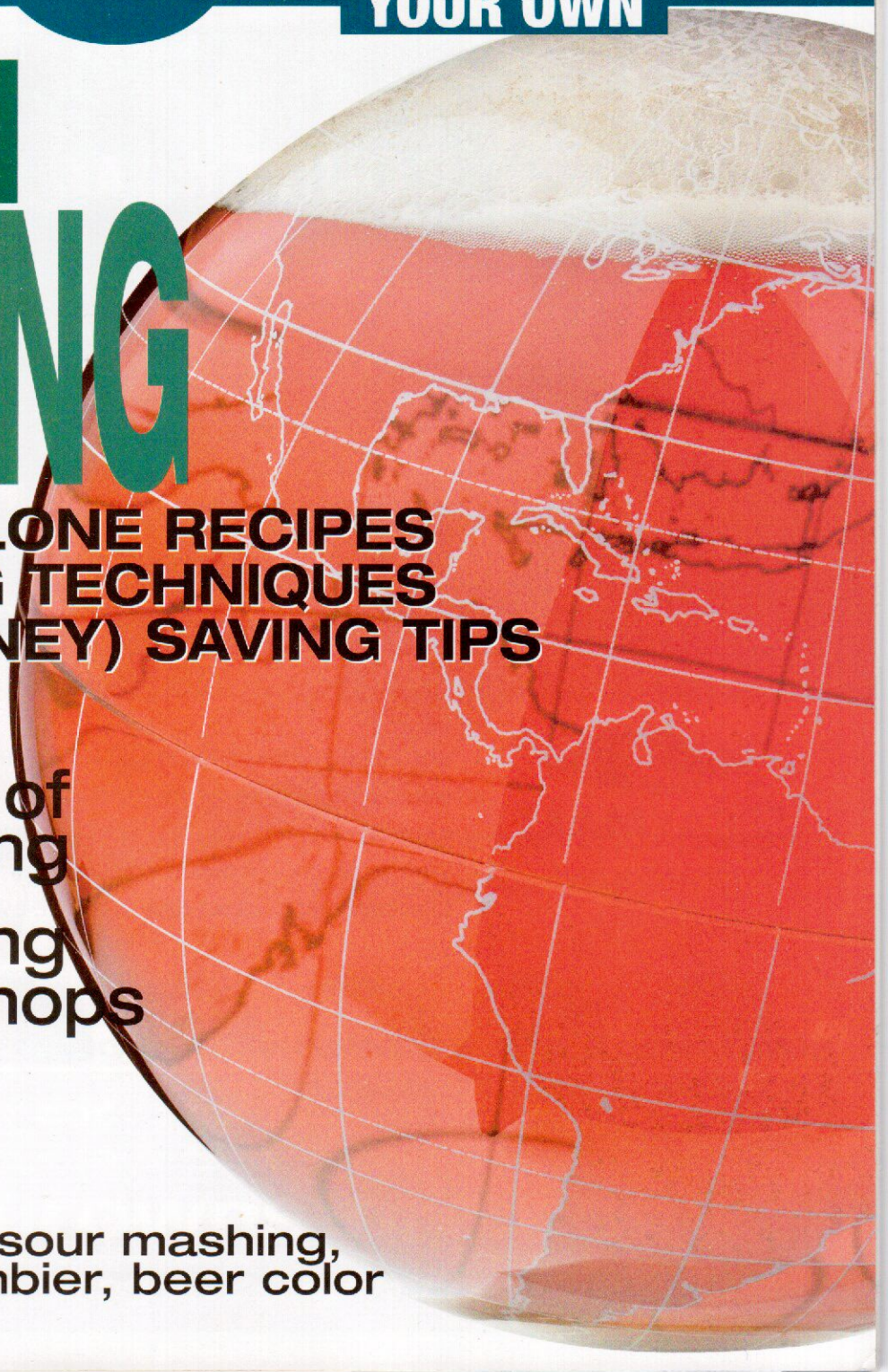
CONVERT KEG TO KETTLE • HOW PROS CLONE BEERS

BrewYour Own

THE HOW-TO HOMEBREW BEER MAGAZINE

OCTOBER 2008, VOL.14, NO.6

GREEN BREWING



6 ORGANIC CLONE RECIPES
ECO-BREWING TECHNIQUES
EARTH (& MONEY) SAVING TIPS

dark secrets of partial mashing

picking & using homegrown hops

www.byo.com
U.S. $4.99 • CAN. $4.99

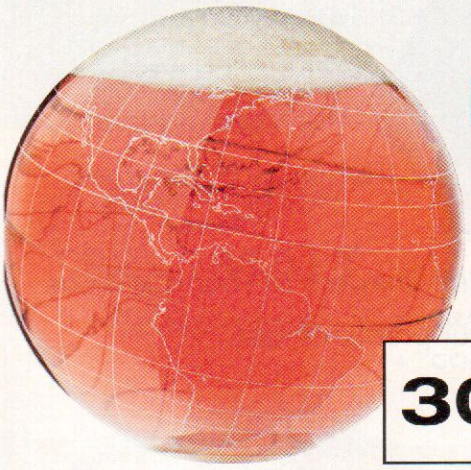
$4.99US $4.99CAN
10>
0 09281 02485 9

PLUS: sour mashing, roggenbier, beer color

Brew Your Own
THE HOW-TO HOMEBREW BEER MAGAZINE
OCTOBER 2008
Volume 14 Number 6

19

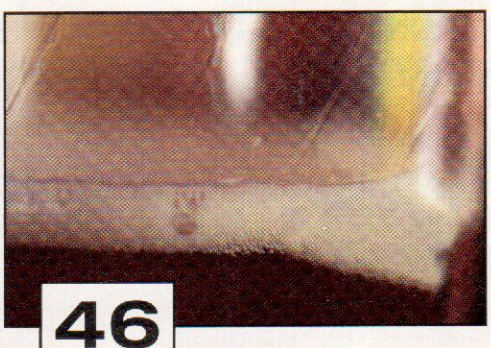
Features



30

Organic

38



46

Departments

Where to find it

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

How to reach us

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

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

Advertising Contact
Kiev Rattee
kiev@byo.com

Editorial Contact
Chris Colby
chris@byo.com

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

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

Special Subscription Offer
8 issues for $28.00

Web Site
www.byo.com

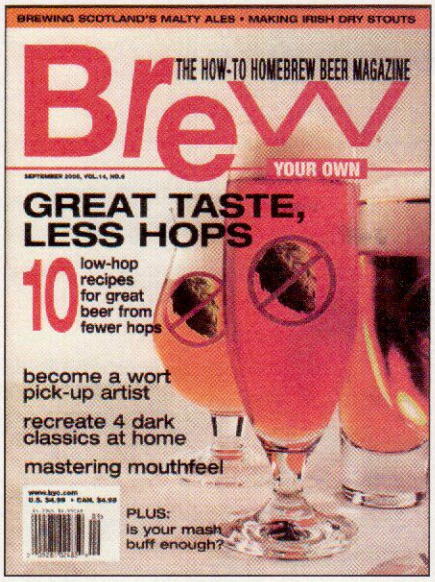
Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for $28.00 per year by Battenkill Communications, 5515 Main Street, Manchester Center, VT 05255; tel: (802) 362-3981; fax: (802) 362-2377; e-mail: BYO@byo.com. Periodicals postage rate paid at Manchester Center,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

Cover Photo: **Charles A. Parker**

Hopping Questions

I was excited to read the hop-stretching tips presented in the September 2008 issue of BYO ("Low Hop Recipes"). However, after thinking about it, I had a few questions. The first thing that popped into my head was a question about making a tea to extract the aroma compounds from bittering hops. Is the aroma from bittering hops any good? I thought there was a reason they were boiled for an hour. Secondly, how does steeping the bittering hops affect their alpha acid rating? And finally, after reading the extensive procedure in the recipe for making an aroma tea to add during conditioning, I couldn't help but thinking why not just dry hop?

Derek Pierce
Portland, Maine



BYO Editor Chris Colby responds: *"The first question asks for an opinion and is fairly easy to answer. Before you brew, open up your package of bittering hops and smell them. If they have an aroma you think would be pleasing in your beer, then try the method outlined in the sidebar to the article. Many commercial breweries use high-alpha hops as late addition or dry hops, so it's not the case that all bittering hops have poor aroma qualities. The pale ale recipe I gave in the article instructs the brewer to extract the aroma from Columbus hops and I personally like the aroma of Columbus. Your mileage may vary.*

"As for how the steeping of the hops affects the alpha acid rating, I honestly don't know. When the aroma is extracted from the bittering hops by steeping them in a French-press coffee maker, the wort is not hot enough to convert alpha acids to iso-alpha acids. As such, no bitterness is extracted. However, it is likely that some percentage of the (non-isomerized) alpha acids get extracted into the tea. In practice, it doesn't seem like the bitterness of the resulting beer is decreased noticeably, but this is from very limited experience on my part.

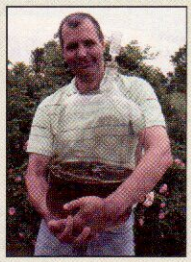
"If you would like to try the method, but are concerned about lowering the level of alpha acids too much, you could try limiting the amount of time they steep in the French press. You could probably extract a decent amount of aroma in just a few minutes, as the aroma compounds are very volatile. In contrast, the alpha acids should be much slower getting into solution. (Note also that when you add the aroma tea to the boil, some percentage of the alpha acids in the tea will get converted to iso-alpha acids, depending on how long before the end of the boil the tea gets added.)

"Your last question is a good one. Dry hopping is very simple, so why not ditch the French press and just add a handful of cones in secondary? The answer is that the hop character is different. In dry hopping, hop aroma is slowly dissolved into the beer. When adding either an aroma tea or a highly-hopped kräusen beer to conditioning beer, you are adding the aroma compounds you would get from dry hopping plus other flavor and aroma compounds that only come from boiling the hops. (In the case of a kräusen beer, you are also adding some bitterness.) A beer with a lot of hops added late in the boil tastes different from a beer with those same hops used as dry hops. In addition, the French press method delivers a lot more hop character than dry hopping.

"I should mention that the ideas in the sidebar came from a variety of sources. A couple years ago, I had tried adding highly-hopped kräusen beer to some of my pale ales and liked the results. Sometime last year, a BYO reader — who prefers to remain anonymous — phoned me and told me about the hot-water hop extracts he was making with a French press. He was using them to get more hop character in his double IPAs. The idea of using the "spent" hops from the French press came to me when I read a Mr. Wizard question submitted by Brad Petit, who asked about recovering late hops from the boil to use as bittering hops in a later batch. The idea of adding hops to the priming sugar came from another reader, who's name is now unfortunately stranded on the hard drive of a dead computer.

To these ideas, I added a few twists, including using weak wort instead of water for making the aroma teas and adding a step where the hops used for making the aroma tea in secondary are also

Contributors



JAMES SPENCER is the host of the Basic Brewing Radio and Basic Brewing Video podcasts, which can be found at www.basicbrewing.com. James started brewing in 1996 and in 1998, he won the only homebrew contest he ever entered — the 3rd Annual Ozark Homebrew Contest. On page 30 of this issue, James offers a colection of tips for green brewing so you can offset your carbon footprint, and still enjoy good beer!

GLENN BURNSILVER is a freelance writer, backcountry adventurer, record collector and frequent contributor to *Brew Your Own*. He has authored several collections of homebrew clone recipes, including the "double" and "imperial" clone story in the December 2006 issue, as well five Belgian-inspired clone recipes in the July-August 2008 issue.

In this issue, Glenn tracked down organic clone recipes from six US brewers. Start brewing organic by reading his story on page 38.

AMELIA SLAYTON is the President and a founding member of Seven Bridges Cooperative Organic Brewing Supplies in Santa Cruz, California. She worked for Greenpeace from 1990 to 1997, and was the manager of the Santa Cruz local chapter until 1997 and has been a homebrewer since 1994. She helped found Seven Bridges in 1996 with other homebrewers, and started the organic ingredient homebrew business in 1997. In this issue, Amelia writes about green homebrewing on page 36 and gives a few "Tips from the Pros," on page 13.

boiled briefly. That last step ends up making the French press method almost as much work as making a kräusen beer, and I suspect many homebrewers will just skip it.

"I think the French-press method is something homebrewers will want to try. Using it, you get a big hop flavor and aroma from a relatively small amount hops. Plus, it's faster and easier than making highly-hopped kräusen beer (especially if you skip the part where you boil the hops for the tea added in secondary). Both methods produce beer with a hop character that — to me — has a "raw" edge. (The best way I can describe it is that it's similar to the character of dry hopping, but in both the flavor and aroma.) I really like the character in pale ales, but it might be too aggressive for lager beers.

