Off Pale Ale

Barley Brown's Brew Pub

American-Style Pale Ale (5 gallons/19 L, all-grain)

OG = 1.052
FG = 1.008
IBU = 35 SRM = 13 ABV = 5.7%

Use quality American hops and be careful not to overpower the malt (but not too careful).

— Tyler Brown, Brewmaster

Ingredients

4 lb. 4 oz. (1.9 kg) pale malt (Maris Otter)
5 lb. 2 oz. (2.3 kg) 2-row pale malt
0.33 lb. (0.15 kg) caramel malt (10 °L)
0.33 lb. (0.15 kg) caramel malt (30-37 °L)
0.50 lb. (0.23 kg) Munich malt (10 °L)
0.25 lb. (0.11 kg) flaked barley
5.4 AAU Chinook hops (60 mins)
(0.45 oz./13 g of 12 % alpha acids)
3.6 AAU Amarillo hops (30 mins)
(0.45 oz./13 g of 8% alpha acids)
0.36 oz. (10 g) Amarillo hops (10 min)
0.36 oz. (10 g) Cascade hops (2 min)
0.36 oz. (10 g) Crystal hops (0 mins)
White Labs WLP001 (California Ale) or
Wyeast 1056 (American Ale) or
Fermentis US-05 (dried) yeast
(1.0 qt./~1 L yeast starter)
1.0 cup corn sugar (for priming)

Step by Step

Mash at 152 °F (67 °C) for 60 minutes. Boil for 75 minutes. Ferment at 70 °F (21 °C). Dry hop with Cascade hops for 1 week.

Extract option:

Reduce amount of each pale malt to 7 oz. (0.2 kg) each. Add 1.75 lbs. (0.79 kg) light dried malt extract at beginning of boil and 3 lb. 10 oz. (1.8 kg) light liquid malt extract as a late addition.

Anniversary Ale

Amherst Brewing Co.

American-Style Amber/Red Ale (5 gallons/19 L, all-grain)

OG = 1.070 FG = 1.016
IBU = 62 SRM = 12 ABV = 7.0%

This amber is loaded with hops and I think that helped it stand out in a crowd at the GABF.

— Mike Yates, Brewmaster

Ingredients

11.9 lbs. (5.4 kg) Muntons pale ale malt
1.16 lbs. (0.53 kg) Weyermann
Carafoam® malt
1.16 lbs. (0.53 kg) Muntons light
crystal malt
0.58 lbs. (0.26 kg) Weyermann
melanoiden malt
5.2 AAU Columbus hops (60 mins)
(0.4 oz./11 g of 13% alpha acids)
11.3 AAU Columbus hops (45 mins)
(0.87 oz./25 g of 13% alpha acids)
Columbus Hops 2.0 lbs. (5 mins)
Columbus Hops 3.0 lbs. (0 mins)
White Labs WLP001 (California Ale) or
Wyeast 1056 (American Ale) or
Fermentis US-05 (dried) yeast

(1.5 qt./~1.5 L yeast starter)
1.0 cup corn sugar (for priming)

Step by Step

Mash at 152 °F (67 °C). Boil for 90 minutes. Ferment at 68 °F (20 °C).

Extract option:

Reduce amount of pale malt to 10 oz. (0.27 kg). Add 2.0 lbs. (0.91 kg) light dried malt extract at beginning of boil and 5.5 lbs. (2.5 kg) light liquid malt extract as a late addition. Begin boil with at least 3.5 gallons (13 L) of wort.

5 Barrel Pale Ale

Odell Brewing Co.

Classic English-Style Pale Ale (5 gallons/19 L, all-grain)

OG = 1.052–1.054 FG = 1.013
IBU = 36 SRM = 11 ABV = 5.1%

What makes our beer stand out is our approach of using a lot of fairly subtle hops in both late additions and dry hopping. Our goal with the 5 Barrel is to accentuate hop flavor and aroma over bitterness. — Doug Odell, Brewmaster

Ingredients

8.0 lbs. (3.6 kg) pale ale malt
1.75 lbs. (0.79 kg) Gambrinus ESB Malt
0.5 lbs. (0.23 kg) crystal malt (40 °L)
0.75 lbs. (0.34 kg) Munich malt
9.5 AAU Cascade hops (90 mins)
(1.9 oz./54 g of 5% alpha acids)
0.5 oz. (14 g) Fuggles hops (0 mins)
0.5 oz. (14 g) First Gold hops (0 mins)
1.0 oz. (28 g) Glacier whole hops (hopback)
0.66 oz. (19 g) Willamette whole hops (hopback)
0.5 oz. (14 g) Centennial whole hops (hopback)
1.0 oz. (28 g) Glacier hops (dry hop)
1.0 oz. (28 g) Willamette hops (dry hop)
0.25 oz. (7 g) Centennial hops (dry hop)
ale yeast (1.5 qt./~1.5 L yeast starter)
1.0 cup corn sugar (for priming)

Step by Step

Mash at 150–152 °F (66–67 °C). Boil 90 minutes. After cool down, pitch your favorite ale yeast, but not one which produces diacetyl. At end of fermentation, chill to as close to 32 °F (0 °C) as you can for 1–2 weeks.

Extract option:

Omit pale ale malt. Reduce amount of ESB malt to 1.75 lbs. (0.79 kg). Add 1.5 lbs. (0.68 kg) light dried malt extract at beginning of boil and 3 lb. 10 oz. (1.8 kg) light liquid malt extract as a late addition.

Otis Alt

Elk Grove Brewery and Restaurant

German-Style Brown Ale (5 gallons/19 L, all-grain)

OG = 1.055 FG = 1.014
IBU = 35 SRM = 19 ABV = 5.3%

This beer should be bitter and have a nice "Spalty" nose to it. But to keep the hops from overwhelming the palate the malt has to come through as well. The roasty undertones of the Munich and Vienna malts complement the aggressiveness of the hops very well.

— Bill Wood, Brewmaster

Ingredients

7.25 lbs. (3.3 kg) Pilsen malt
2.0 lbs. (0.91 kg) Vienna malt
1.0 lb. (0.45 kg) Munich malt (10 °L)
0.5 lb. (0.45 kg) wheat malt
0.5 lb. (0.45 kg) caramel malt (60 °L)
2.0 oz. (57 g) chocolate malt
6 AAU Northern Brewer hops (60 mins) (0.66 oz./19 g of 9% alpha acids)
3 AAU Northern Brewer hops (30 mins) (0.31 oz./8.8 g of 9% alpha acids)
2 AAU German Spalt hops (30 mins) (0.35 oz./9.9 g of 5% alpha acids)
3.0 oz. (85 g) German Spalt (0 mins)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Fermentis US-05 (dried) yeast (1.5 qt./~1.5 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

Mash at 153–154 °F (67–68 °C) for 20–30 minutes. Boil for 60 minutes. Ferment at 58–60 °F (14–16 °C) for 5 days. Allow temperature to rise naturally (but not above 68 °F/20 °C) until day 7 or 8. Then crash to below 40 °F (4 °C) over 4 days, rack off yeast and lager for 20–30 days to below 34–38 °F (1–3 °C) if possible.

Black Wolf Schwarzbier

Flossmoor Station Brewing Co.

German-Style Schwarzbier (5 gallons/19 L, all-grain)

OG = 1.055 FG = 1.013
IBU = 30 SRM = 37 ABV = 5.5%

My biggest suggestion for making a Schwarzbier is to go light handed on the specialty malt. You want enough for color and a bit of flavor and aroma, but don't want it to turn into a roasty bomb.

— Matt Van Wyk, Brewmaster

Ingredients

9.5 lbs. (4.3 kg) Pilsner malt
11 oz. (0.32 kg) Munich malt (20 °L)
4.8 oz. (0.14 kg) aromatic malt
11 oz. (0.32 kg) Carafa II® malt
1.6 oz. (45 g) roasted barley
4.6 AAU German Perle hops (80 mins) (0.6 oz./17 g of 7.7% alpha acids)
2.0 oz. (57 g) German Hallertau hops (10 mins)
White Lab 830 (German Lager) yeast
1.0 cup corn sugar (for priming)

Step by Step

Mash at 148–152 °F (64–67 °C) for 60 minutes. Add the last two malts to the mash just before sparging. (A decoction mash could and should be used if your system allows.) 90 minute boil. Pitch yeast slurry at 70 °F (21 °C) and once initial fermentation starts, lower temperature to the low 50's °F (~11 °C). Ferment at 52–54 °F (11–12 °C). Lager at 32–34 °F (0–2 °C) for 4–8 weeks.

Extract option:

Reduce amount of Pilsner malt to 3 oz. (85 g). Add 2.0 lbs. (0.91 kg) light dried malt extract at beginning of boil and 4.25 lbs. (1.9 kg) light liquid malt extract as a late addition.

Sunfest Lager

Ham's Restaurant & Brewhouse

Münchner-Style Helles (5 gallons/19 L, all-grain)

OG = 1.053 FG = 1.013
IBU = 15 SRM = 7 ABV = 5.1%

I think the secret to any good lager is patience and attention to detail. Helles is a very delicate, very subtle style of beer. This is its strength, but can also be its weakness. Keep in mind the malt is the star of this show.

— T.L. Adkisson, Brewmaster

Ingredients

9.0 lbs. (4.1 kg) 2-row Pilsner malt
0.5 lbs. (0.23 kg) Munich malt (10 °L)
0.5 lbs. (0.23 kg) Munich malt (20 °L)
1.0 lbs. (0.45 kg) Carapils® malt
1 AAU Magnum hops (75 mins) (0.07 oz./2.0 g of 14% alpha acids)
1 AAU Perle hops (75 mins) (0.13 oz./3.5 g of 8% alpha acids)
2.75 AAU Perle hops (20 mins) (0.34 oz./9.6 g of 8% alpha acids)
1.25 AAU Mt. Hood hops (5 mins)
lager yeast
1.0 cup corn sugar (for priming)

Step by Step

Mash at approximately 154 °F (68 °C) for 60 minutes. Vorlauf until wort clarity is acceptable. Boil for 90 minutes. Pitch a fairly malty lager yeast strain at approximately 48 °F (8.8 °C). Allow to free rise to 52 °F (11 °C) during fermentation. At approximately 58% attenuation, allow temp to rise to 55 °F (13 °C). Once terminal gravity is reached, cool 3 °F (1.5 °C)/day to 36 °F (2.2 °C). Allow to cold condition for a least three weeks.

Extract option:

Omit Pilsner malt. Add 2.0 lbs. (0.91 kg) light dried malt extract at beginning of boil and 4.0 lbs. (1.8 kg) light liquid malt extract as a late addition.

Smoke River Rauchbier

Great Basin Brewing Co.

Smoke-Flavored Beer (5 gallons/19 L, all-grain)

OG = 1.055 FG = 1.016
IBU = 18 SRM = 32 ABV = 5.0%

Beers with smoke flavors are most satisfying when the body is full and there is a strong hint of sweetness in the palate to balance the toasty smoke-rich flavor and aroma.

— Tom Young, Brewmaster

Ingredients

2.0 lbs. (0.91 kg) Weyermann rauchmalz (smoked malt)
2.0 lbs. (0.91 kg) Weyermann Pilsner malt (home smoked)
2.0 lbs. (0.91 kg) Weyermann Munich Type 2 malt (home smoked)
2.0 lbs. (0.91 kg) Weyermann Munich Type 1 malt
1.0 lb. (0.45 kg) Weyermann Pilsner malt
10 oz. (0.28 kg) Weyermann CaraMunich Type 2® malt
8 oz. (0.23 kg) Weyermann dehusked Carafa Type 2® malt
4.75 AAU Northern Brewer hops (90 mins) (0.52 oz./15 g of 9% alpha acids)
0.5 oz. (14 g) Hallertau hops (0 mins)
Wyeast 2124 (Bavarian Lager)
1.0 cup corn sugar (for priming)

Step by Step

Infusion mash at 153–154 °F (67–68 °C) for 45 minutes. Sparge with water up to 165 °F (74 °C). Ferment at 52 °F (11 °C) until finished. Two-day diacetyl rest at 62 °F (17 °C). Lager at 32 °F (0 °C) for at least one month.