"The reader who invented the French press method has now tried it using fresh homegrown hops. His only warning, from experience with 10-gallon (38-L) split batches, is that you can easily overdo it if you add too many hops to the press. (And this is from someone who developed the method as a way to supercharge his double IPAs.)

"As these are methods that are still being refined and tested, BYO welcomes any input from homebrewers on their experiences with or modifications of the techniques. Happy hopping!"

Yeast Not Released

In the July-August 2008 issue, you mentioned Antwerp ale yeast (Style Profile, "Belgian Pale Ale"). White Labs makes it, but it is not available now. Same for Wyeast. Do you know where I can find some? About a year ago, I was in California at a brewery that uses this strain exclusively, but they refused to tell me what it was. It took me a year to figure out what strain it was and then, by coincidence, your article came out.

Larry Stevens
via email

White Labs Antwerp Ale yeast (WLP515) is a seasonal offering. It is usually offered in September and October. So, by the time you see this magazine, you'll probably have found some. (Wyeast's 3655 (Belgian Schelde), released in late 2006 in their VSS series, may also return at some point.)

If you ever need a yeast that is "out of season," your best shot is to ask around at different homebrew shops. One of them may have some stuck in the back of their yeast fridge. To revive out of date yeast, make a weak wort (SG 1.010–1.020) and make a yeast starter with the liquid yeast plus roughly the same volume of starter wort (i.e. don't pitch the yeast straight to a regular-sized starter). Once the "mini-starter" shows some activity, pitch it to a regular-sized yeast starter. Be very careful with sanitation to keep the culture pure.

Questions, concerns, comments?

Contact us!

Brew Your Own
The How-To Homebrew Beer Magazine

5515 Main Street
Manchester Center, VT 05255
edit@byo.com

homebrew NATION

BYO

winning reader RECIPE

National Organic Homebrew Challenge

Richard Lawrence • North Falmouth, Massachusetts

Here is the top winning eastern-division recipe from last year's National Organic Homebrew Challenge, originally published by Seven Bridges Cooperative in Santa Cruz, California.

"Wu Wei Wit"

(5 gallons 19-L, partial mash)

O.G.: 1.050 F.G.: 1.008

One of Richard's hobbies is growing bonsai trees so his home brewery is named "Bonsai Brewery," and he names all of his beers based on Asian and bonsai-related themes. As part of the grand prize, he had the opportunity to brew All American Ale II with Morgan Wolaver at Wolaver's Organic Ales in Middlebury, Vermont (pictured below).

Ingredients for the all-grain mash 50 min.

5 lbs. (2.3 kg) Gambrinus organic wheat malt
1 lb. (0.45 kg) Gambrinus organic Pale Ale malt
1 lb. (0.45) organic oat flakes
½ lb. (0.34 kg) organic wheat flakes

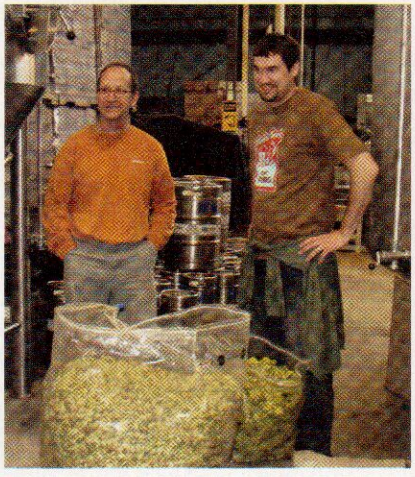
Ingredients added to the boil:

5 lbs. (2.3 kg) Briess organic dried malt extract (boil 15 min.)
½ oz. (21 g) German Saphir whole hops (boil 60 min.)
1 oz. (28 g) German Saphir whole hops (boil 20 min.)
⅔ oz. (19 g) organic whole coriander (boil 20 min.)
½ oz. (9.5 g) organic orange peel (boil 20 min.)
½ oz. (9.5 g) organic lemon peel (boil 20 min.)
1 oz. New Zealand Saaz whole hops (boil 60 min.)
⅔ oz. (19 g) organic whole coriander (boil 5 min.)
½ oz. (9.5 g) organic orange peel (boil 5 min.)
½ oz. (9.5 g) organic lemon peel (boil 5 min.)
½ oz. (9.5 g) organic whole coriander (dry hop 3 days)
½ oz. (9.5 g) organic orange peel (dry hop 3 days)
½ oz. (9.5 g) organic lemon peel (dry hop 3 days)
White Labs WLP400 (Belgian Wit) yeast

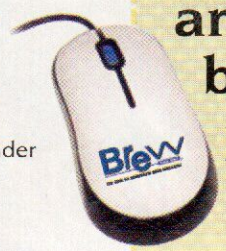
Step by step

Steep the crushed grains in a large grain bag in 2.5 gallons (9.5 L) for 50 min at 154 °F (68 °C). Sparge with 1.5 gallons (5.7 L) of 170 °F (77 °C). Add 1 gallon (3.8 L) of water to top up to 5 gallons (19 L) and the malt extract. Bring to a boil

Divide the spices into three additions and add to the boil as per the ingredients list. Add the hops per the hopping schedule. Cool the wort to 75 °F (24 °C) and pitch the yeast. Ferment at around 74°F (23 °C).



byo.com BREW POLL



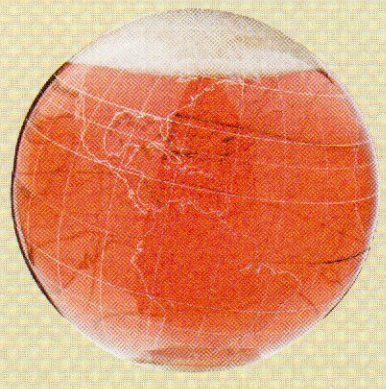
How environmental are your brewing practices?

Realistic. My equipment and circumstances are limited: 46%

Conservative, but not the main focus of my brews: 30%

Sustainable, or I have plans to be more efficient: 14%

Very green. I save as much energy and water as I can: 12%



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

club PROFILE
The Midnight Homebrewers' League
Carroll County • Maryland

The Midnight Homebrewers' League is based in Carroll County, Maryland which is about 35 miles northwest of Baltimore. Founded in 1994 by customers of a local homebrew shop, the club currently has 55 members from central Maryland, Virginia and Pennsylvania.

Some of the proud members of the Midnight Homebrewers' League in Carroll County, Maryland.

From the beginning, the Midnight Homebrewers' League's primary goals have been to promote the homebrewing hobby, and to foster knowledge of beer and brewing among its members. Though more than half of its members have over ten years of brewing experience, the club continues to cater to new and novice brewers, who are the lifeblood and the future of the hobby. Whenever possible, experienced brewers pair with novice brewers at the club's frequent group brewing events, to share their knowledge and experience . . . and the beer.

The Midnight Homebrewers' League is a familiar name around the Carroll County area, frequently getting local news coverage of its large public brewing events including Big Brew in May, its annual Brew-Ha-Ha in July and BrewCamp in October. For the past three years, the club has also hosted a homebrewing information and demonstration pavilion at the Maryland Microbrewery Festival in September.

The club charges annual dues of $15 for individuals and $25 for couples. Members' dues help subsidize the cost of club activities including large group events and the annual Holiday Party. Another more tangible benefit of membership is 10% discount at Maryland Homebrew, located about 45 minutes away in Columbia, Maryland.

Regular club activities include informal tastings approximately every month, and a quarterly newsletter, which focuses on homebrewing practices and techniques, new book and equipment reviews, club news and events, beer and brewing news in general, and homebrew recipes.

Every now and then a serious competition breaks out, like the one held in 2004 to celebrate the club's tenth anniversary. Club members did what very few homebrewers ever get to do: bring a homebrewed beer recipe to the commercial market. The club partnered with local microbrewery Clay Pipe Brewing Company, whose owner Gregg Norris agreed to brew a commercial batch of the winning recipe from the tenth anniversary competition. Midnight Special Pale Ale was an American Pale Ale made with local Carroll County wildflower honey added after primary fermentation, and it was largely sold out at liquor stores throughout central Maryland in about a week's time.

For more information about the Midnight Homebrewers' League, check out http://homecast.net/~midnighthomebrewers/.

WE WANT YOU

Do you have a system or a homemade gadget that will make our readers drool? How about a killer recipe or tip? Want to profile your club? Email a description and photos to **edit@byo.com** and experience fame among 100,000+ homebrewers!

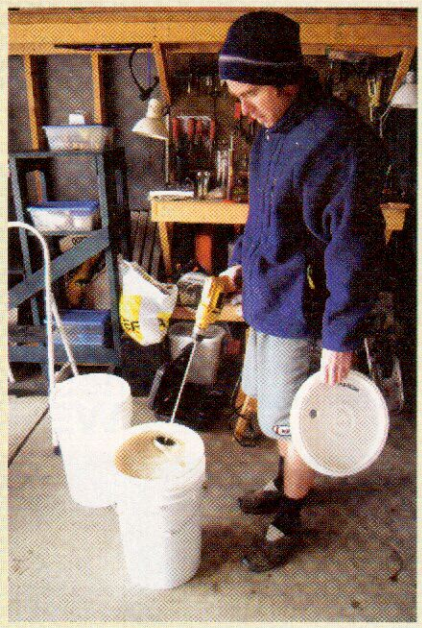
If we publish your article, recipe, photos, club news or tip in Homebrew Nation, you'll get a cool ½ Liter German Stein (courtesy of White Labs) and a *BYO* Euro sticker.

homebrew NATION BYO

reader TIP
Seth Townsend

Erie, Colorado

I have been using an alternative method to aerating my wort prior to pitching my yeast. I am using a simple tool that can be purchased for about 15 bucks at your local hardware/paint store; a paint mixer. The mixer fits on as an attachment to a standard power drill. I usually mix for 3–5 sets of 45 seconds until I get a frothy head of foam that sits just below the top of the bucket. Clean up of the mixer is quick and easy — just drop it in your bucket of clean-up water and let it rip. Cleaned in seconds. This has been used on all my batches in the last several years, including several that won local BIS awards and at least one national placing.



A paint mixer, available at your local hardware store, can speed up the aerating process — and uses power tools, too.

hop PROFILE NZ Pacific Gem

NZ Pacific Gem hops are a bittering, woody, citrusy, high alpha variety that were bred in New Zealand from Smoothcone (also a NZ variety) and Californian Late Cluster x Fuggle. It was released in 1987 by the New Zealand Horticultural Research Centre, now known now as HortReseach.

When grown in New Zealand, which has less hop pests and diseases, Pacific Gem is not susceptibile to damage from disease and is often grown organically. It is sometimes recommended as a substitute for Magnum, Millenium, Nugget, or Columbus hops and works well in bitter and dark beers.

STATISTICS

Hop type: bittering

Alpha acids: 13–15%

Beta acids: 7–9%

Cone structure: long, compact, oval

Maturity: mid-season

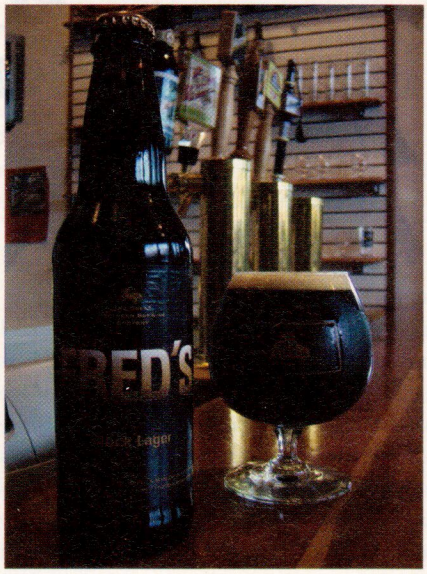
Yield: moderate to high

replicator
by **Marc Martin**

Dear Replicator,

My husband grew up in Iowa drinking yellow, fizzy macrobrews and had no appreciation for beers with flavor. I was born in central California and my dad was a homebrewer. I learned the hobby from him. We now live in Ohio and my husband has finally come around to microbrews. I do all the homebrewing and pick up your magazine at our supply store. I've made several of your recipes and they always turn out great. My family had a reunion at Glacier National Park and I discovered that in the nearby town of Whitefish, Montana was Great Northern Brewing Co. They make a beer called Fred's Black Lager and it is fantastic. I'm not sure of the style but would love to try to brew it. I hope you can help me to duplicate it.

Jill McCormack
Cincinnati, Ohio



I am always looking for an excuse to take a long motorcycle ride and this request presented the perfect opportunity. It is hard to find scenery more dramatic and beautiful than northern Montana. Combine that with the mountain air and great beer and you have a winning combination.

You would also be hard pressed to find a more beautiful brewing facility anywhere in the country. While many breweries are adapted to an existing building this one was built from the ground up and designed specifically for functionality. Modeled after many German gravity flow systems, the brewery is housed in three stories with the roller mill at the top. All levels are accessed by a huge spiral staircase which helps the employees maintain their fitness. As a bonus they lay claim to being the tallest building in Whitefish and can easily be seen from anywhere in town.

The brewery opened in 1994 and was founded by the great, great grandson of Henry Weinhard, famous for his large brewery in Portland, Oregon. Great grandson Fred is the namesake for this beer. They package in bottles and kegs but distribution is only in Montana.

Brewmaster Joe Barberis provided me with a great tour and tasting. He is originally from Kansas and grew up drinking those light American lagers. Upon moving to Alaska to work at Denali National Park he discovered Sierra Nevada Pale Ale. In 1991 he received a homebrewing kit as a Christmas gift and was hooked. By 1994 he was ready to "go pro" and began an apprenticeship at Otter Creek Brewing in Middlebury, Vermont. Opportunity led him to Montana and he now works his magic on their 20 barrel system.

This black lager replicates German schwartzbier, a style that almost became extinct in this country. Today only a handful of American breweries continue to regularly produce this obscure beer. Schwartzbier was originally a regional specialty from southern Thüringen and northern Franconia in Germany. It was thought to be a variant of the Munich dunkel style. The word schwartz means "black" in German.

Great Northern's version of this style has a solid malt base allowing the Carafa® and Carawheat® to dominate. This helps to create a semi-bitter chocolate palate. The highly attenuative German lager yeast produces a well balanced beer with a somewhat dry finish accentuating the noble hop profile. Overall, I found this to be a memorable and classic example of a Schwartzbier.

Now that you have the recipe for Fred's Black Lager you can help perpetuate this style and "Brew Your Own".

For further information about the brewery and their other fine beers visit the brewery on the Web at: www.greatnorthernbrewing.com or give them a call at 406-863-1000.

Great Northern Brewing Fred's Black Lager

(5 Gallons/ 19 L. extract with grains)
OG = 1.052 FG = 1.012
IBUs = 28 SRM = 24 ABV = 5.2 %

Ingredients

3.3 lbs. (1.5 kg) Muntons light, unhopped, liquid malt extract
2 lbs. (0.9 kg) light dried malt extract
1 lb. (0.45 kg) 2-row pale malt
10 oz. (0.28 kg) Carafa® malt (400 °L)
6 oz. (0.17 kg) Munich malt
7 oz. (0.19 kg) Carawheat® malt (40 °L)
6.5 AAU Magnum pellet hops (60 min.) (0.5 oz./ 14 g of 13% alpha acid)
1.85 AAU Hallertauer pellet hops (10 min.) (0.5 oz./14 g of 3.7% alpha acid)
½ tsp. Irish moss (last 15 minutes)
White Labs WLP 830 (German lager) or Wyeast 2308 (Munich lager) yeast
0.75 cup (150 g) corn sugar for priming (if bottling)

Step by Step

Steep the crushed grain in 2 gallons (7.6 L) of water at 154 °F (68 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.8 L) of hot water. Add the liquid and dried malt extracts and bring to a boil and add the hops and Irish moss as per the schedule. Add the wort to 2 gallons (7.6 L) of cold water in a sanitized fermenter and top off with cold water up to 5 gallons (19 L).

Cool the wort to 75 °F (24 °C). Pitch your yeast and aerate the wort heavily. Allow the beer to cool over the next few hours to 65 °F (18 °C). When evidence of fermentation is apparent drop the temperature to 52 °F (11 °C). Hold at that temperature until fermentation is complete (approx. 10 days). Transfer to a carboy, avoiding any splashing to prevent aerating the beer. Condition for 2 weeks at 42 °F (5 °C) and then bottle or keg. Allow to carbonate and age for 4 weeks and enjoy your Black Lager.

All-grain option:

This is a single step infusion mash. Replace the malt syrup with 6.75 lbs. (3 kg) 2-row pale malt and increase the Munich malt to 3.5 lbs.(1.6 kg). Mix the crushed grains with 3.5 gallons (13 L) of 172 °F (78 °C) water to stabilize at 154 °F (68 °C) for 60 minutes. Sparge slowly with 175 °F (79 °C) water. Collect approximately 6 gallons (23 L) of wort runoff to boil for 60 minutes. Reduce the 60 minute hop additions to 0.4 oz. (11g) Magnum and 0.4 oz. (11g) Hallertauer to allow for the higher utilization factor of a full wort boil. The remainder of this recipe and procedures are the same as the extract with grains recipe.

Homebrew CALENDAR

October 4

Westminster, Colorado

2nd Annual KROC World Brewers Forum Homebrew Competition

The Keg Ran Out Club of Bloomfield, Colorado will hold this AHA/BJCP sanctioned event. This is an all-IPA homebrew competition. $5 per entry. Medals awarded for top entries and Best of Show at the World Brewers Forum on October 9 in Denver, Colorado. Entries accepted 9/22–9/29. For more info visit http://kroc.org.

October 17-18

Houston, Texas

Dixie Cup XXV

Held by the Foam Rangers, the 25th annual Dixie Cup Homebrew Competition is one of the final qualifying events for The Masters Championship of Amateur Brewing. As always, the competition will feature a special beer category. This year . . . Malt Liquor. $7 entry fee until 9/19. $10 entry fee until 9/26. For more info visit http://www.crunchyfrog.net/dixiecup/.

October 24-25

Fargo, North Dakota

Hoppy Halloween Challenge

For the 11th year, the Prairie Homebrewing Companions will crown the "Great Pumpkin" of brewers. All BJCP categories are accepted. One category unique to this event is the Halloween Themed Beer. The competition will conclude with an awards banquet. For more info and rules visit http://www.prairiehomebrewers.org/index.htm.

October 25

Placerville, California

"Queen of Beer" Women's HBC

2008 marks the 12th year of this AHA/BJCP sanctioned competition, which is held by The Hangtown Association of Zymurgy Enthusiasts. First entry is $8. Each subsequent entry is $6. Entries will be accepted between 9/26 and 10/11. Sorry gents, only ladies are allowed to compete for "Queen" status. For more info visit http://www.hazeclub.org/.

BEGINNER'S block

Home Hop Brewing

by Betsy Parks

If you followed the advice from previous issues of *BYO* this year for growing and processing your own hops, you should be getting ready to use some of your homegrown harvest. But before you start substituting your store-bought supplies for your backyard bounty, take some advice for brewing with cones grown at home.

What's the difference?

The best uses for homegrown hops are finishing and dry hopping, which is true for two reasons: they are fresh and their bitterness levels are unknown. Just like commercial hops, the bitterness of backyard hops can vary from year to year. But while commercial hops are scrupulously tested in labs, it's not so easy to figure out what the levels are for a small batch of hops grown at home.

Ambitious brewers who want to know exactly what's in their hops can send a sample to be analyzed (for a fee) to a commercial lab that works with commercial growers to get this information, but there are no simple, proven methods for determining alpha acids at home. So if you want to use your hops for bittering without waiting for an analysis (especially if you only grew a small amount of hops), you're going to have to adapt. Otherwise, save your homegrown hops for after the boil is over.

Bittering

If you really want to use your hops for bittering, there are ways of making educated guesses for figuring out their bittering potential, but it takes experimentation. The first method is to estimate the hop's alpha acids by looking up a hop's typical profile and brewing with your own hops accordingly (see *BYO's* online hop chart at www.byo.com/referenceguide/hops/). This may (often) not yield the same results as brewing with the commercial versions, so a few test batches may be helpful for finding the right recipe adaptation. Another method is to brew two batches side by side — one with commercial hops, the other with your homegrown hop equivalent — to get a taste of how your hops compare.

Finishing and dry hopping

One of the benefits of homegrowing hops, much like growing other herbs or vegetables, is that they are much fresher and sometimes more fragrant than anything you can buy in a store, and boiling homegrown hops for bittering could be compared to using heirloom Brandywine tomatoes for canning instead of in a salad — sure it works, but you lose the freshness. And since bittering is a bit of a gamble, lots of brewers reserve their backyard hops for adding aroma and flavor.

Use your homegrown hops for finishing and dry hopping (or in a hopback) just as you would with your regular commercial hops, but you might also choose some recipes that really highlight the hops' best characteristics. For example, try hop-friendly styles such as a pale ale, IPA or California Common. (read more about dry hopping at http://byo.com/departments/1105.html).

Tips

Since your hops are loose cones, you may want to keep them under control while you are brewing by using an herb ball or a nylon or muslin brewing bag so that you don't clog up the spigots or small connections in your brewing equipment. Just be sure to pack the hops in the bag or ball loosely to allow them lots of exposure to the beer.

Also, remember that hops are light and temperature sensitive, so only take out as much as you need for the batch you're currently brewing. Store the rest of the hops in a sealed, preferably light-sensitive bag in a cool place or the freezer until you need them. (For more information about processing homegrown hops, read *BYO's* May-June 2008 "Techniques" column on page 54).

Organic at Home

How your beers can impact the environment

by Betsy Parks

What's better than a great homebrew? A homebrew that is good for the environment and sustainable farmers! This issue two brewers discuss the reasons for going organic at home, how ingredients can shape your brews and what to avoid in the brewhouse.

AMELIA SLAYTON, President and Founding Member of Seven Bridges Cooperative Organic Brewing Supplies in Santa Cruz, California (lower left). Amelia worked in the environmental movement for Greenpeace from 1990 to 1997, and was the manager of the Santa Cruz local chapter until it closed in 1997. She started homebrewing in 1994, and experimenting with organic ingredients a year later at a time when access to organic ingredients was limited to one base malt and a few free samples of German organic hops obtained from HopUnion. She helped found Seven Bridges in 1996 with other homebrewers, and started the organic ingredient homebrew business in 1997.

Whenever I hear the question why brew organic, my first response is why not? When it is possible to brew beer that tastes just as good if not better than non-organic beer, and when knowing that the choice to brew organic means less chemicals sprayed on farms, endangering health and clean water supplies, and less chemicals in the beer, why not? When the reward at the end of the organic brewing adventure is great tasting, healthy beer that I can feel great about, why not?

They say necessity is the mother of invention, and that could not be more true than when it comes to brewing organically. Because there are so many ingredients that are not available as organic, it forces brewers to get creative with their recipes and this often results in unique beers. Almost every day I have to make choices about ingredients to try and achieve the same result with a more limited range of ingredients. For instance, many recipes call for Victory malt, which is currently not available organic. The best substitute I have found is a half and half mixture of Briess organic Munich malt and Weyermann Caramunich® malt. This blend gives the sweet nutty flavors plus the toasted biscuit flavors . . . not exactly the same as biscuit malt but a pretty tasty substitute that also hits the target color range.

Choices about hops are also a daily occurrence. When making a substitute for a hop, lets say Chinook, first I try to learn as much about that hop as I can. For example, Chinook was developed from the Goldings variety and is employed as both a bittering hop and as a flavor hop. If I want to match the bitterness of Chinook I would choose another high alpha acid hop such as Pacific Gem or Admiral. If the herbal-spicy, slightly piney aroma characteristic is desired, I would pick a German Perle or Goldings hop. In some cases, using two different hops to achieve the desired effect is the best solution.

There are some things I would not consider doing as an organic brewer. Using unfiltered municipal water that has been treated with chlorine or chloramine is one, although I know quite a few brewers who rely on evaporation to remove chlorine. A simple charcoal filter such as a PUR® faucet filter is an affordable way to filter water at home. I never buy bottled water unless I need distilled water to cut the mineral content for brewing a lager. Most bottled water is simply filtered water, and packaging and transporting it has a huge impact on the environment, and all the plastic bottles taking up landfill space or ending up in lakes or oceans is another huge problem. I also never use chlorine bleach as a sanitizer because chlorine, even in the mild household form, is quite volatile and can bind with organic molecules (such as those found in brewing grains or hops) to form dioxin, one of the deadliest toxins known and considered to be 300,000 times more carcinogenic than DDT. While multiple studies have shown chlorine to be safe to use as a household bleach or cleaner, I would rather not take my chances when I have so many other choices, such as Iodophor, peroxide, or acid-based sanitizers.