Goddess Porter

Big Time Brewing Co.

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

OG = 1.060 FG = 1.018
IBU = 33 SRM = 47 ABV = 5.5%

Porter is a style with a lot of latitude, and I like to find a balance between the subtle sweetness and dark malt character, without being too overwhelming in terms of the natural flavors. Keeping the finishing hops lower will help accentuate the malt aspects.

— Bill Jenkins, Brewmaster

Ingredients

9 lb. 10 oz. (4.5 kg) pale malt
1.0 lb (0.45 kg) Munich malt
9.0 oz. (0.26 kg) flaked barley
9.0 oz. (0.26 kg) chocolate malt
3.6 oz. (100 g) crystal malt (75°L)
3.6 oz. (100 g) crystal malt (15°L)
3.6 oz. (100 g) roasted barley
1.8 oz. (51 g) black malt
8 AAU Chinook hops (60 mins) (0.63 oz./18 g of 13% alpha acids)
0.75 oz. (21 g) Centennial hops (0 mins)
ale yeast (1 quart/~1 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

Mash at 154 °F (68 °C) for 45 minutes in 4 gallons (15 L) of water. Boil for 90 minutes, adding hops at times indicated in ingredent list. Cool wort and transfer to fermenter. Aerate throughly and ferment at 68 °F (20 °C).

Extract option:

Omit pale malt. Steep grains — almost 3 lbs. (1.4 kg) total — in 4.5 qts. (4.2 L) of water at 154 °F (68 °C) for 30 minutes. Add 2.0 lbs. (0.91 kg) light dried malt extract at the beginning of the boil and boil for 60 minutes. Add 4.5 lbs. (2.0 kg) light liquid malt extract as a late addition. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L) with water. Aerate wort and ferment at 68 °F (20 °C).

archaeo BEER

By **Dan Mouer**

The lowest register of a plaque used to decorate the sounding box of a large lyre for the Royal Cemetery of Ur. It shows a gazelle offering two beakers of beer to a scorpion man. The use of beakers as opposed to straws indicates filtered beer.

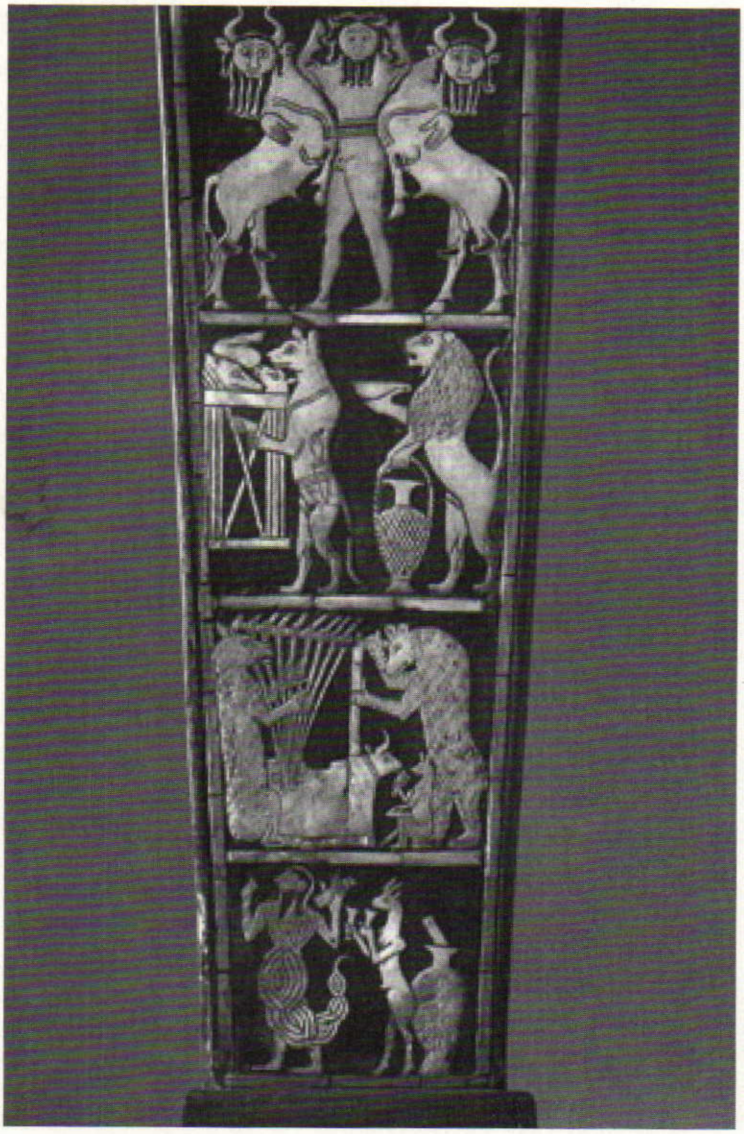


Photo courtesy of the Museum of Archaeology and Anthropology, University of Pennsylvania, Philadelphia.

archaeology and beer seem to go together, and it's not just because a cold brew helps wash the dust from your teeth after a long day on the digs. I'm an archaeologist by profession and a homebrewer by avocation. Lots of archaeologists brew their own, and those who don't often have a passion for more exotic commercial brews.

A few years ago I helped organize a conference for more than 1,000 archaeologists. When my colleagues and I spoke with the staff of the hotel where the conference was to be held, we repeatedly stressed that they should be certain to have lots of beer on hand. And not just any beer, but the "good stuff" — microbrews and specialty imports. Despite our warnings, the beer ran out very early on the first night. The conferees were thirsty and surly; the organizers were angry; and the hotel staff members were chagrined. The next day, beer trucks lined up around the block and everyone was happy.

It is fortunate that more than a few brewers and scientists with skills allied to the brewer's profession seem to like archaeology as well. The resulting interplay between the science of discovering the past and the art of making better brew has produced a handful of novel beers from homebrewers and commercial breweries alike. But why the love between archaeologists and brewers? Well, let's dig into a little history — or, rather, prehistory — to get to the heart of the matter.

The Neolithic Revolution: Daily Bread or "Party Time?"

Long before radiocarbon dating and similar techniques, the first serious archaeologists divided Old World prehistory into the Stone Age, the Bronze Age and the Iron Age. The Stone Age was further divided into the Paleolithic (Old Stone Age), Mesolithic (Middle Stone Age) and Neolithic (New Stone Age). The Neolithic period was characterized by newer forms of stone tool technology; specifically, by the presence of ground, rather than chipped, stone tools. However, by the middle of the Twentieth Century, archaeologists understood that the Neolithic was about a whole lot more than tool-making technology. It was about a thorough revolution in the way human beings lived on this earth. After millions of years

DIGGING UP THE FIRST ANCESTRAL BREWS

of depending on wild plants and animals, people settled into permanent villages, and supported themselves with herds of domestic animals and fields of cultivated crops. This led, over a relatively short time in archaeological terms, to the rise of cities and all the complex trappings of civilization.

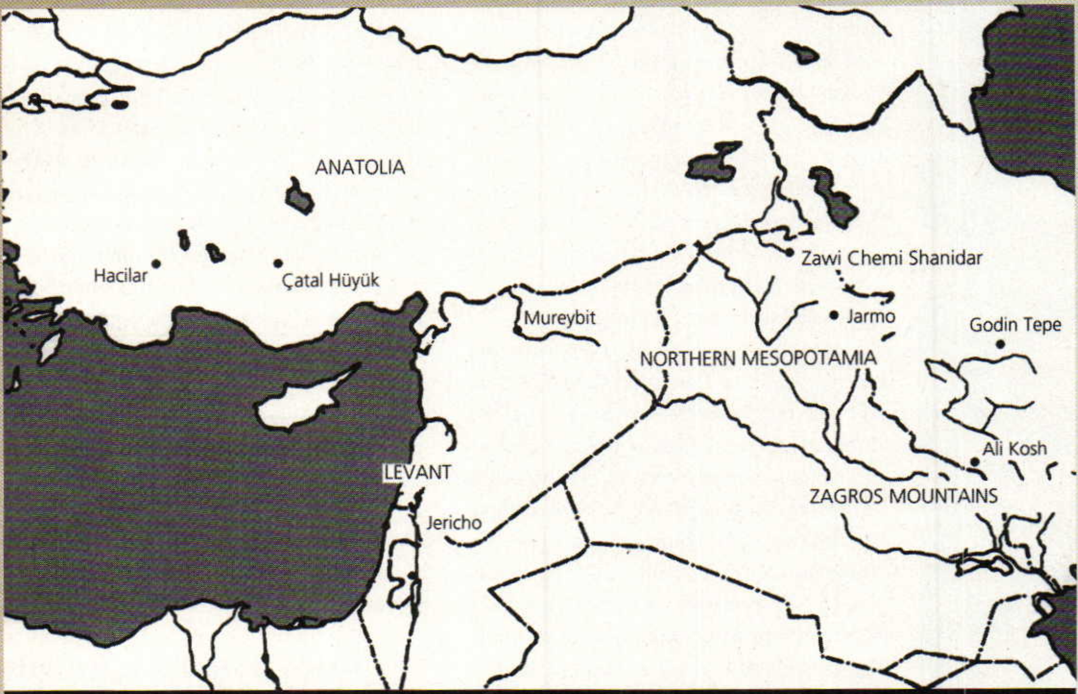
Of course, there was not just a single Neolithic Revolution; we now know that this process of domesticating plants and animals happened repeatedly, often independently, throughout the Old and New Worlds. The process continues today in some areas.

The key ingredient that seems to anchor the switch from hunting and gathering to gardening, herding and farming, is the domestication of starchy staple foods. The first of these were grains — particularly wheat and barley — domesticated in the Near East and Asia Minor beginning around 12,000–10,000 years ago. Wheat and rice were largely responsible for fueling similar cultural evolution in Asia. Likewise, sorghum and yams were domesticated in Africa; as were maize, potatoes and cassava in the Americas.

Domesticated starchy staples revolutionized life because they provided huge amounts of energy and, especially, because they could be stored to feed folks even through lean seasons. As I noted, wheat and barley were among the very first domesticated plant foods. And what do we do with wheat and barley? Well, we make beer, of course, and for that reason some archaeologists have argued that beer was the reason that people settled down and began to farm in the first place. In this view, beer itself might have led to civilization. Certainly, no reader of *Brew Your Own* would doubt that life without beer could scarcely be called civilized!

Others have argued, using archaeological evidence in the form of pictures on pottery and the like, that bread was the primary product of early grain domestication. Back in the 1950s and 60s, there was a great debate in archaeology over whether it was beer or bread that most likely fueled the Neolithic Revolution. Of course, these earliest domesticated grains — wheat and barley — can also be used to make gruel or porridge. Over the years, archaeologists have posited that beer was brewed by soaking bread in water, or by diluting porridge, to make a mash. But the big question was whether or not it was specifically the quest for beer that led to the enormous social, technological and economic changes we call the Neolithic Revolution.

In 1994, anthropologist Thomas W. Kavanaugh again took up the debate. Was his in-depth academic study published in some august anthropology journal? Nope, it appeared in *Brewing Techniques*, the now-defunct craft brewing magazine. After a thorough review of the arguments that had been laid out by archaeologists, Kavanaugh concluded that one key bit of technology was probably essential to the development of brewing: ceramic pottery, and as all archaeologists know, pottery was a product of The Neolithic Revolution. In other words, the Revolution had arrived before beer brewing became widely established. (For those who are interested in the details of the Great Debate, you can read Dr. Kavanaugh's entire article online at http://www.brewingtechniques.com/library/backissues/issue2.5/kavanagh.html.)