Brewing organic is a little more expensive than non-organic, although recent shortages of malt and hops have actually had the effect of equalizing prices somewhat. Basically, it's an issue of supply and demand. The supply of organic ingredients has not been sufficient thus far to meet the demand by brewers, both commercial and homebrewers, thus the prices have been higher. When we first started out in 1997 the ingredients available cost as much as three times their non-organic counterparts, but today the average price difference is more like 20%. Growing organic crops is not always more expensive than crops that depend on sprays as pesticides and other agricultural chemicals are quite expensive. Usually the money saved by an organic farmer is offset by higher labor costs because more work has to be done by hand. Also, most organic farms are smaller and do not have the same cost savings due to mass production.

Think of organic brewing as a new and exciting adventure and to remember that it is just as fun as any other kind of brewing. The challenges are not overly hard and the rewards are just as sweet. The journey to organic homebrew nirvana begins with the right knowledge and tools, and ends when that cold glass of organic beer is in your hand with knowledge that it arrived there with less of an impact on our planet Earth.

STEVE PARKES, Brewmaster for Wolaver's Organic Ales and Otter Creek Brewing in Middlebury, Vermont. In addition to being the owner and lead instructor for the American Brewer's Guild in Salisbury, Vermont, Steve oversees the production of all the organic brews produced at Wolaver's, which became a part of Otter Creek in 2002.

The reason for brewing organic is to support organic farming. Modern farming agribusiness is dangerous and detrimental while traditional methods have been time tested over the years.

Organic brewing is certainly more expensive, doesn't have as widespread an appeal as conventional brewing and is harder to sell than some more mainstream products, but it does provide that tie to farming as an agricultural process.

Using organic ingredients can be a challenge, but not when finding malt — the maltsters take care of that for you. Organic malts are very good for brewing and you can see them ferment well. There are less producers of organic malts, but the products that come out of those malt houses are very similar to the conventional counterparts. Organic specialty malts are also coming from companies like Briess and Weyermann and the quality and range is there. There is also a huge availability of organic spices, for example Wolaver's uses an organic orange peel.

Organic hops are a different story, however. New organic hop fields are probably the most exciting thing for me. Over the past ten years we supported at least two different hops growers in Oregon, both of whose crops failed once they became certified. We are now supporting a third grower who just became certified.

Availability of hops does affect the styles you brew, such as if you want to brew a classic beer style, so you have to brew based on the availability of the hops. But American homebrewers are not known for following the rules so you can certainly make all kinds of interesting things with the hops that are available. From Germany you can get pretty good quality Kent Golding, Hallertauer Tradition, Perle, Saphir and Spalt, from England there is organic First Gold and New Zealand produces Hallertauer and Pacific Gem, which are all available to homebrewers so you can make some interesting beers with those. This year we're getting organic Fuggle, Magnum, Golding and some Cascade. You can also grow hops in your garden, presumably without chemicals.

At home, keep in mind the obvious stuff about cleaning and chemicals. Use water and elbow grease instead of chemicals and don't use chemical additives. If you follow those rules and source good ingredients, you can be pleased about the impact your five gallons (19 L) of beer is having on the environment.

Bittering Substitutes

"Help Me, Mr. Wizard"

Steeping grains and what makes beer better

by Ashton Lewis

Hop subs

When substituting bittering hops, how important are the hop characteristics? It would seem that the boiling of the hops destroys most everything except the desired bitterness. Also, the hop substitution guide lists Northern Brewer as a substitute for Perle but not the reverse. Can you clarify this for me?

Vern McConnell
Victoria, British Columbia

In my experience, variety does matter whether you are substituting hops in a recipe primarily for bittering or for aroma. The compounds in hops that contribute bitterness to beer are the alpha acids, with humulone, adhumulone and cohumulone being the most significant in terms of amount. Hop chemists use several methods to separate the various compounds in hops and brewing scientists have tried to figure out the effect these compounds have on finished beer flavor. One conclusion scientists made over decades of this type of research is that beers made from hop varieties high in cohumulone have a harsh and unpleasant bitterness. As it turns out, the so-called noble hop varieties are low in cohumulone and this "noble" rank may have been originally assigned to those hop varieties that produce a mellow bitterness.

When you substitute one bittering hop variety for another I think it is important to understand what you are brewing and what that hop variety means to the recipe. If, for example, you are brewing a recipe for a beer that you have never brewed and the recipe calls for a hop variety that is not available at your local shop, substituting just about any variety will not end up in disaster. After all, you have never brewed this beer, have no preconceived expectations and will not know how your change affected the outcome of the brew. If you choose a variety that you like and have used before, then the substitution is not a big deal.

On the other hand, if you have been brewing McConnell's award-winning Irish Ale for the last 20 years using a specific hop variety, and suddenly that hop variety is not available, things get a bit more complicated. In this case a brewer is certainly not going to grab whatever source of alpha acids is lying about in the hop room. Instead they are more likely to select a replacement variety that has a similar alpha acid profile as the original variety.

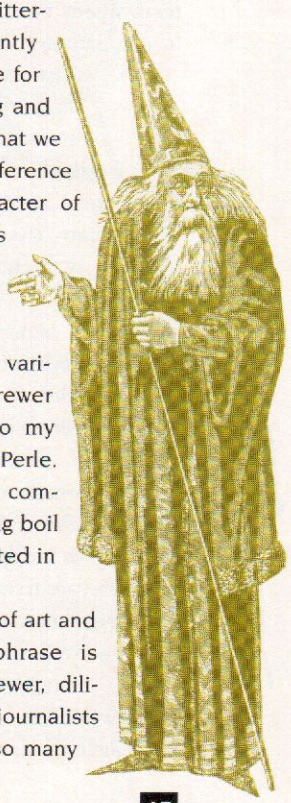
I also like a substitute that has a similar alpha acid content because the plant matter in the hop does contribute flavor. Let's assume a hop variety has been used with a very low alpha acid content and the beer being brewed has a target bitterness level of 25 IBU. If we substitute a variety for the original that has five times more alpha that means that the weight of bittering hops will decrease by a factor of five. If the high hopping rate in the original formulation contributed a grass-like character to the beer then this high-alpha substitute is likely to alter the flavor profile.

Some readers are probably mocking my example . . . "well Mr. Wizhead, this new brew is obviously a marked improvement and the judges at the brew competition are not going to blah, blah, blah" . . . but in the commercial world of brewing consistency is extremely important. So this question has a very different answer depending on the brewer. In the commercial world, when a beer has a glaring defect it is important for it to be consistent because it is part of that beer's identity. It's the equivalent of "fixing" the gap in Lauren Hutton's charming smile.

Aroma variety substitutions become more difficult because humans are more able to detect small variations in aroma than we are at detecting small variations in compounds that we perceive with taste buds and the trigeminal nerve. We are able to differentiate thousands of aromas while only a small handful of tastes. This is why it is difficult to taste food when you have a cold and is also why little kids hold their noses when being forced to eat something new with an objectionable taste. It's really the sense of small that is being disturbed, not the taste buds or trigeminal nerve.

This is an obtuse way of saying that if you change from one aroma variety to another the differences probably will be detectable, assuming that enough aroma hops are used to make a reasonable contribution to the overall bouquet of the beer and that you have a sniffer that is in good working order. Again, if you are not selling your beer things get easier. I like changing things up because it broadens my personal knowledge of things and if you substitute Perle for Northern Brewer, or vice versa, not only will you have first-hand experience of how this affects aroma, you may also stumble upon something that you really like. You cannot learn this from a table. This is why commercial brewers use pilot breweries to test new ingredients, process changes, etc.

A substitution guide is usually subjective and is based on a combination of conclusions drawn by evaluating data on a hop's composition and personal experience. I would substitute Perle for Northern Brewer and Northern Brewer for Perle if the hop is used as a bittering hop. In fact, I recently had to find a substitute for Perle used for bittering and Northern Brewer was what we chose. No significant difference in the bitterness character of any of beers was noticed. If the substitution was for an aroma addition I would not have chosen the same variety since Northern Brewer has a coarser aroma to my nose in comparison to Perle. But since the aroma compounds evaporate during boil this difference is not noted in the finished beer.



Brewing is a blend of art and science. While this phrase is uttered by many a brewer, diligently copied down by journalists and has been printed so many

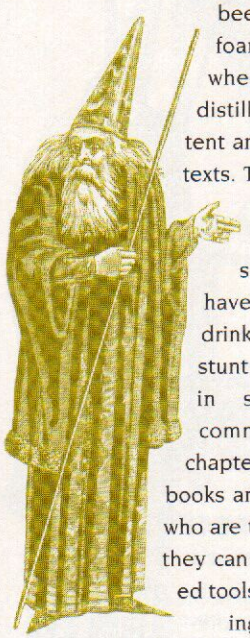
times that it has truly become cliché, it is also very appropriate when discussing hop selection.

Steep or mash?

Serious brewing references say that grains like oats and flaked barley need to be mashed with base malts rather than just steeped. I have heard that steeping these grains leads to problems with haze, increased possibility of contamination and shorter shelf-life of finished beer. Despite this, I often see these ingredients in extract recipes with instructions to just steep at 160 °F (71 °C). Are the concerns about steeping these grains warranted, and these are just bad recipes? Alternatively, is there a time and place for steeping these grains and what differences can be expected from using them in this way?

Colin Henein
Ottawa, Ontario

I assume when you use the term "serious brewing references" you mean texts that are full of chemistry, biochemistry, microbiology and engineering principles. These serious references are totally devoid of recipes and none on my bookshelves have a picture of anyone actually drinking beer. Pictures of beer torture are the norm. Colloidal stability tests where beer is cycled hot and cold in incubators, foam stability tests where beer is sacrificed to assess its foaming potential and tests where beer is boiled to distill and assay its alcohol content are the photos in the serious texts. These texts are for commercial brewers.



Homebrew texts (presumably not so serious) do have recipes, photos of people drinking beer while brewing (a stunt that would get anyone's can in serious trouble in the commercial world) and long chapters on the beer style. These books are targeted to homebrewers who are trying to brew the best beer they can using the sometimes limited tools and time that they are willing to buy, build and devote to their hobby.

I am a product of formal brewing education and like the science contained in these serious texts. When I put on my mortarboard I say that the only grains that belong in a steeping bag are crystal/caramel malts, roasted barley and roasted malts. Anything else must be mashed. This rule makes extract brewing fairly limited and would seem to suggest that all-grain is the way to go. While I am a big advocate of all-grain brewing, because it is the path to brewing freedom and also is not nearly as difficult as all-grain brewers claim when their chests are all puffed and inflated while critiquing the efforts of extract brewers, this method does add more time to the brew day. And if you are fastidious about your kitchen and don't have a place that is as easily cleaned up with a hose as it is soiled by digging out a lauter tun, extract brewing has its benefits.

Extract brewers, in their pursuit of creativity, have tossed out much of the basics about mashing found in serious brewing texts. I typically turned a blind eye to many of the methods described in extract recipes because my brewing experience is different. The way I see it is that enough brewers are using materials in ways that fly in the face of commercial convention that their efforts are surely not the brewing equivalent of pounding sand.

But what does really happen when raw cereal grains and malted grains are steeped in a dilute solution at or above 160 °F (71 °C)? The starches and simple sugars contained in these grains will dissolve in the steeping liquor and any enzymes present will also be released into solution. The concentration of starches and enzymes in a brewery mash is considerably higher and, in accordance with Michaelis-Menten enzyme kinetics, the rate that these starches are converted to fermentable sugars is also considerably higher compared to what is seen in an extract brewer's steep pot. Additionally, any enzymes present, for example if Munich malt is steeped, in this solution begin to denature because of the high temperature. In a nutshell, this means that not much starch degradation occurs.

Since brewing yeast does not secrete enzymes that degrade starch and do not ferment starch, any starch in wort will be found in the finished beer. And as you state, starch in beer can cause haze issues and can also cause problems with microbiological stability. Certain yeasts, such as *Brettanomyces*, and bacteria, such as *Pediococcus*, can cause super-attenuation. This means that these organisms can ferment compounds that brewing yeast do not. If starch remains in beer it is an invitation to these possible contaminants to grow and spread their funk into your beer. Usually this is unwanted, but if you wanted to brew something funky then these bugs may be just what are needed. As it happens lambics have starch in their worts before fermentation and the distinctive character in these beers arising during the long aging (after a somewhat normal yeast fermentation) requires residual carbohydrates for these bugs to chew on.

When I make suggestions about brewing I do stick to my formal training and I do not personally recommend steeping grains other than crystal/caramel and roasted types. Any other material used in the brewhouse needs to be enzymatically acted upon in a brewers mash.

With that being said, other brewers have different opinions and offer different advice. While it seems from the number of recipes suggesting unconventional advice that such advice may indeed work for those offering it, I do recommend taking this advice with some skepticism and caution. If one of the primary goals of homebrewing is to brew good beer a logical brewer will recognize that the practices used by commercial brewers share this goal. If a technique is not commonly used by commercial brewers there is probably a reason. Of course commercial brewers, with very few exceptions, employ a mashing method and techniques surrounding steeping that are totally irrelevant.

So if you are an extract brewer, I would heed the warnings of the texts while also listening to practical advice offered by fellow homebrewers who have developed good beers with unconventional methods.

From good to great

What are some of the brewing techniques that separate good beers from great beers?

Andy Mattarese
Newport, Vermont

This question could be addressed by focusing on what most brewers think of when pondering "brewing

technique." Mash oxidation, fermentation control, wort aeration, pitching rate, etc. I have commented on these subjects in many past columns and will avoid these important topics in attempting to answer this difficult question. Given sound brewing technique, I think what really makes a great beer is recipe formulation and recipe refinement. In beer competitions one of the things that judges do is to compare a beer sample to some paradigm of that style. The beer being judged is held against this real or imaginary standard and greatness is partially granted if the sample lives up to the standard. I think this is a narrow way to evaluate a beer.

When I am tasting beer, I rarely think, "This IPA is really delicious, but it lacks the proper hop level for this style." I tend to taste the beer in the glass and think more about my flavor experience than I do if it conforms to the name it was given. Don't get me wrong, I am not dismissing the importance of style but a really great pale ale may make for a mediocre IPA and the real corrective action may simply be renaming the beer.

To me great beers begin with a great recipe. Sounds pretty obvious, but too often bad beers are deemed so for the wrong reason. Before brewing a beer spend time thinking about the recipe. Have you used the ingredients specified? If you think that ingredient substitutions may improve the recipe you are preparing to brew then these ideas should be considered. After all, a recipe is really just a general guide to brewing a new beer.

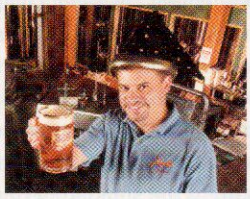
The recipe should also be considered for balance. Although it is hard to know if a recipe is balanced by simply reading, a good impression of balance can be made by comparing the bitterness to specific gravity, imagining how late hop additions are going to marry with the fermentation aromas, how sweeter malts, like crystals, will pair with any roasted malts and how these characteristics will all be cast against the finished gravity expected by the recipe. Experienced brewers begin to taste a beer described in a recipe similar to how musicians can hear a piece by simply looking at a piece of music. Whether brewing a big hop bomb or a delicate blond lager, great beers tend to have balance.

Recipe refinement comes into play after a beer is brewed and the brewing methods, ingredients and their proportions can be evaluated in the glass. Great beers rarely are the product of just one brew and take time to form over time. Some changes that brewers often make to really fine tune a beer involves changing specific ingredients. For example, say you have an amber ale and you really want some residual sweetness from crystal malt and you are not getting the finish flavor that you desire. Some brewers would respond to this deficiency by increasing the amount of crystal. This is one strategy, yet the answer may be found by changing the type of crystal malt. This may mean changing from one color rating to another or can come from using the malt of a different maltster. There is a great variety of special malts available to brewers and real differences are found among the various suppliers.

The same refinements can be applied to any and all of the brewing raw materials; hop variety, hop type (cone versus pellet), yeast strain and water chemistry. I recently visited a friend in Burlington, Vermont and was discussing brewing (what else do brewer friends discuss?). Bill Cherry is the owner and brewmaster of Switchback Beerworks and has been very successful by brewing a single, draft-only beer, Switchback Unfiltered Ale, since he opened his brewery in 2002. I honestly do not know what style Bill's beer fits into because he really did not think of style when he formulated his beer. Balance, drinkability, and uniqueness were some of the things considered when he formulated his beer. I do know his creative process, but imagine it involved fine-tuning his brewing experience with different methods and ingredients in order to satisfy his brewing objective. The result is a beer that is interesting, different from others on the market, balanced and simply enjoyable to drink.

To me this type of mental exercise is a brewing technique that is often overlooked because techniques are usually procedures that are perfected by practice. Much like most musicians begin by playing scales over and over again, brewers must master the basics by practicing the basics of brewing until the basics become second nature. It's the art of brewing, a technique unto itself, that must be developed on an individual basis. The brewing artist begins this journey by brewing, taking notes, written and mental, and tasting, tasting and tasting. Eventually enough information is accumulated to begin improvising, while always remembering the basics. In my brewing opinion, this is one of the key techniques separating great beers from good beers.

The take home message is feel free to experiment and refine. Recipes are not set in stone and just because a recipe is printed does not mean that it is a good recipe. Even a "bad" recipe can be in the inspiration of a great beer in the hands of a great brewer. Not because the great brewer can robotically follow the recipe with surgical precision, but because they can spot the flaw in the recipe and use their skill and creativity to fix it!



Brew Your Own Technical Editor Ashton Lewis has been answering homebrew questions as his alter ego Mr. Wizard for the last 12 years. A selection of his Wizard columns have been collected in "The Homebrewer's Answer Book," available online at brewyourownstore.com.

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

Roggenbier

The weizen-style rye beer

by Jamil Zainasheff

It is difficult to find good examples of the roggenbier style. Few commercial examples exist and those that do are rarely shipped around the world. That is why I was so excited when I heard that my friend John Curtis was teaming up with Michael Ferguson (who was the brewer at Barley's in Las Vegas at that time) to brew a roggenbier for the 2004 National Homebrew Conference. JC had brewed numerous test batches to dial in the recipe, so I was anticipating a fine roggenbier. When I finally had a chance to sit down at Barley's for a pint, I was amazed. It was clearly the best roggenbier I had ever had. It was spectacular, with a fine rye note and a malty finish.

The quick and dirty way to describe roggenbier is to say it is like a dunkelweizen made with rye instead of wheat.

ROGGENBIER by the numbers

OG:	1.046–1.056 (11.4–13.8°P)
FG:	1.010–1.014 (2.6–3.6°P)
SRM:	14–19
IBU:	10–20
ABV:	4.5–6.0%

While there is some truth to that description, there are enough differences to make it not 100% accurate.

Roggenbier and dunkelweizen do have a similar appearance: hazy, ranging in color from light copper-orange to a dark copper-brown, and topped with a large, dense, creamy off-white head.

The aroma of a good roggenbier has gentle spicy notes of clove and rye along with some restrained citrus and banana. In the background there might be noble hop notes, spicy and a little floral, but they are only apparent because the other weizen-type aromatics are restrained. Another reason the weizen yeast character shouldn't be over the top is that it would cover up the spicy rye notes. Dunkelweizen, on the other hand, will often have a more pronounced clove and banana character. Roggenbier also has slightly more body than the average dunkelweizen.

Like most weizen-style beers, roggenbier has a grainy, bready flavor, except the breadiness is more like rye or pumpernickel than whole wheat. A subtle caramel note is not unwelcome either. The balance between bittering and sweetness is usually even, though some examples can have an initial sweetness up front. While I don't think an acidic or tart character is indicative of great roggenbier, I do think proper attenuation, pH, and hop/malt balance keeps this style refreshing and balanced with any malty sweetness.

You can't make roggenbier without malted rye. It should comprise about 50% of the grist, which is enough to develop a significant rye flavor and to add some body to the beer. For the remainder of the base malt, a blend of continental Pilsner and Munich malt helps develop the rich, grainy, bready malt character that is so important to this style. Keep in mind that the flavor and aroma of rye malt is fairly subtle. Don't expect a really bold character. In the United States rye bread almost always contains caraway seeds and can include ground spices such as fennel, coriander, aniseed or cardamom. So, while many people associate the bold flavor of

RECIPE

JC's Roggenbier

(5 gallons/19 L, all-grain)

OG = 1.054 (13.4 °P)
FG = 1.014 (3.6 °P)
IBU = 17 SRM = 16 ABV = 5.3%

After tasting JC's roggenbier, I asked him for some tips and he generously shared his recipe, as all great brewers are willing to do. The recipe below is a slightly simplified version of his and makes an excellent roggenbier.

Ingredients

6.0 lb. (2.72 kg) Dingemans or Briess rye malt (3.5 °L)
2.75 lb. (1.25 kg) Durst or Weyermann Pilsner malt (1.8 °L)
2.75 lb. (1.25 kg) Durst or Weyermann Munich malt (8 °L)
0.9 lb. (408 g) Weyermann CaraMunich® malt (60 °L)
2.0 oz. (57 g) Weyermann Carafa® Special II (430 °L) (Make sure you're using the huskless Carafa® Special and not the regular Carafa®)
3.32 AAU Tettnang pellet hops, (0.83 oz./24 g at 4% alpha acids (60 min.)
0.875 AAU Czech Saaz pellet hops, (0.25 oz./7 g at 3.5% alpha acids (15 min.)
Wyeast 3068 (Weihenstephan Weizen) or White Labs WLP300 (Hefeweizen Ale) yeast

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 154 °F (68 °C). Hold the mash at 154 °F (68 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with

a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.042 (10.5 °P).

The total wort boil time is 90 minutes, which helps reduce the S-methyl methionine (SMM) present in the lightly kilned Pilsner malt and results in less DMS (dimethyl sulfide) in the finished beer. Add the bittering hops with 60 minutes remaining in the boil. Add Irish moss or other kettle finings and the last hop addition with 15 minutes left in the boil. Chill the wort rapidly to 62 °F (17 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly.

Ferment at 62 °F (17 °C) until the yeast drops clear. With healthy yeast, fermentation should be complete in a week, but don't rush it. The cooler than average ale fermentation temperature can extend the time it takes for the beer to attenuate fully. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 to 3 volumes.

Partial Mash Option

The Munich and Pilsner malts get replaced with 3.8 lb (1.72 kg) of a Munich extract blend (50/50 or 60/40 is fine). The rye malt needs to be converted via a mash. Crush the rye and other grains and place crush grains in a steeping bag. Heat 10 quarts (~ 9.5 L) to 160 °F (71 °C), add grain bag, and let steep for approximately one hour. Rinse out the grains and proceed as normal, adding the extract and water to the steeping liquor.

Commercial examples of roggenbier include Paulaner Roggen from Paulaner Salvator Thomasbraeu AG in München, Germany.

caraway with rye, adding caraway to a roggenbier is inappropriate.

The grist still needs two malts to develop a rich color and add a touch of caramel flavor. A little caramel malt (5 to 10%) adds some color and hints of caramel flavor. Don't add so much that the beer has a bold caramel flavor or the balance becomes too sweet. I like CaraMunich® (60 °L), but most mid-color caramel malts work just fine. To develop color without adding roasty flavors, a little debittered black malt does the trick. My preference is for Weyermann Carafa® Special, a huskless, roasted malt. The lack of a husk means far less bitter roasted flavors, which would be inappropriate in roggenbier. Weyermann also makes Carafa®, which does have a husk and a lot more roasted character, so make sure you're getting the huskless variety, Carafa® Special. Weyermann also makes SINAMAR®, a liquid extract of Carafa® Special, made in accordance with the Reinheitsgebot. It is easy to use and provides as good a result as using the grain itself. Just add it to the boil kettle. One ounce by weight (28 g) of SINAMAR® in 5 gallons (19 L) of liquid adds 6 SRM of color and little in the way of roasted flavor. The only problem with SINAMAR® is that it is a bit harder to find at most homebrew shops than Carafa® Special.

This really isn't a great style for extract brewers. There are no rye malt extracts, so the rye needs to be mashed. Most rye malts will self-convert when held long enough at saccharification temperature. All it takes is paying attention to the water/grain ratio and holding the mash in the proper temperature range. Yes, messing with the pH of the mash can help, but it isn't critical for your first time and most tap water will work just fine. Other than that, the process is very similar to steeping grains. For the remaining base malt (Munich and Pilsner) you can use a 50/50 Munich/Pilsner malt or Munich/two-row extract.