Map showing the locations of archeologically significant areas in the history of beer.

Really Old Style (Ancient Sumerian Beer)

(5 gallons/19 L)

OG = 1.062 FG = 1.009 ABV = 6.9%

Ingredients

4.5 lbs. (2.0 kg) Weyermann rauchmalz (smoked malt)
3.5 lbs. (1.6 kg) bappir ("beer bread")
1.5 lbs. (0.68 kg) rice hulls
1.5 lbs. (0.68 kg) honey
1 gallon (3.8 L) date wine

Step by Step

Make the date wine (see below), then bake the bappir (see below) one or two days later. Let bappir cool overnight. The next day, add crushed malt and crumbled bread to your kettle. Mash in to 131 °F (55 °C) with 3.0 gallons (11 L) of water. Immediately begin slowly heating the mash to 156 °F (69 °C), stirring constantly, then rest at 156 °F (69 °C) for 45 minutes. Heat mash to 170 °F (77 °C) and transfer it to your lauter tun. Stir in rice hulls. Let sit for 5 minutes, then recirculate briefly and run off wort to kettle. Collect 4.0 gallons (15 L) total. Boil for 15 minutes, then cool to 70 °F (21 °C). Remove bag of date skins from fermenter. (If you can get a friend to hold the bag, you can use two cookie sheets to gently press the pulp and yield a bit more juice.) Combine fermenting date wine with your fresh wort, then stir in honey. Add water to make 5 gallons (19 L), aerate and let ferment at 70–80 °F (21–27 °C) until fermentation subsides. Keg or bottle.

Date Wine

(1.0 gallon/3.8 L, fruit wine)

OG = 1.092

Ingredients

3.5 lbs. (1.6 kg) dates

Step by Step

Pit dates and place them in a large nylon grain bag. Put fruit bag in the bottom of a sanitized bucket fermenter and crush the fruit with a potato masher (or your feet). Add water to make 1 gallon (3.8 L). Let the wild yeast on the fruit begin to ferment the juice.

Bappir (Beer Bread)

Ingredients

3.0 lbs. (1.4 kg) Weyermann rauchmalz (smoked malt)
1.0 lb. (0.45 kg) unbleached (wheat) flour
1.25 lbs. (0.57 kg) honey

Step by Step

Grind barley malt into flour. Combine dry ingredients in a large mixing bowl. Fold in honey. Slowly add water and knead dough until it is roughly the consistency of cookie dough. Form dough into large, flat loaves about one inch (2.5 cm) thick. Bake at 350 °F (176 °C) on a pizza stone until outside browns. Remove from oven and let cool. Cut cooled bread into "logs" about 1.5 inches (3.8 cm) thick (think biscotti). Rebake at 350 °F (176 °C) until bread just hardens. Let cool overnight.

Of Microbes and Molecules

Any attempt to store starchy staple foods has to deal with microbes. The world is filled with little buggers that are looking for a free meal, and nothing turns dried starch into food quicker than a little water and a little warmth. Warm water interacts with enzymes to convert starch to sugar and the microbes come to lunch. What happens next depends upon the microbes. If they are "friendly" yeasts, they will either make dough rise or they will turn grains into beer. If they are other sorts of yeasts, or bacteria or molds, they may do something less useful. It's called spoiling the food! Most successful forms of early storable foods rely to some degree on controlling the work of microbes to make useful, pleasant and non-toxic products. Think about sauerkraut, cheese, yogurt, bread, wine, mead, and — of course — beer.

We archaeologists could learn a lot about the dawn of brewing if we could track down and identify the work of these microbes. Fortunately, chemists have found ways to identify specific molecules that relate to byproducts of distinctive fermentations: good stable molecules that can sometimes be found under exceptional archaeological conditions. It has been the curiosity of archaeologists and the chemists who work with them that has led to the discovery and recreation of historic and prehistoric beers. Sometimes, however, archaeologists get even luckier than finding tell-tale residue — sometimes they find a written beer recipe.

Ninkasi was the Sumerian Goddess of Beer, and the Hymn to Ninkasi has come down to us written on cuneiform tablets from the Sumerians of 4,000 years ago. (See sidebar on page 41 for full text.)

In 1989, Fritz Maytag, who salvaged the archetype of California Common Beer when he purchased Anchor Steam Brewing Company, became fascinated by archaeology's focus on early brewing after reading an article on the bread or beer debate written by Dr. Solomon Katz of the University of Pennsylvania. Katz had mentioned the existence of Sumerian tablets with pictures of brewing and beer-drinking, as well as cuneiform texts related to brewing. Maytag contacted Katz and got him to visit Anchor. Maytag also managed to get Professor Miguel Civil, who translated Ninkasi's Hymn, to help work out some of the details of the recipe it contained.

Anchor produced Ninkasi Beer just one time. Barley was the only grain used in Ninkasi, although honey was also added. Ninkasi didn't make a huge splash except as a novel idea. Perhaps Anchor's interpretation of the recipe was too realistic? Or, more likely, the beer-drinking public wasn't ready for a sweet-sour brew flavored with dates and no hops.

Brewing "Archaeobeer"

I found many challenges in trying to recreate a beer from just 300 years ago using a detailed, handwritten recipe and archaeological evidence from the kitchen/brewhouse of the housewife/alewife who penned it. (See "Colonial Beer" in the January-February 2003 issue of BYO.) I concluded that we cannot avoid the need for interpreting, for reading between the lines of history. Nonetheless, by paying attention to details, from inscriptions on clay tablets to molecules recovered from inside clay jars, we can learn things we otherwise wouldn't know about the past.

The hymn to Ninkasi reveals that Sumerians, living in Iraq 4,000 years ago, made a sweet wort from loaves of bread and malted grains, and this, in turn, was brewed with honey and wine. The Phrygians, living 2,800 years ago in the Anatolian Highlands of Turkey, buried a king with drinking vessels containing evidence of a beverage made of grain malt, wine grapes and honey. Could it be that the ancient brewers simply used everything they could find to provide sugars for those hungry beer-making microbes?

When Fritz Maytag experimented with Ninkasi, his brewery and the homebrew renaissance was still in its youth. Today, beer enthusiasts are familiar with wine-like beers flavored with fruits or spices, some even modified by "bad" microbes that might have been very common in ancient brews. And who doesn't like a little honey in the brewpot? Perhaps what is old is new again — perhaps our Homebrew Revolution is just the Neolithic Revolution, version 2.0.

Dan Mouer is a frequent contributor to BYO. *His article on Dogfish Head's archaeobeer experiments will appear in the* November 2007 *issue.*

"THE HYMN TO NINKASI"

Borne of the flowing water (...)
Tenderly cared for by the Ninhursag,
Bourne of the flowing water (...)
Tenderly cared for by the Ninhursag,

Having founded your town by the sacred lake,
She finished its great walls for you,
Ninkasi, having founded your town by the sacred lake,
She finished its great walls for you.

Your father is Enki, Lord Nidimmud,
Your mother is Ninti, the queen of the sacred lake,
Ninkasi, Your father is Enki, Lord Nidimmud,
Your mother is Ninti, the queen of the sacred lake.

You are the one who handles the dough,
[and] with a big shovel,
Mixing in a pit, the bappir with sweet aromatics,
Ninkasi, You are the one who handles
the dough, [and] with a big shovel,
Mixing in a pit, the bappir with [date]-honey.

You are the one who bakes the bappir
in the big oven,
Puts in order the piles of hulled grains,
Ninkasi, you are the one who bakes the bappir in the big oven,
Puts in order the piles of hulled grains,

You are the one who waters the malt
set on the ground,
The noble dogs keep away even the potentates,
Ninkasi, you are the one who waters the malt set on the ground,
The noble dogs keep away even the potentates.

You are the one who soaks the malt in a jar
The waves rise, the waves fall.
Ninkasi, you are the one who soaks the malt in a jar
The waves rise, the waves fall.

You are the one that spreads the cooked mash on large reed
mats,
Coolness overcomes.
Ninkasi, you are the one who spreads the cooked mash on large
reed mats,
Coolness overcomes.

You are the one who holds with both hands the great sweet wort,
Brewing [it] with honey and wine
(You the sweet wort to the vessel)
Ninkasi, (...)
(you are the sweet wort to the vessel).

The filtering vat, which makes
a pleasant sound,
You place appropriately on [top of] a large collector vat.
Ninkasi, the filtering vat,
which makes a pleasant sound,
You place appropriately on [top of]
a large collector vat.

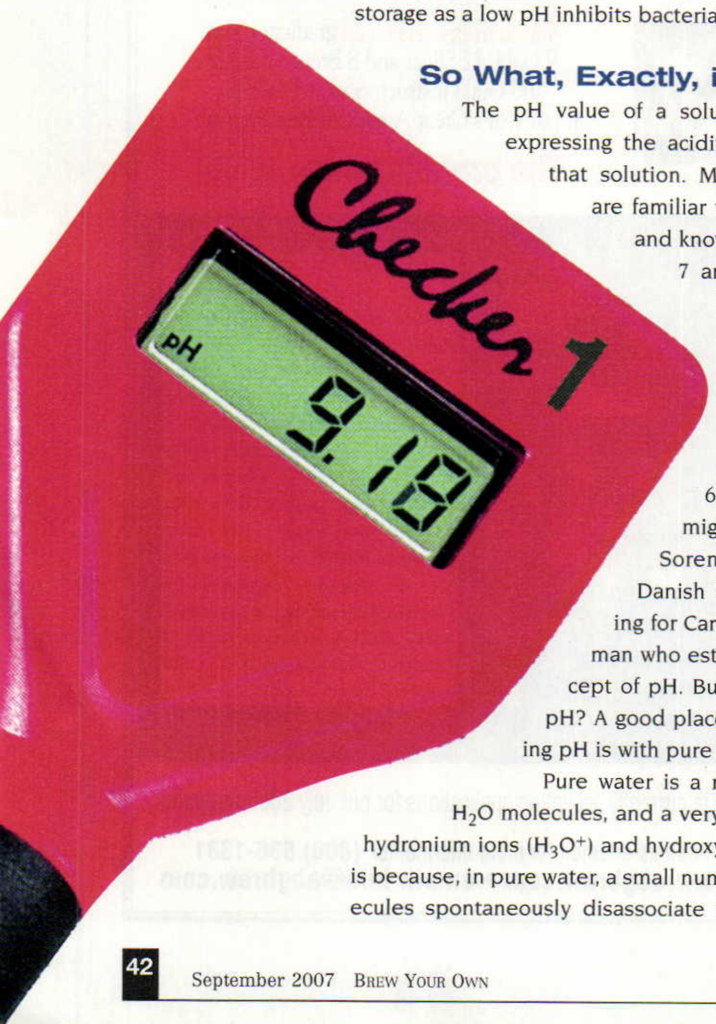
When you pour out the filtered beer
of the collector vat,
It is [like] the onrush of
Tigris and Euphrates.
Ninkasi, you are the one who pours out the filtered beer of the
collector vat,
It is [like] the onrush of
Tigris and Euphrates.

Translation by Miguel Civil, Professor Emeritus of Sumerology, The Oriental Institute, and the Department of Near Eastern Languages and Civilizations and Linguistics, The University of Chicago.

the principles of pH

by Chris Bible

pH is an important factor in brewing quality beer. The pH levels during various stages of the brewing process affect extract potential, beer color, hot-break formation, foam stability, hop oil extraction, hop bitterness and lauterability of the beer. It is also an important consideration for beer quality during storage as a low pH inhibits bacterial growth.