Historically, like most weizen-type beers, roggenbier would have been decoction mashed. While a decoction mash might induce more Maillard reactions, the rich malt flavors provided by today's Munich and Pilsner malts is more than adequate and a single infusion mash works well. Roggenbier has a medium to medium-full body. Target a mash temperature range of 152–156 °F (67–69 °C). If you are making a lower gravity beer, use the higher end of this temperature range to leave the beer with a bit more body. If you

are making a bigger beer, use the lower end of the range to avoid too full of a body, which can limit drinkability. Keep in mind rye malt is huskless, so if your equipment is prone to stuck mashes, you might want to add a volume of rice hulls equal to the volume of rye malt.

I know the current hop shortage makes it difficult, but try to always use German hops for German beers, such as Hallertau, Spalt, Tettnang, Perle, Magnum or Tradition. Liberty or Mount Hood can be acceptable substitutes if you can't source one of the others. Balance the beer with enough hop bitterness to be evident, but not enough to overcome the malt sweetness of the beer. The balance should be even or maybe slightly sweet, but not

"Roggenbier has a medium to medium-full body."

more. Target a bitterness-to-starting gravity ratio (IBU divided by OG) between 0.2 and 0.4. The bulk of the hopping should be as a bittering addition at 60 minutes. Limit late hop to a small addition of noble hops near the end of the boil. My friend JC prefers Czech Saaz for his late addition, as the spiciness of the hops complements the spiciness of the rye.

While the traditional weizen fermentation esters and phenols should be present in roggenbier, it is more restrained than most weizen-style beers. While some brewers like to pitch a reduced cell count to increase weizen fermentation characteristics, you don't want to do that for a roggenbier. Instead, pitching rates should be the same as other ales. My favorite yeasts for all weizen-type beers is White Labs WLP300 Hefeweizen Ale and Wyeast 3068 Weihenstephan Weizen. You can try other weizen-type yeasts and might prefer one over the other, so feel free to experiment. A restrained fermentation temperature of 62 °F (17 °C) produces a nice balance and restrained esters.

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

No time to clone? Why not let the pros do the work for you? Brewers and kit manufacturers are working together to bring some of your favorite commercial beers into your home brewery.

ANATOMY OF A BEER CLONE

by **betsy parks**

For many homebrewers, the journey to making a first batch of beer is often the result of a thirst for craft beer that cannot be quenched by mere pub crawls and bomber bottles alone. Perhaps it is a natural extension of loving beer, or maybe it is a need to experiment beyond the limits of what's available at the local bottle shop. And for some, there are commercial brews that are so beloved, so downright drinkable, that brewers want to take their beer appreciation a step further — to get into the craft brewer's head and figure out the inner components of the beer itself — to clone it.

Just like trying to recreate the recipe of a favorite cookie from the local bakery, beer clone recipes are written because even though you sometimes can buy your favorite six-pack down the street, there is always going to be an attraction to making that same brew with your own two hands. At the same time, however, developing a clone recipe can also mean a brewer is in for a lot of trial and error to get the flavor and color of a beer just right.

So what if you're not interested in making test batch after test batch, constantly swapping out grains or extracts, hops and techniques to get the beer just right? What kinds of changes need to be made in the ingredients list and the procedure to make a 5-gallon (19-L) batch? What if whoever brewed the original batch could be there to point you in the right direction? For anyone who has ever asked those questions, perhaps a commercial beer clone kit is the answer.

Much like the many hundreds of homebrewers developing clone recipes at home in attempts to replicate their favorite beers in the confines of their home breweries, kit clones scale the recipes of popular commercial beers down to a homebrew level. The difference, however, is that kit and malt companies can eliminate all the guesswork by forging professional relationships with commercial brewers, ergo getting the best information — the beer's original recipe and procedure — straight from the source. It's the next best thing to having the brewer standing over your kettle answering all your questions.

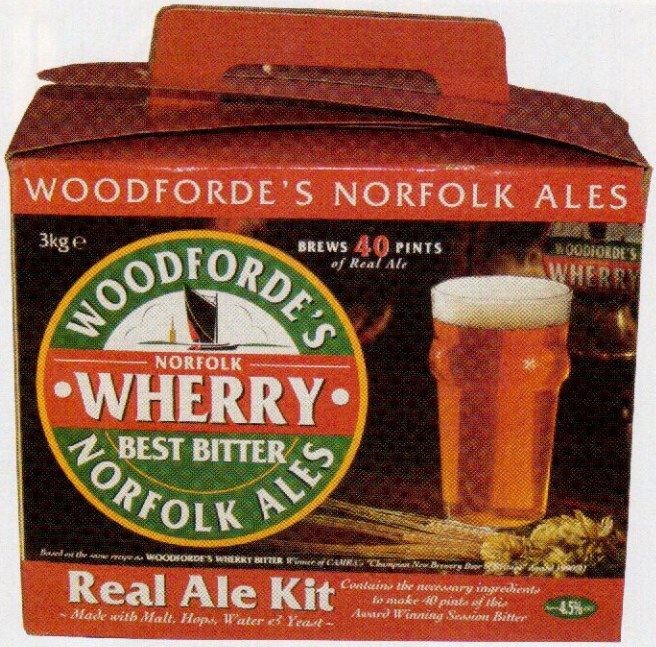
For example, Dr. David Mugglestone, the Quality Assurance Food Safety & Environmental Systems Manager at Muntons, a UK-

based malt and malt ingredients producer, said that his original attempts to develop a beer kit clone line based on the samples of beer he recieved from Woodforde's Brewery in Norfolk, England were frustrating.

"At that time I was involved with Research and Development and so I was approached to carry out work to match malt extract-based kits with the commercial beers. Naturally Woodforde's provided samples of beer for me to work with," he said. Unfortunately, after lots of testing to determine the bitterness, color, aroma and other characteristics of the beer samples, the brewing trials with sample recipes turned out to provide, "no success whatsoever," as far as matching the original brew. To get the job done, Mugglestone went straight to the source.

"I was not really getting anything close so I approached Woodforde's and asked for all details from the brew house (grist ratio, hops used etc.)," he said, although the brewery was initially reluctant to share. "I signed a confidentiality agreement with Woodforde's and after receiving the information from the brewery it was not long before matches were made that compared very well with the beer supplied by Woodforde's."

With this information, Muntons was able to create worts nearly identical to Woodforde's, which were in turn evaporated



One of the earlier commercial beers cloned into a beer kit is Woodforde's Wherry from Woodforde's Brewery in Norfolk, England. UK-based malt manufacturer Muntons developed the kits based on the original brewery recipe.

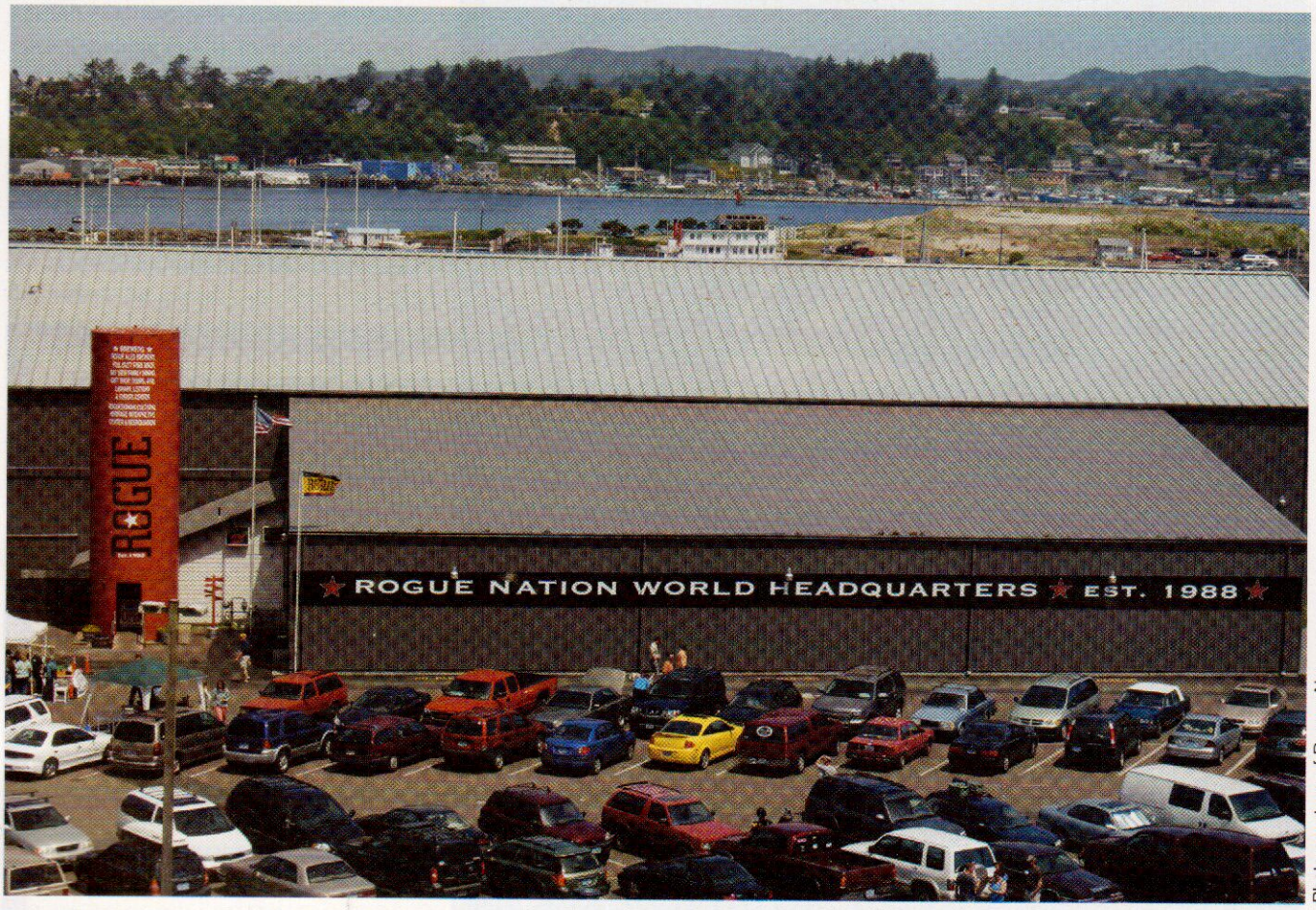


Photo courtesy of Rogue Ales

Rogue Ale's headquarters in Newport, Oregon. The idea for starting the brewery came about in 1987 when Jack Joyce, Bob Woodell and Rob Strasser were approached by Jeff Schultz, Bob's accountant, and an avid homebrewer. The brewery currently produces more than twenty beers and regularly shares recipes and ingredient information with the public.

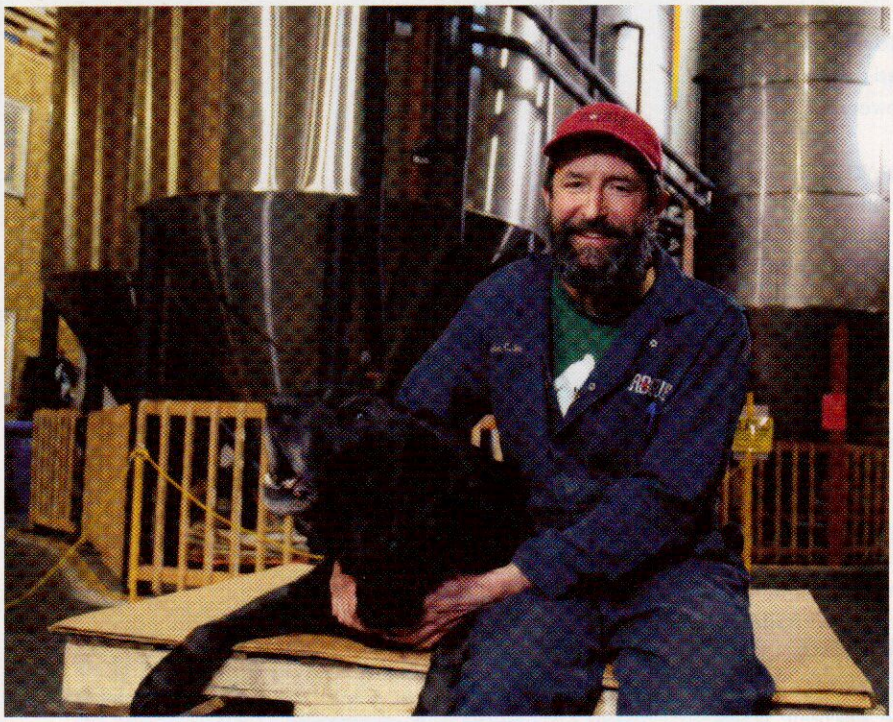


Photo courtesy of Rogue Ales

John Maier, Brewmaster at Rogue Ales, started out as a homebrewer before attending the Siebel Institute. After graduating in the fall of 1986, Maier worked as Assistant Brewmaster at The Alaskan Brewery in Juneau, Alaska. He has been with Rogue since the Newport, Oregon brewery was built in 1989.

into malt extracts and packaged with dry yeast for kits. Initially when the line was developed in the late 1980s and early 1990s, Muntons offered Woodforde's Wherry, Great Eastern and Headcracker then expanded the line to include other beers like Great Eastern, Nelson's Revenge and Admiral's Reserve.