So What, Exactly, is pH?

The pH value of a solution is a way of expressing the acidity or alkalinity of that solution. Most homebrewers are familiar with the pH scale and know that values over 7 are basic (or alkaline) and values under seven are acidic (Assuming the pH reading is taken at 68 °F/20 °C). You might not know that Soren Sorensen, a Danish biochemist working for Carlsberg labs, is the man who established the concept of pH. But what, exactly, is pH? A good place to start explaining pH is with pure water.

Pure water is a mixture of mostly H_2O molecules, and a very small number of hydronium ions (H_3O^+) and hydroxyl ions (OH^-). This is because, in pure water, a small number of water molecules spontaneously disassociate into H^+ and OH^- ions. The H^+ ions almost immediately combine with a water molecule to form H_3O^+.

The idea of pH can be approached nicely using the concept of the ionization constant of water, or K_w. K_w is defined as the product of the concentration of H_3O^+ and OH^- ions present within the solution or:

$$K_w = [H_3O^+][OH^-]$$

(In a chemical equation, brackets around an ion or molecule indicate the concentration of that substance.)

For pure water at 25 °C (77 °F), $K_w = 10^{-14}$, which can also be written as 0.00000000000001. Since, in pure water, each disassociated water molecule provides one ion of H_3O^+ and one ion of OH^-, it follows that $[H_3O^+] = [OH^-]$. Therefore:

$$K_w = [H_3O^+]2 = 10^{-14}$$

By solving for $[H_3O^+]$, we find that:

$$[H_3O^+] = 10^{-7} \text{ (or 0.0000001)}$$

pH is defined as the negative log of the hydronium ion concentration, or equivalently:

$$pH = -\log [H_3O^+]$$

So, in pure water at 25 °C (77 °F), the concentration of H_3O^+ is 10^{-7}, and thus the pH is 7.

In pure water at 25 °C (77 °F), the pOH — the negative log of the hydroxl ion concentration — is also 7 (because the concentration of hydronium and hydroxl ions are equal). In addition, in any dilute aqueous solution, at any temperature, the following is true:

$$pH + pOH = pK_w$$

This relationship becomes important when measuring the pH of solutions — such as mashing or boiling wort — at temperatures other than 25 °C (77 °F) as K_w varies with temperature.

The relative acidity or alkalinity of an aqueous solution depends on whether there are more H_3O^+ ions or OH^- ions present within the solution. If there are more H_3O^+ ions present, the solution is acidic. If there are more OH^- ions present, the solution is basic (or alkaline).

For example, if you add some acid to pure water at 25 °C (77 °F), the concentration of hydronium ions goes up. Consequently, the pH goes down because pH is the negative log of that concentration. In addition, since at this temperature pH + pOH = 14, the concentration of hydoxyl ions goes down — because some hydronium ions and hydoxyl ions react to form water molecules — and consequently the pOH goes up.

Because of the way that pH is defined, the pH scale is not linear. A solution that has a pH of 4 is ten times more acidic than a solution that has a pH of 5, and one hundred times more acidic than a solution that has a pH of 6.

Change During the Brewing Process

During the brewing process, the pH of the wort and beer changes. Water from most municipal water sources will have a pH over 7 (because it is treated to prevent corrosion of pipes). When combined with crushed malt, the pH of the grain and water mixture drops considerably compared to the initial pH of the water alone.

Natural pH Decrease

This observed pH decrease is the result of changing mineral composition within the solution. The principal change that happens during the mashing process is the precipitation of phosphates and amino acids derived from the malt. Phosphates, such as phosphoric acid, will disassociate. For example:

$$H_3PO_4 \longrightarrow H^+ + H_2PO_4^-$$

$$H_2PO_4^- \longrightarrow H^+ + HPO_4^{-2}$$

and

$$HPO_4^{-2} \longrightarrow H^+ + PO_4^{-3}$$

If calcium ions are present, the phosphates will precipitate as calcium phosphate, leaving behind hydrogen ions:

$$3Ca^{+2} + 2H_3PO_4 \longrightarrow 6H^+ + Ca_3(PO_4)_2$$

A similar reaction occurs if magnesium ions are present, but magnesium phosphate is more soluble than calcium phosphate, so the effect on pH is less dramatic.

A reaction will also occur if amino acids or polypeptides are present within the the solution. The calcium ions will react with the amino acid group:

$$2(\text{Amino Acid Group} - COOH) + Ca^{+2} \longrightarrow Ca\ (\text{Amino Acid Group} - COO)_2 + 2H^+$$

If calcium sulfate ($CaSO_4$) is added to the brewing water, amino acids will form the insoluble precipitate as described above, leaving behind hydrogen ions (H^+) — which, remember, instantly combine with water to form hydronium ions — and sulfate ions, (SO_4^{-2}).

These changes in mineral composition and the precipitation of calcium salts are responsible for the majority of the pH decrease that is observed prior to fermentation. However, the composition of the grain bill also influences pH. If the same water is used for two mashes, a mash with dark specialty malts would settle into a lower pH than a mash composed entirely of pale base malts. A mash of pale malts and a starchy adjunct — such as rice or corn — would have a pH higher than either of the previous two.

Interference With the Natural pH Decrease

The presence of other minerals within the brewing water can interfere with the pH decrease during the brewing process. Specifically, the carbonate (CO_3^{-2}) and bicarbonate (HCO_3^-) ions (the ions associated with temporary water hardness) can act as buffers to pH decrease. These ions interact with water molecules to form hydroxyl ions (OH^-):

$$CO_3^{-2} + H_2O \longrightarrow HCO_3^- + OH^-$$

$$HCO_3^- + H_2O \longrightarrow H_2CO_3 + OH^-$$

Measuring pH

by Chris Colby

The best way to measure pH in a homebrewery is with an inexpensive pH meter. There are many adequate models that cost less than $100.

When you first get your pH meter, begin soaking the electrode in electrode storage solution. Whenever the meter is not in use, it will need to be stored in this solution. Ideally, the electrode should never be allowed to dry out.

Calibrate the meter according to the meter's instructions, using a pH 7.01 buffer and a pH 4.01 buffer.

Take your wort sample in a clean glass. If the sample is from the mash, cool it down to room temperature, even if your pH meter has automatic temperature control. Taking readings of hot samples will decrease the life of the electrode. Rinse the electrode with distilled water then dry the electrode with a tissue. Don't let the tissue touch the electrode, just bring it close enough to wick the liquid away.

Place the electrode in the sample and give the sample a quick swirl. Make sure there are no bubbles attached to the electrode. Turn on the power to the electrode. The power to the electrode should never be on unless the electrode is submerged.

With the power on the electrode, the meter will take the reading. Note it in your lab notebook, then turn the power to the electrode off before pulling it out of solution. Rinse the electrode with distilled water again, dry and return to the storage solution.

Since pH changes with temperature, you need to compensate for this change. At room temperature, the pH of the cooled sample will be around 0.35 units higher than the pH at mash temperature. Thus, if you get a reading of pH 5.60 for your cooled sample, your corrected reading would be pH 5.25. (You need to do this even if your meter has temperature correction.)

These extra OH^- ions will then react with any H_3O^+ ions that they happen to encounter and produce water molecules. This effectively removes the extra H^+ ions that are being generated by the brewing process and limits the natural pH decrease. This is why it is important to ensure that the ions responsible for temporary hardness are removed from the brewing water, especially when brewing light-colored beers.

Proper Mash pH

Optimally, the pH of an infusion mash should be in the 5.2–5.6 range, with the lower half of this range often cited as being preferable. This range is a compromise between the pH optima for a variety of processes. Mash pH affects many aspects of the brew including extract yield, fermentability, tannin extraction, lauterability and saccharification time.

In an infusion mash, the greatest extract yield is achieved when the pH of the mash is 5.2–5.4. The most fermentable wort is obtained in the 5.3–5.4 range. Fastest conversion time is obtained in the 5.3–5.6 range.

If the pH during mashing is too high, starch and protein hydrolysis can be adversely affected. Also, high pH during the mash will increase the amount of dextrins present in the wort, resulting in a less fermentable wort.

The husks of malted barley contain compounds such as polyphenols (such as tannins) and silica compounds that are more soluble, and therefore more easily extracted, under high pH conditions. Polyphenols can contribute to colloidal instability and can produce astringency in the finished beer.

Most polyphenols are extracted during the final stages of sparging, when the pH of the wort being run off from the mash rises. It is therefore important to stop collecting wort when the pH of the last runnings climbs to 5.8–6.0. (Note that it's the pH of the wort being run off that matters, not the pH of the sparge water.)

The optimal pH for many aspects of mashing actually varies due to temperature, mash thickness and other factors, including whether an infusion or decoction mash is employed. As such, optimal pH ranges cited in the brewing literature sometimes vary by quite a bit.

For the homebrewer, getting your mash pH in the right ballpark will greatly improve your beer if you have previously missed the mark. However, making small adjustments within the acceptable range will likely not result in major changes in your beer. And generally, once you learn how to control your pH for a given beer, you will not need to monitor the pH each brewing session. In many cases, the first time a brewer checks his pH, he will find that everything has been OK all along.

Controlling Mash pH

If the pH of your mash does not naturally fall into the acceptable range, there are a variety of ways to manipulate it. The most common problem for brewers, especially those with lots of carbonate ions in their water, is a mash pH that is too high.

To lower pH, brewers often add calcium ions, from gypsum (calcium sulfate) or calcium chloride. In a 5-gallon (19-L) batch, one or two teaspoons of either of these will often solve the problem. Likewise, organic acids — such as lactic acid or phosphoric acid — can be added to directly lower mash pH. Adding sour malt, up to about 5% of the grist, is a "natural" way to add lactic acid to the mash.

If the brewer's water has a lot of carbonates, and this is what is keeping his or her pH level too high, the carbonate level can be greatly reduced by boiling the water and racking it off the precipitate. It is usually easier, however, to simply treat carbonate-rich water with acid (to neutralize the carbonates) or dilute it with distilled water or water prepared by reverse osmosis (RO).

In some cases, especially if a brewer is using very soft water and making a dark beer, the pH of the mash may be too low. In these cases, adding a little bit of chalk (calcium carbonate) or baking soda (sodium bicarbonate) will help.

For detailed instructions on how to modify your water chemistry to achieve the right pH, see Bill Pierce's article, "It's the Water: Understanding Residual Alkalinity and pH" in the May-June 2005 issue of *Brew Your Own*.

The Importance of Boil pH

After mashing, the wort is run off to the kettle and boiled. Just as pH is important in the mash, it affects many different processes in the boil as well.

During the boil, calcium phosphate will continue to be precipitated — just as it was during the mash — as long as sufficient calcium is still present in the wort. As such, the pH decreases and continue to decrease as the boil progresses.

Optimally, a post-boil wort pH of 5.0–5.2 shuld be achieved. Landing in the right range will help you get the best character extracted from your hops, maximize the amount of hop break that is formed and keep color pickup during the boil to a minimum. Usually, establishing the proper mash pH will allow you to hit the right boil pH without any manipulation, but this isn't always the case.

Isomerization of alpha acids into iso-alpha acids during wort boiling is influenced by pH. This isomerization reaction is favored by higher pH. Within a pH range of 8–10, the conversion to iso-alpha acids can approach 90%. (This is why hop extracts are produced at very high pH levels.) At typical wort pH ranges (5.2–5.4), the conversion is limited to a theoretical maximum of about 60%, with a final utilization value of about 35%. This does not mean that a high boil pH is a good thing; although high-pH boils extract more bitterness from the hops, the character of the bitterness is more "coarse" and the beer will likely suffer from many other pH-related problems.

Coagulating the hot break — a complex of proteins and polyphenols — is another important function of the boil. The pH of your boil has a very visible affect on this. The optimal pH for break formation is 5.2. If, at the beginning of your boil, you see big, fluffy bits of break material in your wort, you will have visual confirmation that your pH is in the right range.

Wort color generally increases during the wort boiling process due to Maillard reactions, reactions between amino acids and sugars. Maillard reactions are not favored at lower pH values, so having a wort of lower pH is important if a beer of lighter color is to be produced.

If your kettle pH needs to be lowered, adding a little bit of calcium usually helps. For five gallons (19 L) of wort, ¼–½ tsp. of gypsum or calcium chloride should do the trick. You can also add acid.

And Finally, Fermentation

During fermentation, the pH continues to drop for a variety of reasons. Yeast cells take in ammonium ions (which are strongly basic) and excrete organic acids (including lactic acid). The yeast strain chosen can affect the final beer pH. Most lager beers finish at 4.2–4.6, with some ales ending as low as 3.8. (Sour beers may have pH values around 3.0.)

Achieving an optimal pH, less than 4.4, favors faster beer maturation (including uptake of diacetyl), better beer clarity, better biological stability and a "more refined" beer taste.

Brewers rarely adjust final beer pH with acid. To reach a suitable final pH, all that is needed is to conduct a good, vigorous fermentation. As pH decreases with attenuation, drier beers tend to have slightly lower pH values. One interesting tidbit about fermentation is that some molecules in the fermenting beer become decolorized as the pH lowers and so the color of beer actually lightens slighty during fermentation.

Summary

pH affects almost all of the physical, chemical and biochemical reactions that occur within the brewing process. Brewers who understand the factors that affect pH and how to manage them during the brewing process will be more able to consistently produce good beer. Although pH is clearly an important variable in the brewing process, it rarely requires a great deal of attention from the homebrewer. Usually matching the grain bill with suitable brewing water should be all you need to ensure a successful brew day.

Chris Bible wrote about temperature in the July-August issue of BYO.

Two Brews in One

How to successfully combine coffee and beer

by Jon Stika

Like many homebrewers, I start my day with a cup of coffee rather than a glass of beer. But the roasty, bitter, sweet and earthy flavors I like in coffee are also some of the same flavors I like in beer.

Though I can get some of the same coffee-like flavors from various specialty malts, nothing tastes quite like coffee itself. Using coffee in beer raises many of the same questions one would ask when experimenting with any unusual ingredient. Has anyone done this before? What styles of beer would work well with coffee? What varieties and roasts of coffee would work best? What form of coffee should be used in beer? When should the coffee be added during the brewing process? How much coffee should be used in a typical five-gallon (19-L) batch of homebrew? Will the oils responsible for some of the flavors and aroma of coffee ruin the foamy head on my beer? Let's get right to the facts and see how we can make this marriage of morning and evening brews work.

To find out if coffee beers have been tried before, I looked into the worlds of both homebrewers and professionals. As it turns out, there are a number of homebrew recipes containing coffee, including several in past issues of BYO. There are also several commercial coffee beers in the U.S. and U.K., including Dogfish Head Craft Brewery's Chicory Stout, Lakefront Brewery's Fuel Café Stout, Mill Street Brewery's Coffee Porter, Bluegrass Brewing's Heine Brothers Coffee Stout, Thunderhead Brewing's Espresso Stout, Meantime Brewing and Breakfast Stout from the Founders Brewing Company.

Based on those and other popular examples, it seems the styles that work best with coffee as an ingredient are all on the dark side. Porters and stouts, which already have dark colors and roasty flavors from malts and specialty grains, seem to benefit the most from the addition of coffee. This is not to say that other styles such as brown ale, strong ale, dunkel weizen, altbier, rauchbier, schwarzbier, bock, dark lagers, or others might make

A marriage of coffee and beer is not only possible, but can be a beautiful thing.

interesting candidates for experimentation with coffee as an ingredient.

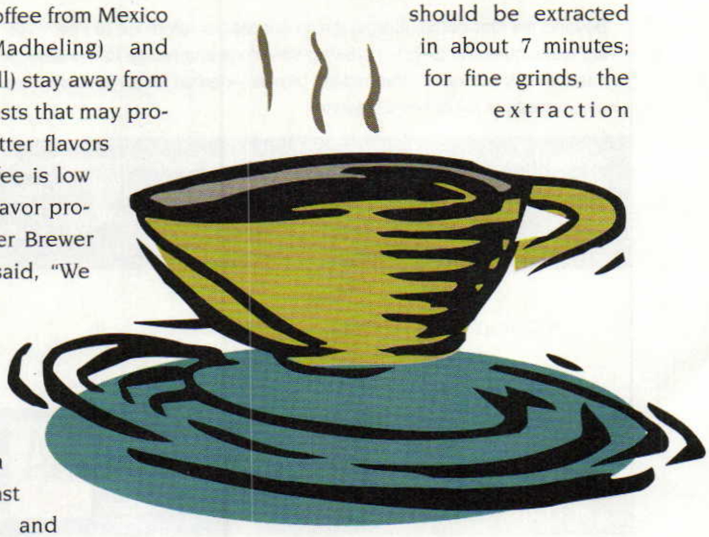
With these beer styles in mind, what about the coffee itself? Before grabbing that can of Folger's, let's look at some different origins of coffee beans and different roasts that affect the flavor of the coffee we might add to our brew. There are two major varieties of coffee grown in the world known as robusta and arabica. A lot of coffee in a can on the supermarket shelf consists of robusta beans roasted to a light or medium degree of darkness. The whole beans you buy in the store or at a coffee shop are usually arabica beans.

Most commercial brewmasters who make a coffee beer say arabica are the beans of choice. A couple breweries even specified that they use coffee from Mexico (Oaxaca), Sumatra (Madheling) and Rwanda. Many (but not all) stay away from dark French or Italian roasts that may produce strong burnt or bitter flavors unless the variety of coffee is low in acidity as part of its flavor profile. Ashton Lewis, Master Brewer at Springfield Brewing said, "We specify that our Mudhouse Stout is made using Sumatra Madheling beans which have a wonderful earthy aroma with very low acidity; we roast our beans very dark and because the beans are low in acidity the result is very rich without the burnt flavors." Other brewmasters said they prefer coffee roasted closer to the middle of the road that lends more mellowing, nutty flavors. They all felt that roasty or bitter flavors are better achieved and controlled using roasted barley or malt, or appropriate additions of hops.

The coffee I add to my homebrew is arabica I roast myself to the point where the inner oils just begin to appear on the surface of the bean (see accompanying sidebar on the basics of roasting your own coffee). Try arabica beans of various origins until you find one that suits the coffee beer you wish to brew.

At this point you may have a beer style and type of coffee in mind, so how should coffee be added to the brew? Of the brewmasters I spoke to, all said they add the coffee post-boil. Since they wanted coffee flavor and aroma rather than bitterness (which will occur if the coffee is actually boiled) they all preferred to add ground coffee right at the end of the boil or brewed coffee or espresso to the finished beer.

Knowing how to brew a good cup of coffee will definitely help you brew a better coffee beer. Ideally, the water used for brewing coffee should be between 195 °F and 200 °F (90 and 93 °C). For coarsely ground beans, the coffee should be extracted in about 7 minutes; for fine grinds, the extraction



Heine Brothers Coffee Stout

(5 gallons/19 L, all-grain)

OG = 1.086 FG = 1.022
IBU = 27 SRM = 66 ABV = 8.4%

Ingredients

14 lbs. (6.4 kg) pale malt
28 oz. (0.79 kg) roasted barley (300 °L)
28 oz. (0.79 kg) flaked oats
12 oz. (340 g) chocolate malt
8.0 oz. (227 g) chocolate wheat malt
1.5 oz. (42 g) ground coffee (0 mins)
6.5 fl. oz. (192 mL) brewed coffee (add to finished beer)
9 AAU Fuggle hops (45 mins) (2 oz./57 g at 4.5% alpha acids)
ale yeast

Step by Step

Mash grains at 153 °F (67 °C) for 90 minutes. Collect seven gallons (27 L) of 1.063 wort. Boil two hours, adding hops during the last 45 minutes.

should occur in about 2 minutes. (Let your tastebuds be your guide when experimenting with different grinds.) At higher temperatures or longer extraction times, the coffee will be too bitter. At lower temperatures or shorter contact times, the coffee will be weak and insipid. Use two level tablespoons of medium grounds for each five to six ounce (~150–175 mL) cup of coffee you brew.

With these guidelines in mind, freshly ground coffee beans could be added to your wort after turning off the burner and letting the wort temperature drop to around 200 °F (93 °C). Allow the coffee to brew in the wort for a few minutes before quickly cooling the wort.

Alternatively, coffee could be brewed either as coffee or espresso and added to the beer sometime post-boil, preferably at packaging. I brew espresso and add it to my beer at kegging.

To brew espresso, use 0.23 ounces (6.5 g) of finely ground coffee packed firmly — with 20–40 lbs./9–18 kg of downward pressure — into the portafilter of an espresso machine for each one-ounce (30-mL) shot. The espresso machine should deliver water near 195 °F (90 °C) at 130 PSI (9 bar) to extract the espresso in about 25 to 30 seconds.

The next question is quantity. How much coffee to add to a batch of beer is a matter of taste, but there are some guidelines you can use as a starting point. For example, I brew ten 1.5 fluid ounce shots of espresso (for a total of 15 fl. oz./440 mL of espresso) and add them to a five-gallon (19 L) batch of porter or stout at kegging. Many homebrew recipes call for eight to 16 shots of espresso per 5.0-gallon (19-L) batch. I use ten shots as I prefer the coffee as a part of the profile rather than the dominant flavor.

Finally, there's the question of how oils in coffee will affect beer foam. This does not seem to be a problem when coffee is used in styles of beer that typically produce strong foamy heads like porters or stouts. Using only enough coffee to achieve mellow flavors limits the amount of oil from coffee in the beer, especially in a roast that is not too dark and oily. Oils also float on top of the kegged beer, and since beer is drawn off the bottom, through the dip tube, they don't do much to limit foam in your glass. I add ten shots of freshly brewed espresso at kegging to my espresso porter and it always has a very good, long-lasting head of foam.

A marriage of coffee and beer is not only possible, but can be a beautiful thing. For your first coffee beer pick a style on the dark side such as a porter or stout that lends itself to coffee flavors. I use a good quality arabica variety of coffee that is not roasted too dark, and keep the coffee as part of the flavor profile without dominating it. Experiment with adding ground coffee immediately after the boil or brewed espresso or coffee to the finished beer. Finally, use this information as a guide to begin experimenting with your own coffee beer and do what homebrewers do best, experiment to make better beer.

Jon Stika is an avid homebrewer and writes "Techniques" in every issue of Brew Your Own.

Roast Your Own Coffee

Equipment

- Popcorn popper with a hand-cranked paddle (automated home coffee roasters are also an option)
- Thermometer that registers 400 °F (204 °C)
- A heat source to fire the pot
- Metal colander
- Wooden spoon or stick
- Green coffee beans

Step by Step

WARNING - *Roasting coffee generates smoke. Roast outside or in a well-ventilated area.*

Warm the popper to 400 °F (204 °C) inside the pot. Add eight to 12 ounces (227 to 340 g) of green coffee beans, close the lid and shake the pot to distribute beans evenly across the bottom of the pot.

Over low flame or high setting of an electric burner, slowly crank the handle to stir the beans. Stir constantly and shake the pot to shuffle the beans around every few minutes.

After several minutes, as the beans expand, they will smoke and pop or crackle, which is called "first crack." Continue stirring and shaking until all the beans go through first crack.