More recently in the US, Brewcraft USA, a regional wholesaler of homebrewing and winemaking supplies in Portland, Oregon, has been collaborating with Rogue Ales in Newport, Oregon to release clone kits for Dead Guy Ale and Brutal Bitter. Adam Southard, Sales Manager at Brewcraft, said the idea for the collaboration actually came about in a casual conversation with James Smith, Homebrew Sales Manager at Muntons, about adding some "zing" to the beer kit market. "We thought we would see if we could do a brewery beer," said Southard.

Much like the Woodforde's-Muntons clone kits, Brewcraft USA's Rogue kits are based on Rogue's original recipes. Unlike Muntons, however, Brewcraft USA doesn't

> "Kit and malt companies can eliminate all the guesswork by forging professional relationships with commercial brewers — ergo getting the best information. . ."

have a malting facility to make their own malt extracts, so the cloning process was more like something a homebrewer would experience when scaling down a large all-grain recipe.

"It took a lot of calculator punching," Southard said of trying to find the right ratio of ingredients to make an extract equivalent for Dead Guy Ale, the first Rogue kit released. Although he knew the original ingredients, converting to an extract recipe meant playing around with the character and crystal malts, such as using dark Munich, crystal 80 °L and Carastan whereas Rogue uses Carastan and crystal 60 °L, mixing and matching to achieve more unfermentable sugars in the wort, as well as adding some sugar to dry it out and prevent it from tasting syrupy. All in all, it took (you guessed it) some trial and error.

"John being John, he didn't go into a lot of detail, he just gave me the ingredients and the hops," said Nate Sampson, president of the Cascade Brewers Society, a homebrew club in Eugene, Oregon, and a friend of Rogue Brewmaster John Maier who helped Southard with test batches and communicating with Maier.

"It took about six batches to get it right," said Southard, who worked closely

with Maier and Sampson to find the right combination of ingredients and techniques as well as brewing and sampling test batches of extract brews . "It's been so long since I've brewed an extract that I've forgotten how easy it was," said Sampson. "Thirty hours on ProMash is worth thirty brews," said Southard.

For instance, Southard originally tried using dextrose as the additional sugar, which altered the color, so he ended up using dark Belgian candy sugar. And even though Brewcraft USA followed the recipe for Dead Guy from the brewery which uses Perle and Saaz hops, brewing a smaller, 5-gallon (19-L) batch meant that there was a difference in hop utilization. To compensate, there are more hops in the kit proportionately than the original recipe.

The Dead Guy Ale kit also calls for dry hopping, which Rogue doesn't do at the brewery. Certain ingredients and techniques, however, are more important than others when it comes to replicating, including hops, yeast and temperature. Southard says that deviating from the kit by using an ale yeast other than Rogue's proprietary "PacMan" ale yeast, will make a good beer, but "flat out" won't duplicate the Rogue beers. Also, fermentation temperatures should always stay in the 60–62 °F (16–17 °C) range or the beer can turn from being malty to estery.

> "I don't believe in secrets and I don't think this industry would exist without input from homebrewers."
>
> - *Jack Joyce, Rogue President*

So why did Rogue and Woodforde's agree to share their recipes? One reason could be that the breweries have roots in homebrewing. Woodforde's was established in 1981 by Ray Ashworth and Dr. David Crease, who were both members of the Norwich Homebrewers' Society and Maier also started out as a homebrewer, and is still a member of the Cascade Brewers Society.

"Working with Rogue was great — maybe because John's a homebrewer — but they look at the homebrewing community differently," said Southard, who explained that many other breweries he contacted about making commercial kits were responsive and helpful, but Rogue took a special interest.

"I don't believe in secrets and I don't

think this industry would exist without input from homebrewers," said Jack Joyce, the founder and president of Rogue. "They are a gigantic and critical part to the commercial (brewing) world."

"I've been doing it for a long time," Brewmaster John Meier said of sharing his recipes. "Not just for kits but also for publications." Similar to the Brewcraft USA project, Meier has also contributed a homebrew-sized recipe of I²PA to California-based homebrewing retailer MoreBeer! for both extract and all-grain kits after he tested the smaller batch on a MoreBeer! sculpture. Even with that information, however, MoreBeer! President Chris Graham says replicating a commercial beer can be tough.

"I think in every brewery there are house characteristics that are really tough to replicate. We've done homebrew-sized tests with local clubs and gave the same exact recipe pre-weighed out here and got six pretty different beers as everyone handles things differently. I was amazed at the variations of house characters that came through," Graham said. So if you're looking to closely replicate a beer, the more information you can get, the better.

But although commercial kits are limited for now, growing interest and strong sales indicate that we may be seeing more of these kinds of kits in the future. Southard said the Rogue kits are some of the most popular in the company's catalog, outselling any other individual kit. And in light of the scarcity of brewing ingredients, perhaps it makes sense to have the pros work together to find the right ingredients.

"Unfortunately, with hops being scarce this is making cloning that much harder now," said Graham. "I think we will always pursue working with breweries on this as homebrewers understand this fact usually, but want to make something really close to the final product."

Betsy Parks is the Associate Editor of Brew Your Own *magazine.*

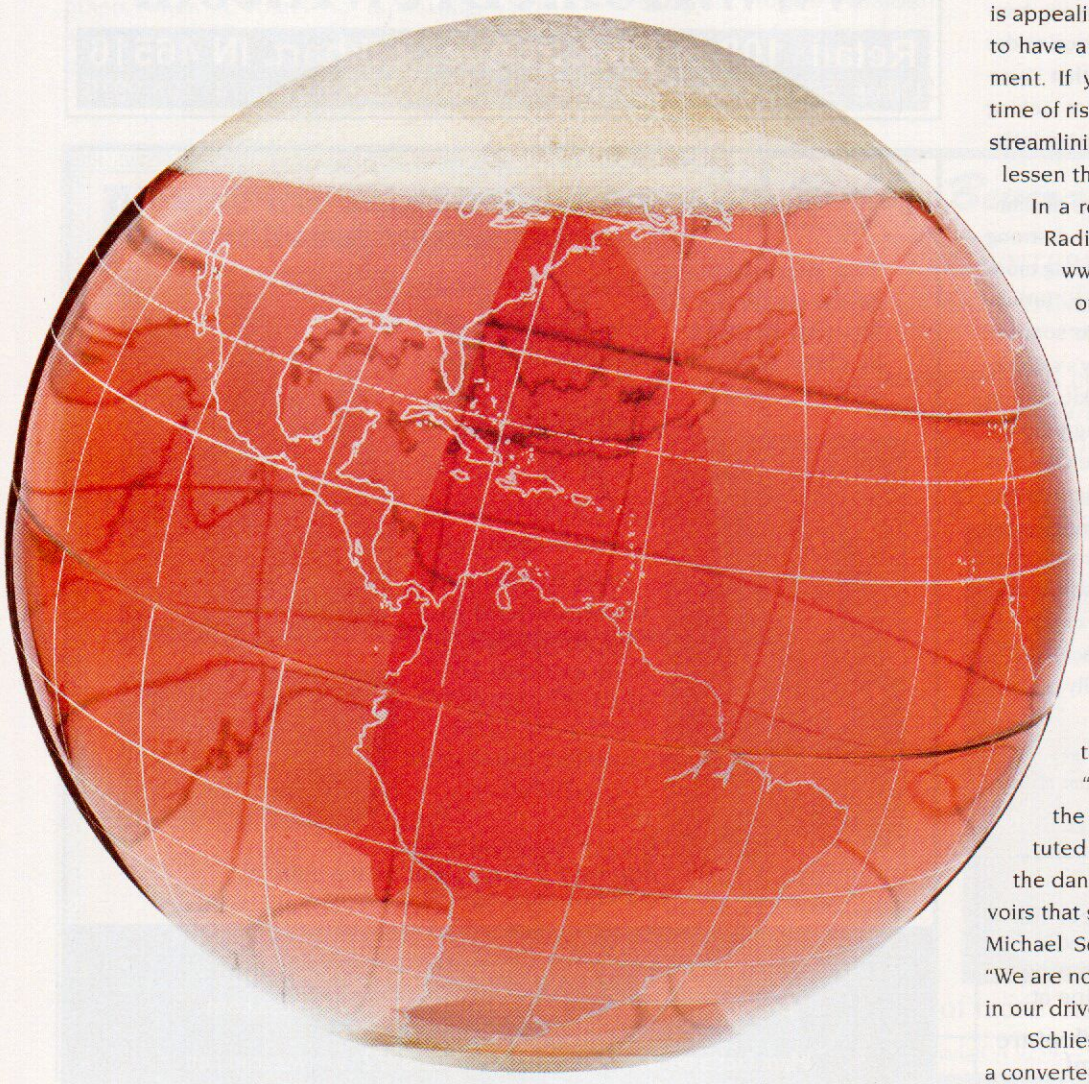
Web extra:

Is your favorite beer still waiting to be cloned? Chris Colby explains how to replicate a recipe at:

http://byo.com/feature/1266.html

GREEN BREWING

by James Spencer



BREWING "GREEN" is appealing to more than those who want to have a positive effect on the environment. If you're frugal, especially in this time of rising ingredient and energy costs, streamlining your brewing processes can lessen the impact on your wallet as well.

In a recent episode of Basic Brewing Radio (which can be found at www.basicbrewing.com), we asked our listeners to send in tips on how they have changed their brew day to be greener or more cost-efficient. By far, the most common thread was about the use of water in chilling the wort after the boil.

In some areas of the country, being more mindful of water use is a necessity. The southeast United States and California have been in the news lately as they suffer through drought conditions.

"Here in the Atlanta metro area, the local governments have instituted outdoor watering bans due to the dangerously low levels of our reservoirs that supply our drinking water," says Michael Schliesman of Roswell, Georgia. "We are not even allowed to wash our cars in our driveways."

Schliesman brews on his back deck in a converted keg, and he chills with a coun-

IT CAN BE EASY BEING GREEN

terflow wort chiller. Although he says the chiller is very efficient, it still uses a lot of water to cool 10-gallon (38-L) batches.

"In an effort to conserve that water, I connect a hose to the water outlet of my chiller and water my vegetable garden and other plants around my house with the water that would normally have run through my yard and down the storm drain," Schliesman says.

Several brewers reported capturing the chiller water and using it for other purposes, from filling clothes washers to cleaning brewing gear to watering the lawn. One thing to keep in mind: when the water first comes through the chiller, it's going to be very hot. This can have unexpected effects in terms of safety and marital harmony.

"I decided to water the garden with my chiller water," says Steve Wilkes, co-host of the Basic Brewing podcasts. "I didn't realize how hot the water was at first. The next day, one of my wife's prized azaleas was brown. The beer was good, though."

What's bad for azaleas is good for cleaning solutions, though. The initial exit water from your chiller can be used to make a great, hot solution that you can use to clean your kettle and immersion chiller after the wort is safely in the fermenter.

Another podcaster, Douglas Wawrzynski of Homebrewing Perspectives, lives in Salt Lake City, Utah, which is on the edge of a desert. Wawrzynski modified one of the techniques from our Low-Tech Lagering DVD to minimize the amount of water he needs for chilling with an immersion chiller.

"I start with a large cooler," Wawrzynski says. "I fill it about halfway with cool water and add the proper amount of Iodophor. I use that water to sanitize my plastic fermenter and all the gadgets associated with brew day. I complete the boil, and then when all my things are sanitized, I place my immersion chiller in the wort in front of the cooler and attach one end of the immersion chiller to a small pond pump in one end of the cooler. I then loop the other end of the immersion chiller circuit to the far side of the cooler. My sanitization solution has now become my heat exchange fluid, plus I have the peculiar benefit of knowing I'm killing whatever is lurking in the dark coils of my immersion chiller."

As the sanitizing solution/chiller water heats in the cooler, Wawrzynski adds milk jugs of ice from his freezer along with other cold packs and ice cubes. Once the wort is chilled, he adds PBW and uses the water to clean all his brewday equipment.