"Second crack" will begin shortly, which is more subtle than first crack and sounds like pine needles burning. It takes only minutes and can mean the difference between a light roast and burnt. Take samples from the roaster throughout first crack and inspect them to prevent overroasting. Empty the drum when you feel the beans have the desired appearance.

When you've roasted to the degree you like, dump the beans into the metal colander and stir them with the wooden spoon until they stop smoking. Set them aside to completely cool (but don't freeze). Use within one to ten days. For best flavor, grind immediately before brewing.

Projects in a Pinch

Three helpful DIY problem solvers

Story and photos by Forrest Whitesides

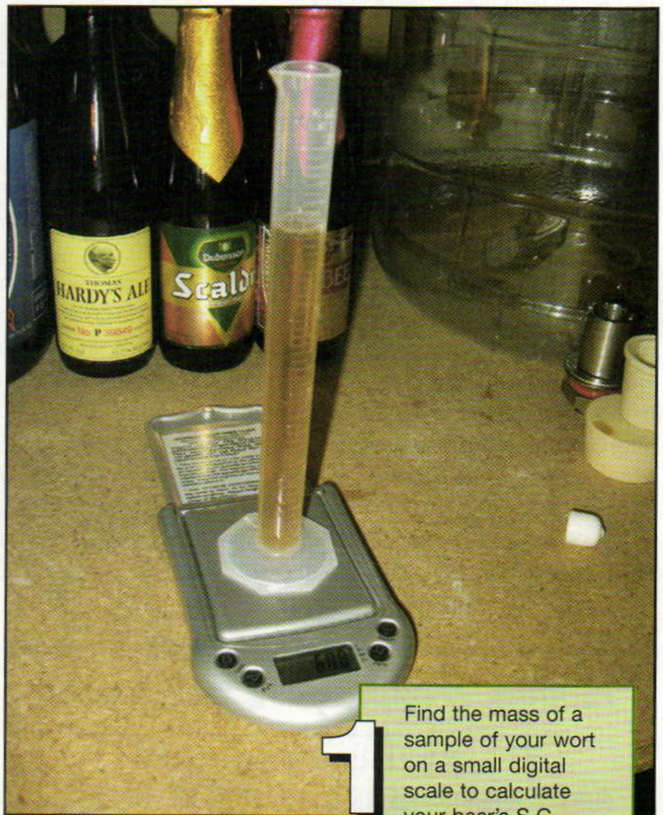
These projects are simple and relatively inexpensive, but nonetheless may prove to be quite useful in your home brewery. Have you ever broken a hydrometer when you needed it most? Ever had an airlock run dry in the night? Do you worry that your plate chiller could be a source of contamination? If so, read on and put your mind at ease.

Measuring specific gravity without a hydrometer

Not too long ago, I broke my hydrometer at probably the worst possible moment of the brew day: just after I had taken a test sample but before I had taken a specific gravity reading. In a panic, I weighed the sample and hydrometer test jar on a small digital scale and then marked the liquid level on the side of the test jar. Then I discarded the sample wort and filled the test jar with water to the line I marked previously. Then I weighed the water and the sample jar. By comparing the weight (actually mass, since my scale measures in grams) of the wort sample with the weight of the same volume of water, I was able to get a fairly accurate specific gravity reading.

The easiest way to prepare against a broken hydrometer is to have two of them on hand at all times (or to procure a refractometer). This isn't always possible, so it pays to know the basic concepts of measuring specific gravity. For the purposes of measuring for homebrewing, specific gravity is the ratio of the mass of a volume of wort (or beer) to the mass of an equal volume of distilled water. For our purposes, it is fine to assume the known density of distilled water (1 g/mL) for the calculations that follow.

To measure specific gravity of your homebrew without a hydrometer or refractometer, you'll need a scale calibrated to measure accurately (+/- 0.1 g) at small weights/masses. A common electronic jeweler's scale will work fine. I ordered one from an online vendor a couple of years ago to measure small quantities of hops and spice additions. You'll also need a graduated cylinder (50 mL or smaller), which should run about $5. For this project, I'll work in metric units.



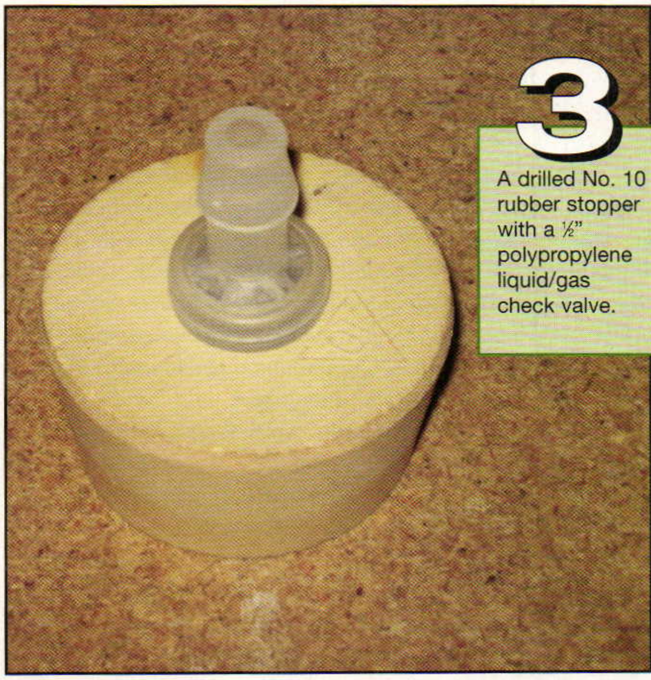
1 Find the mass of a sample of your wort on a small digital scale to calculate your beer's S.G.

First, measure the mass of the empty graduated cylinder. If your scale has a tare feature, go ahead and zero out the mass of the cylinder at this point. If not, record the mass of the empty cylinder. Take a small sample of your beer using your normal method and fill the cylinder so that the bottom of the liquid curve (called the meniscus) is even with the 40 mL mark. Put the cylinder back on the scale and record the mass (Figure 1). If you used the tare feature on your scale earlier, you can go straight to calculating specific gravity. If not, subtract the mass of the empty cylinder from the mass of the cylinder plus the sample and use the result in your calculations.

To get the specific gravity of your sample, divide its mass by the mass of an equal volume of water (40 mL in this case). Let's assume our sample had a mass of 42.5 g. Since we know (considering the above listed assumptions) that water has a mass of 1g/mL, we can assume that 40 mL of water has a mass of 40 g. That gives us a specific gravity reading of 1.063 (that is, 42.5 g/40 g) after rounding up.

It is important that your wort sample be close to room temperature (70 °F/21 °C) when measuring its mass, since the assumed mass of the water you're comparing it to is based on a

2 Two small check valves and a drilled rubber stopper, available at www.usplastics.com



A drilled No. 10 rubber stopper with a ½" polypropylene liquid/gas check valve.

A plastic carboy cap with a ⅜" polyethylene check valve.

room temperature mass measurement. Temperature directly impacts volume, so if your sample is too far above or below room temperature, it will adversely affect the accuracy of your specific gravity calculation.

When putting together your own measuring system, consider the following things: A sample size in the 35 mL to 50 mL range is a nice tradeoff between sample size and accuracy. The larger the sample, the more fine-tuned the result will be (assuming all other variables are the same) . . . but it also means less beer in your bottles or kegs at the end of the brewing process. A sample size of 100 mL is also easy to work with and accurate, but it can be difficult to find a graduated cylinder of that volume with a small enough base to fit on the measuring tray of smaller scales.

Depending on the accuracy of your scale and graduated cylinder, your specific gravity calculations as outlined above may be off by as much as 0.010. But with careful volume measurements and an accurate electronic scale, you can calculate specific gravity with a relative degree of accuracy . . . especially if you just broke your hydrometer.

Dry airlock

Airlocks are essential tools in the vast majority of homebrewers' fermenting setups, and most of the airlocks out there use water or some other liquid in one configuration or another to allow CO_2 to escape from a fermenter but prevent airborne contaminates from getting in. In essence, these water-based airlocks are simple hydraulic check valves. They work great but have some downsides. For example, the liquid can evaporate over time or be ejected during vigorous fermentation, thus rendering the airlock more or less useless.

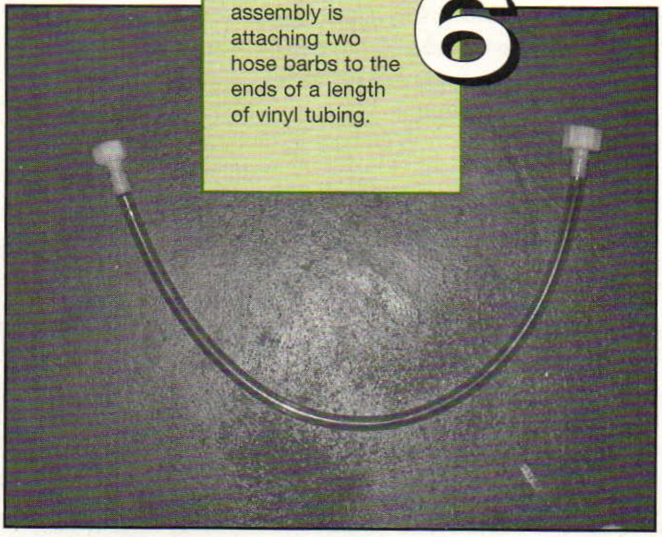
One way to avoid these downsides is to use a non-hydraulic check valve in place of a standard S-shaped or three-piece airlock. For this project, you can use either of two small check valves outlined below and available from US Plastic (available at www.usplastic.com) in conjunction with a drilled rubber stopper or plastic carboy cap (Figure 2).

For polyethylene terephthalate (PET) plastic carboys, use a drilled No. 10 rubber stopper with a ⅜" polypropylene liquid/gas check valve (US Plastic part No. 64049, $1.04) (Figure 3). For glass carboys of any size, use the appropriate-sized drilled rubber stopper with the same check valve as above. I find that the fit is sufficiently snug to ensure proper operation, but if your stopper hole is a little too wide, apply a small amount of 100% silicone caulk to the check valve shaft and reinsert it in the stopper. For buckets, you can simply insert the check valve straight into the rubber airlock grommet and you're done.

a ¾-inch garden hose thread fitting with a hose barb, a ½-inch female NPT fitting with a hose barb, and a length of standard vinyl tubing.

As an alternative for PET or glass carboys, you can use a plastic carboy cap with a ⅜" polyethylene check valve (US Plastic part No. 64001, $1.69). Insert the check valve into the thinner, taller stem (Figure 4). Again, I find the fit to be snug as is, but you can caulk this connection if need be.

The nature of check valves is to allow air to pass through in

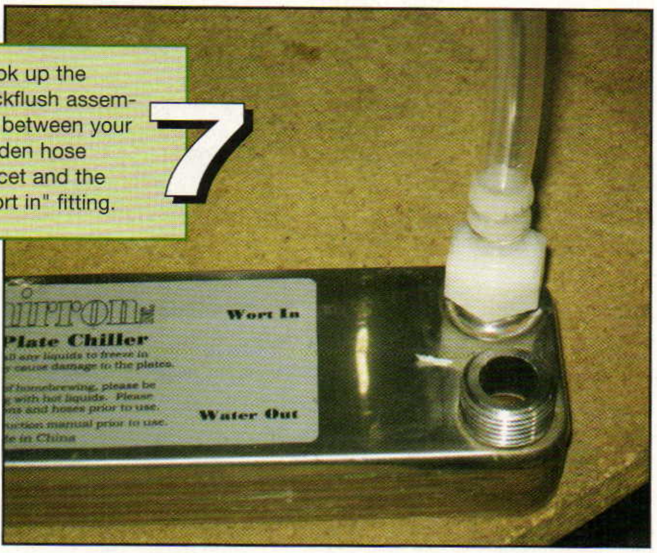


6 A crucial step in making a plate chiler backflush assembly is attaching two hose barbs to the ends of a length of vinyl tubing.

only one direction, so make sure you have the "out" end of the valve facing the outside of the stopper (look for a small arrow on the valve that indicates the direction of flow). Also note that there are several check valves available in the size useful for this project, but most of them have a cracking pressure (the minimum pressure need to open the valve and let out the CO_2) that is too high for our purposes. Please use only the two check valves listed above (or do extensive testing on other models before use), or there is a possibility that you could end up with beer on the floor and ceiling in the best case and serious physical harm from exploding glass in the worst case. Do not underestimate the power of fermenting beer.

Although dry airlocks do not exhibit the familiar and delightful *kerplunk* sound as bubbles escape during fermentation, you can tell it is doing its job by the soft *pfft* sound it makes as gas is pushed through it. Also, for you airlock sniffers out there, dry airlocks expel CO_2 that has not been passed through the sanitizer/water that is in a standard airlock, thus affording an unadulterated olfactory experience.

Please note that a dry airlock should be used in exactly the same manner as a liquid airlock. It is not a substitute for a good blowoff hose should you require one.



7 Hook up the backflush assembly between your garden hose faucet and the "wort in" fitting.

Plate chiller backflush assembly

As competition has increased and prices fallen over the past couple of years, brazed plate wort chillers have grown rapidly in popularity. Their ability to chill wort to pitching temperatures in just a few minutes makes them an attractive addition to any homebrewer's arsenal of equipment. One drawback to homebrew-sized brazed plate chillers, however, is that they cannot be taken apart for cleaning purposes like plate heat exchangers with gaskets. Without proper cleaning and sanitizing, a plate chiller can become a haven for various contaminates that might ruin an otherwise perfect batch of beer. Thankfully, most brazed plate heat exchangers are small enough to be submerged in a pot of boiling water, which is the surest way to sanitize it.

Enter the backflush assembly, which is very simple and yet very useful tool for keeping the "wort" side of your chiller spic and span. You can buy commercial versions of this handy tool for about $20, but you can make one for about $5.

All you need to "get 'er done" is a ¾-inch garden hose thread fitting with a hose barb, a ½-inch female NPT fitting with a hose barb, and a length of standard vinyl tubing (Figure 5).

I chose to work with plastic fittings (US Plastic part No. 63003, $1.51, and No. 62172, $1.04) because they are light and cheap, but you can just as well use brass or stainless steel fittings if you prefer. I recommend using fittings with either ⅜-inch or ½-inch hose barbs. If you have a hot water garden hose connection, consider using hi-temp vinyl tubing instead of the standard stock.

Putting the assembly together is simple. Cut a length of tubing that fits the needs of your brewing space, then simply attach the hose barbs to the open ends of the tubing (Figure 6). In my experience, tubing clamps are not needed but they can't hurt.

Once you've got your wort chilled and in the primary, hook up the backflush assembly between your garden hose faucet and the "wort in" fitting of your chiller and let the water run for a minute or two (Figure 7). Then connect the assembly to the "wort out" fitting (giving the chiller a true backward flush) and let it run for a few minutes as well. The flush water should run clear after just a few seconds as hop particulate and cold break proteins are pushed out of the chiller. Running it for a minute or more is probably overkill, but I'd rather err on the side of caution. From this point, follow your own normal cleaning and sanitizing procedure.

I recommend you pay close attention to sanitizing, as it is very easy to contaminate a batch of wort with a dirty heat exchanger. The most surefire way to clean and sanitize your heat exchanger is using boiling water to either submerge the whole exchanger or pumping the water through the unit (which is more of a commercial method).

Another technique is heating a large volume of hot water and running it into the wort cooler similar to cooling wort. The temperature of the water leaving the unit is measured and the flow rate adjusted to keep the outlet temperature above 180 °F (82 °C). Once the heat exchanger is hot, the flow rate required to keep it hot is quite low. The unit needs to be maintained for at least 20 minutes at 180 °F (82 °C).

Forrest Whitesides writes the "Projects" column in each issue of Brew Your Own *and is an unrepentant airlock sniffer. He lives in Hopatcong, New Jersey with his wife and two cats.*

On The Boil

The keys to success in your kettle

by Bill Pierce

"Double, double toil and trouble; fire burn, and caldron bubble." — *Shakespeare, Macbeth*

One aspect of the brewing process shared by nearly all brewers is boiling the wort. In fact, the symbol for brewing has long been the kettle used for boiling, easily the most recognizable feature of any brewery.

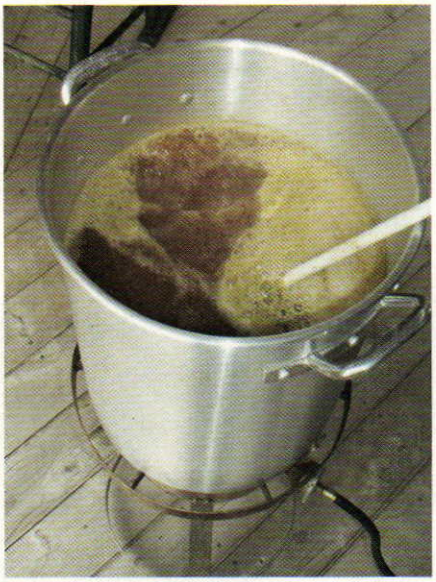


Photo by Michael Pollio

The major goals of boiling are to sanitize the wort, isomerize the alpha acids in hops and coagulate the hot break.

In short, boiling is nearly universal and also important. It affects many of the qualities — gravity, color, bittering, flavor, purity and clarity, to name only the major factors — of the beer we brew. It's worth investigating in some detail.

Boiling by the numbers

During the boil, some of the water evaporates, thereby concentrating the wort. The amount of evaporation varies with the size and geometry of the kettle, the surface area exposed to the air, the intensity of the heat source and to a lesser extent other variables such as the ambient temperature, humidity, air pressure and any movement of air surrounding the kettle.

For homebrew-size batches (5–15 gallons/19–57 L), the evaporation rate is normally measured in gallons (or liters) per hour, with typical values of 1 to 1.5 gallons (3.8 to 5.7 L) per hour. It's worth experimenting to determine the average value for your brewing system. This requires a means of accurately measuring the kettle volume. You can scribe marks on the side of the kettle or make a "dipstick" by marking a tall spoon, rod or a dowel. Gradually fill the kettle with measured volumes of water and make the appropriate marks. Measure the volume both at the beginning and end of the boil and calculate the difference. Divide by the boiling time in hours to determine the evaporation rate.

For example, if the beginning volume is 7.5 gallons (28 L), the ending volume is 5.5 gallons (21L) and the boiling time is 90 minutes, the evaporation rate is 1.33 gallons (5.0 L) per hour:

(7.5 gallons - 5.5 gallons) / 1.5 hours = 1.33 gallons/hour

Assuming the same kettle and burner are used, and that they are capable of maintaining an adequate boil, the boiling losses are largely independent of the batch size because the major factor is the surface area.

It should be remembered that the boiling point decreases with the altitude above sea level. At sea level and standard barometric pressure, water boils at 212 °F (100 °C). Although the formula is not truly linear, a reasonable rule of thumb for the altitudes at which most people live is to decrease the boiling point by one degree Fahrenheit for every 500 feet above sea level (one degree Celsius for every 300 meters). For example, in Denver, Colorado, at an altitude of 5,280 feet (1,609 meters), the estimated approximate boiling point is 201 °F (95 °C). [The more accurate calculated value, using the more complex formula, is 201.8 °F (94.3 °C).]

Hitting the target

If you know your boiling losses and the pre-boil specific gravity, you can estimate the post-boil original specific gravity (OG) of your beer with reasonable accuracy. The formula for calculating the approximate post-boil OG is:

Post-boil gravity points = (Pre-boil volume * pre-boil gravity points) / Post-boil volume

Specific gravity "points" (or GP) are the portion of the specific gravity reading to the right of the decimal point multiplied by 1000. For example, a specific gravity of 1.050 is 50 points.

Using the pre-boil and post-boil volumes from the example above, with a pre-boil specific gravity of 1.036, the projected post-boil OG would be 1.049.

(7.5 gallons * 36 GP) / 5.5 gallons = 49 GP (equivalent to SG 1.049)

Calculating the post-boil OG at the beginning of the boil is valuable because this is the easiest point to make adjustments. If the calculated OG differs appreciably from the target for the recipe, additional extract or water can be added. This subject is covered in detail in the July-August 2005 and January-February 2007 issues of *Brew Your Own*, but the following general rules may be of use to more relaxed brewers:

To increase the gravity of a 5-gallon (19 L) batch by approximately 1 GP at the end of the boil, add 2.5 oz. (72 g) — roughly one-half cup/118 mL — light dried malt extract, or approximately three-quarters cup (177 mL) liquid extract. To decrease the gravity of the same batch by approximately 1 GP, add 24 fl. oz. (710 mL) water prior to boiling. You can also manipulate the OG by changing the boiling time. In the above examples, a 9-minute increase in the boiling time will raise the OG by approximately 1 gravity point, while decreasing it by 9 minutes will lower it by approximately 1 point. The approximate change in the post-boil volume per 9 minutes will be 22 fl. oz. (640 mL).

The bitter truth

is to produce bittering in beer. While the heat dissolves hop resins, the alpha acids in hops are not initially in a form that is soluble in wort or bitter. They must first be isomerized, which roughly means rearranged. Isomerization requires the heat and physical agitation of boiling over a period of time.

Of the total amount of alpha acids in a charge of hops, only a certain percentage is isomerized; the "hop utilization" depends on many factors but in almost no case exceeds 40 percent. For homebrewers, the net figure is typically in the mid-20 percent range for hops that are boiled 60 minutes. (This figure accounts for bitterness lost due to alpha acids adhering to foam during the boil or absorbed by yeast during fermentation.)

What you don't want

Nearly as important as what is transformed and retained during the boil is what is evaporated and driven off. Pale malts especially contain sulfur compounds that can be transformed during fermentation into dimethyl sulfide or DMS, which has a noticeable vegetal aroma and flavor variously described as being like cooked corn, cauliflower or parsnips. DMS is undesirable in nearly all beer styles. Fortunately, DMS is volatile, and a vigorous boil evaporates it and drives it off into the air with the steam. (Heat also converts the DMS's pre-cursor, S-methylmethionine or SMM, into DMS.) For this reason it's important to leave the kettle mostly uncovered during the boil so the steam does not condense and return to the wort. If you do not have a burner with sufficient heat capacity for a rolling boil with the kettle totally uncovered, at least ensure that a significant open area exists in order for the steam to escape.

For all-grain brewers, boiling stops the enzyme activity that results in the conversion of malt starches to sugars. While the alpha-amylase enzymes that are the major factor in this process begin to be deactivated at 158 °F (70 °C), some conversion continues even to the beginning of the boil. Were the enzymes not destroyed completely, the additional conversion would result in a thin beer lacking in residual unfermentable sugars.

Moreover, boiling plays a major role in wort sanitation. In addition to any potentially harmful bacteria, boiling also kills wild yeast and other microorganisms that result in souring and undesirable flavors. Wort boiled for more than ten minutes can be considered sanitary. Further ensuring the safety of beer is the fact that alcohol produced by fermentation, as well as the acidity, also inhibits contamination. No known human pathogens (harmful microorganisms) can survive in beer.

Eat your protein

Homebrewers know that clarity is often a desirable quality, and also that any number of factors can cause the beer to be otherwise. Boiling is part of the solution to this problem. Malt contains proteins and compounds known as polyphenols are present in both the grain husks and hops. Some of these are necessary because they contribute to beer foam and an attractive head on the glass, but in excessive amounts they are a major cause of haze. Many of us have seen the chill haze that can develop when beer is refrigerated and the proteins flocculate (coagulate and become visible). Some of the same occurs when wort is boiled.

During the boil, the heat and agitation — both are necessary — causes the larger proteins and polyphenols to separate from attached water molecules and collect together. The phenomenon is clearly (pun intended) noticeable, and results in the hot break material that appears soon after the beginning of the boil. In worts with significant amounts of protein, such as those containing wheat, the appearance is pronounced, something like that of Chinese egg drop soup (which is caused by denatured egg proteins). Rather quickly (generally within 10–15 minutes) the wort, which has become cloudy as the boil begins, clears considerably, with large particles of hot break floating throughout.

To further assist in the coagulation of proteins and polyphenols, Irish moss is typically added during the last 15 minutes of the boil. Made from a type of seaweed that contains a polymer called carageenan, the moss has a negative electrical charge that is attracted and bound to the positively charged protein molecules.

Unless it is strained, much of the coagulated proteins, break material and Irish moss remain in the wort when it is chilled and transferred to the fermenter, but they are ultimately left behind when the beer is packaged, thus promoting the desired clarity. There is also some indication they provide necessary nutrients for healthy yeast reproduction.

Too much of a good thing

Almost every brewer has experienced the dreaded boilover. Seemingly within a matter of seconds, foam begins to collect on the surface of the hot wort, and the next thing you know it is climbing up and out of the kettle and onto the burner, sticking and burning and creating a mess to be cleaned up afterward. Another potential time for boilovers is during the addition of pellet hops. The tiny particles can provide nucleation sites for bubbles that cause foaming.

Learn to recognize the changes in the appearance of the wort as it comes to a boil. Keep a close watch on the kettle, leaving it uncovered at this point and turning down the heat somewhat at the first signs of agitation. Some brewers skim and discard the early foam, but all that is required is to gently stir the foam into the wort rather than allowing it to build up on the surface. Once a proper rolling but not excessive boil is achieved and the hot break material begins to flocculate, the situation becomes much less critical. Briefly turning down the heat and stirring the wort well immediately after hop additions eliminates problems at those times.

Professional brewers control boilovers with a hose. Spraying water onto the surface of the wort as it begins to come to a boil helps to disperse the foam. Homebrewers can imitate this procedure with a clean garden hose sprayer or spray bottle filled with cold water.

How long?

Boiling times vary with the recipe and the beer style. Extract brewers are generally told to boil the beer for 60 minutes. Coagulation of the proteins in malt extract should occur within about ten minutes. However, the hop alpha acid isomerization necessary for bittering takes considerably longer; at 60 minutes more than 90 percent of this will have taken place. Boiling darkens the wort and the beer; reducing the boiling time will result in a lighter color. A far more important factor in determining color is the wort gravity, another reason to boil the full wort volume if possible, rather than boiling concentrated wort and diluting it with water in the fermenter.

Traditional brewing texts recommend that all-grain beers be boiled for 90 minutes, but my personal experience is that 60 minutes can be sufficient, especially for lower gravity and lighter colored beers. Reasons for a longer boil include the desire for higher wort gravity due to the greater evaporation, and also for flavor changes that occur and are desirable in some styles. Rich beers with complex flavors are often boiled longer.

When subjected to the temperature and agitation of boiling, complex reactions occur between sugars and amino acids, producing substances known as melanoidins. These are usually considered pleasant, resulting in flavors typically associated with the browning of meats and bread. Longer boiling times result in increased melanoidin production and are a major cause of wort darkening. It should be noted this is not quite the same thing as sugar caramelization, which requires higher temperatures and less water than what is present during boiling. Caramelization is part of the process that occurs during the production of crystal and other colored malts.

Sometimes the most reasonable way to produce high gravity wort for a strong beer is by means of a long boiling time. Using the formulas in the previous section on hitting the target gravity, you can adjust the time and calculate the gravity and volume accordingly. For example, if the evaporation rate is 1.33 gallons (5.0 L) per hour, a 120-minute boil of 7.5 gallons (28 L) will increase the pre-boil gravity from 1.070 to 1.108 and reduce the wort volume to 4.83 gallons (18 L).

Additional indications for a longer boiling time include brewing at high altitude where the temperature is lower (the undesirable volatile fractions take longer to evaporate), and situations where the boil is less vigorous than otherwise would be optimal.

What it all boils down to

Boiling is a very straightforward — but essential — brewing procedure. With a little knowledge and understanding of all the particulars and the procedures, you can be the master of your kettle and ensure that your beer is everything you want and more.

Bill Pierce wrote about fermentability in the "Advanced Brewing" column in the May-June 2007 issue of Brew Your Own *magazine.*

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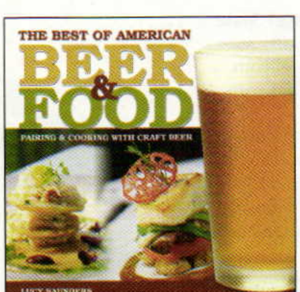

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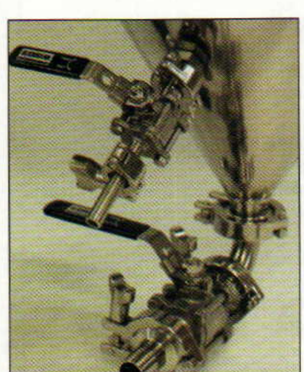

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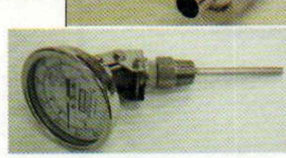

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High Honors

The Beerdrinker of the Year experience

by Diane Catanzaro • Norfolk, Virginia

When I first heard about the Beerdrinker of the Year (BDOY) contest, naturally I was intrigued. What self-respecting homebrewer, meadmaker and beerlover wouldn't be tantalized by the idea of entering — and perhaps even winning — a title like Beerdrinker of the Year? When a friend familiar with the contest described the competition, I immediately blurted out that I'd like to enter, but my ambition was promptly squashed.

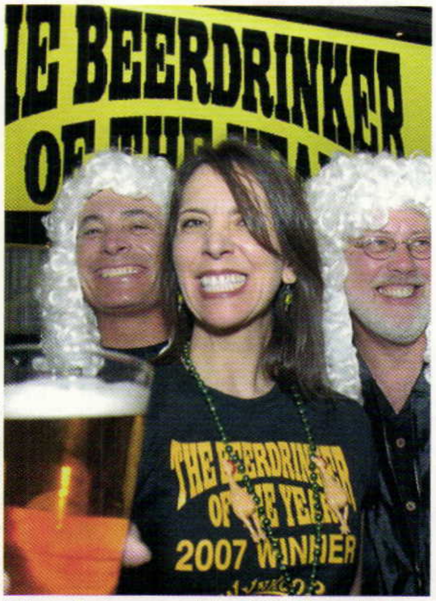

Photo by Duane Howell

Diane Catanzaro at the 2007 Beerdrinker of the Year contest with judges Tom Ciccateri (left) and Tom Dalldorf (right).

"Oh, these people who win are very accomplished beer drinkers" said my friend. In other words, I'd have as much chance of winning this contest as three-days-flat Bud entered in the AHA Nationals' imperial stout category. What happens to a dream deferred? With apologies to Langston Hughes, does it dry up like barley baked in the sun? Or fester like an infected wort — and then run? Does it stink like cheesy old hops? Or crust and sugar over — like a syrupy sweet kriek. Maybe it just fizzles like a foamy keg. Or does it explode?

I was not ready to have my dream fizzle or explode. The next year I decided to enter. By then I had a few more accomplishments under my beer belt, such as passing the BJCP test to become a recognized beer judge, trips to visit breweries in the United States and Belgium, and ongoing service to my homebrewing club, the Hampton Roads (Virginia) Brewing and Tasting Society (www.hrbts.org).

Entering the Beerdrinker of the Year Contest simply involves writing a "beer résumé" describing one's beer appreciation, philosophy, and passion and sending it to the Wynkoop Brewing Company, Colorado's oldest brewpub.

Just writing a beer résumé is actually a fun process. It provides an impetus to actually think about one's philosophy of beerdrinking and put into words your feelings about beer. It gives you a place to detail whatever you have done in your life that relates to beer. My résumé talked about brewery, brewpub and beer bar visits, beer-related travels, homebrewing, beer judging and also included poems I wrote about beer for a beer haiku contest held by Hampton Roads Brewing & Tasting Society.

Three lucky finalists are chosen from the résumé entries and flown to Denver, all expenses paid, for the national finals. I made the top ten on my first try in 2005, but not the top three. In 2006, I entered the contest again, and made it to the national finals . . . lots of fun, but I didn't win. In 2007, I again made the national finals and am happy to say I won against two extremely worthy competitors, Logan Perkins of Denver, Colorado and Phil Farrell of Cumming, Georgia.

The finals are sort of like a combination Jeopardy/Academic Bowl/American Idol for beer conducted in front of an audience of white-wigged, black-robed judges and an audience of beerdrinking fans. Questions range from the technical ("what is the major fermentable sugar in beer?") to the obscure ("who was Pliny the Elder?") to the humorous ("if George Bush was to fall off the wagon, what beer would you serve him?") We were asked to sing beer jingles, tell a fairy tale about beer and demonstrate a field sobriety test. While a bit nerve wracking, the event is conducted with a sense of humor to keep anyone from taking things too seriously.

An unusual aspect of the national finals is the Beer Whispering segment, where each finalist is asked to have a friendly conversation with a beer of their choosing. My beer whispering involved matchmaking a love connection between the Duchesse de Bourgogne and Oskar Blues' Old Chub, culminating in the creation of a tasty blend I call The Chubesse (two parts Duchesse to one part Chub).

How has my life changed as a result of Beerdrinker of the Year? Well, the official prizes of free beer for life at the Wynkoop, my name on a cool plaque, $250 toward a beer party at my local beer bar (the Bier Garden in Portsmouth, Virginia) and not one but TWO Beerdrinker of the Year Winner 2007 T-shirts are pretty nice prizes. Also, I get to work with Wynkoop's Head Brewer Thomas Larsen to design a recipe to be brewed and available at next year's BDOY contest. Cool, huh?

The unofficial rewards are also sweet. Wearing my winner's T-shirt to the Zythos beer festival in Belgium a week after winning garnered so much positive attention that I felt like a rock star. At Cantillon Open Brew Day, owner-brewer Jean Van Roy congratulated me and said that in addition to drinking free for life at the Wynkoop, I could also drink free at Cantillon. (Note to self: MOVE TO BRUSSELS!) The opportunity to talk about beer on podcasts Beer Radio (beerradio.com) and Big Foamy Head (bigfoamyhead.com) was great fun. But what I most appreciate is the opportunity to be an ambassador for beer and change people's perceptions of beerdrinkers. We come from all walks of life. We appreciate this tasty, barley-based elixir that was originally believed to be a gift from benevolent gods. And we love to share our beer, as well as our love of beer, with others.

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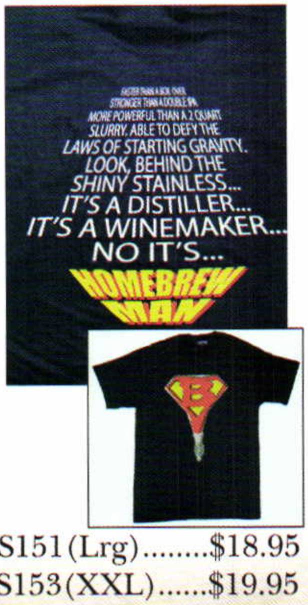

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