"While neither National Chemicals or the PBW people would likely condone mixing the two, I haven't had any problems," says Wawrzynski. "In the end, I am only using about 7 gallons (26 L) of water for sanitization, wort chilling and equipment cleanup combined." A slightly modified approach might be to direct the hottest initial water to your washing machine, or to a cooler to make hot cleaning solution, and only begin recirculating the chilling water once the water has cooled a bit. This would reduce the amount of ice needed (and reduce the amount of electricity needed to run the freezer to make the ice).

Due to their design, counterflow chillers are inherently more efficient in their water usage than immersion chillers. But, the upfront cost is higher. Some immersion chillers, though, are more efficient than others. Some have a twisted strand of plastic running the length of the tubing. This insert causes the flow of water through the tubing to be turbulent, and hence increases the efficiency of the chiller. (If the water flowed more smoothly through the tubing, the water right next to the metal would heat up while the water in the center of the stream would be slightly cooler.)

BREW SOME BEER, SAVE SOME MONEY AND SAVE THE PLANET. IT'S ALL IN A DAY'S WORK FOR THE GREEN HOMEBREWER.

When using an immersion chiller, brewers can dramatically affect the chilling time by keeping the wort moving around the chiller's coils. Steve Arch from Dwygyfylchi, Wales says, "when using an immersion chiller, if the wort is left to settle, then a layer of cold wort forms around the chiller that shields the rest of the hot wort from the chiller. If you stir or agitate the wort with your brewing paddle (sanitized of course) every so often, you prevent these areas of different temperature in the wort and chill the wort faster. You can feel the difference in this if you put your hand on the outlet part of the chiller or in the outlet water stream." (Do not touch the outlet tubing or exit stream in the first few minutes of chilling or you will get burned or scalded.)

Alternatively, brewers can use the immersion chiller itself to get the wort moving around the coils. Swirling the chiller in the wort will cause the liquid to move, increasing the effectiveness of the cool water moving through the copper tubing. Those who are afraid of the effects of hot side aeration should avoid vigorous movement until the wort chills below 100 °F (38 °C). Also, keep in mind that the outflow tubing will be extremely hot, so use gloves or a pot holder when handling the chiller early in the cooling cycle. Swirling your wort or chiller not only saves water, but cools

your wort faster and faster chilling means the wort spends less time in the temperature range where contaminants grow quickly.

Nick Marshall lives in South Florida, which means he's used to thinking about the challenges of chilling hot wort. "If you own a pool, you can install a garden hose spigot to your pool plumbing," Marshall says. "When it comes time to chill, you can simply pump pool water through your chiller and re-circulate it back to the pool where you will also get warmer water for your pool. Zero usage of water on your water bill."

REDUCE

Ironically, one of the letters with suggestions on how to cut down on the use of sanitizing agents came from a sanitizer manufacturer. Murl Landman of National Chemicals wrote in with tips on using BTF Iodophor, which his company manufactures.

"We all know that the real pain is sanitizing bottles," Landman says. "I bottle condition in swing tops, and for the longest time I could not find a great way to sanitize them without either making five gallons and submerging them or buying a bottle tree. Both can be a bit messy. I can't use oven heat as it will degrade the rubber seal on the swing."

Landman devised a solution that cuts down on the use of water and Iodophor. "I came up with a new fast and cheap protocol using a secret sanitizing weapon: a small, plastic, long-necked watering can for houseplants," he says.

"First, I dip the necks and swing tops into a gallon of sanitizer in my bucket, completely ignoring the inside of the bottle to start with. Then, once they have all been dipped, I dip the tip of the watering can into the sanitizer and then fill the watering can with sanitizer. From there, I add a few ounces of sanitizing solution to each bottle. Then swirl and dump the bottles, often 2 to 4 at a time back into the sanitizer bucket, repeating this until all the insides are now sanitized. I easily cut my bottle sanitizing time in half and cut my chemical use by 80 percent."

Landman admits that he may be hurting his Iodophor sales by sharing tricks on how to use less. "But in the long run, if I can do my part to help others achieve more successful and consistent brewing events faster and for less," he says, "the world will be full of more great beer and happier people!"

Another common sense approach to reducing the amount of chemicals used for cleaning and sanitation is to clean or sanitize as much as possible with your solutions. If you make some hot cleaning solution to clean a fermenter, clean the keg you will use as well — and look for other brewery items that need cleaning as well. Most cleaning and sanitizing solutions can be stored for short amounts of time and successfully reused, so if you know you're going to brew again in a couple days, save your solutions in an old bucket.

Reducing the amount of energy needed to bring water and wort up to the proper temperature is also a key point in the process where brewers can have an impact.

Tony Black, from Payneville, Kentucky discovered a new appliance had unexpected results for his brewing sessions. "We remodeled our old farmhouse and installed a tankless water heater," says Black. "The thermostat is adjustable in two degree increments up to 140 °F (60 °C), so if I brew indoors I can get the right amount of water to the right temperature almost immediately. And, it takes less time to get the wort up to boiling (less gas used)." (Of course, depending on how the electricity was generated — by burning coal or by the turning of hydroelectric turbines — and the efficiency of the heater, the tankless water heater may or may not be a net benefit to the environment. Sometimes figuring out what's most green isn't all that simple.)

Those of us who don't have the latest model of water heater can still benefit from using some common sense when we're brewing to cut down on the energy we need.

First, when brewing outside, shield your burner and kettle from the wind. On windy days, precious heat is blown away and diverted from the wort, while you watch the surface for a sign of a bubble. At the same time, keep whatever you're using for shielding well away from the flames. Likewise, heating your brewing liquor more slowly will save propane. If you begin heating your water first, then taking care of any brewery set-up, grain crushing or last-minute cleaning, you can save propane.

Giving your burner a tune-up can also affect the amount of gas you use. When you restrict the amount of air going to the flame, your propane burner should produce a blue flame with no red in it. If it doesn't, you are not burning the fuel as efficiently as you could and are wasting gas. In storage, dust or other material may settle in the burner head and actually restrict the flow of gas. A quick blast of compressed air through the air inlet of your burner will clean this out. However, the burner head itself may not allow for gas to flow as smoothly as it should. Often, if you disassemble a new burner, casting slag can be found inside. Use a metal file to remove this, clearing a path for the gas. A clean propane burner will not only save gas, it will eliminate the deposition of black soot on the bottom of your kettle.

If you're mashing outside, especially in cold weather, add a layer of insulation to your mash tun. Whether it's a sleeping bag or an old blanket, the added insulation will keep your mash more stable and keep you from expending energy to bring your mash back up to your desired mash rest temperature.

REUSE

Of course, if you've ever gone diving into the trashcan after (or even during) a party to fetch "good" bottles, you're familiar with the concept of reuse. Homebrewers are known for rescuing items from the trash or curb for use in their home breweries. This practice is especially useful in communities without recycling programs.

Steve Oatley from Oak Park, Michigan has a list of rescued items. In addition to glass bottles, he reuses old plastic fermentation buckets. "They're great for washing the car — which you should do on your lawn," Oatley says. "The water is good for your grass, and it keeps the soap out of the runoff drains that can harm fish."

On the other hand, not every item is a good candidate for rescue. Matt Fischer from Fort Collins, Colorado has a warning for brewers who are using old freezers to chill their kegs and lager their brews. "One of the reasons I did not go with an old freebie fridge is that they eat electricity like candy," he says.

Fischer directs owners of old refrigerators to a government Web site: http://www.energystar.gov/index.cfm?fuseaction=refrig. calculator.

"You can go here and enter the model number and your electricity cost (in dollars per kwH), and it tells you the annual cost to run the fridge," says Fischer. "A free fridge isn't that helpful if it's burning through $250 in electricity every year. If you see the cost is pretty high, you might save money after a couple of years to buy a new one, or move your kitchen fridge to the garage and buy a new one for the house."

There are also devices, such as the Kill-A-Watt monitor that allow you to find out how much juice any appliance is using. You just plug the monitor into your wall socket and plug your appliance into the meter. The meter will show you how much electricity you are using. This meter is not only great for evaluating your brewing fridge, but it's useful for ferreting out electronic items in your house that could be left unplugged when not in use. (Some items use an astounding amount of power just to display a digital clock or to remain in "standby mode.")

At some point in their pursuit of the hobby, many homebrewers end up with multiple fridges, chest freezers and/or kegerators. One thing to remember about refrigerators is that they use less electricity when they are full. So, if you have multiple fridges, consolidate your bottles and kegs as much as possible and unplug any appliance not in use. (And, of course, if you brew as much as possible, your fridges will always be full.) Also, if you have a fleet of fridges, find out which are least energy efficient and only use them when your beer inventory swells.

RECYCLE

Brewers have an excellent opportunity to turn some of their used ingredients into wonderful plant food, as well. Once grain has done its duty in the mash tun or steeping bag, a backyard compost heap is an excellent final resting place.

Spent grains piled up by themselves will smell bad (OK, horrible), though, and it's best to read up on composting if you are going to try it. If you have an active compost pile, you will need to add some green material along with the spent grains to keep the decomposition of the materials proceeding at a fast rate. For a passive pile, simply covering up the grains with a layer of soil will keep the odor down.

Hops are good candidates for composting, too. However, don't let your dogs eat them — certain breeds have a toxic reaction to them.

Composted soil is excellent food for gardens and household plants. Not only that, but composting keeps spent grains out of the landfill or the wastewater treatment plant if you wash them down the kitchen disposal.

And speaking of gardens, if you live in an area that's suitable for hop growing, you can save money by planting your own rhizomes while helping the environment at the same time.

One homebrew company will also help you recycle their packaging. White Labs yeast comes in plastic tubes. If you save up their tubes, you can return them to White Labs as part of their Customer Club. For every 10 tubes you return you get a coupon for another tube. White Labs

recycles the plastic. Some homebrew shops also collect these for recycling (and you really only need to send in the labels to get your yeast coupon).

GROW YOUR OWN

By now, unless they've been hiding under their brewpots, homebrewers are well aware of the high price of hops. As a response, across the country, hopyards are springing up at the home addresses of many homebrewers. There are numerous advantages to growing your hops, beyond the fact that they look great. They are easy to grow and only need to be dried after picking. In addition, you will control how much pesticide you use on the plants — and if you live outside of traditional hop-growing regions, odds are you may not be troubled much by pests. Finally, in addition to saving on ingredient costs, not purchasing hops sent from across the country will save on the packaging and energy it takes to ship them.

Brewers who use Star San as a sanitizer and grow their own hops may find some use in this advice from Norm Kwasinski from Lynnwood, Washington. "Don't dump used Star-san down the drain, save it," he says. "Get yourself a small garden sprayer and spray your hops with the used Star San. This will not hurt your hops but will help cut down on powdery mildew."

Matt Fischer has an additional tip for gardeners. "Last year we had slugs in our garden, and I had some bad homebrew," he says. "Instead of dumping toxic stuff in the garden to control the slugs, we took a plastic bottle and cut a 'window' in the side and buried it about 3–4 inches (8–10 cm) down. The slugs need to be able to 'walk' into the bottle, which is filled with bad beer up to the ground level. Slugs love your bad beer and will drown in it, presumably after getting hammered."

Bad homebrew? Is there such a thing? One supposes that bad store-bought beer could also be used for the slug traps — after the guests who brought it have left.

In the end, there are as many solutions to brewing green as there are home brewers. Many homebrewers are interesting in brewing green as a way to do their part in helping the planet. Our planet is, after all, where barley and hops grow. As a bonus, many of the environmentally-conscious ideas for green brewing will also save you money . . . and this money can be spent on barley and hops.

There can also be an element of challenge to it. Brewers may wonder what's the least amount of water they can use to successfully chill their wort? How many 5-gallon (19-L) batches can they squeeze out of a single propane tank?

When they set their minds to it, home brewers are as inventive and resourceful as any group on the planet. And when it comes to saving the planet, they've got more than a few answers. And many of these simple, common-sense answers show that, despite what Kermit thinks, it can be easy being green.

James Spencer is the host of Basic Brewing Radio and Basic Brewing Video, which are found at www.basicbrewing.com. James wrote "Small Scale Brewing" in the July-August 2007 issue of Brew Your Own.

HOMEBREWING ORGANIC

by **Amelia Slayton**

These days, almost everyone wants to make environmentally friendly choices. Recycling, fuel efficiency and conserving water are so commonplace that most people do it every day with hardly a second thought. Organic food has also hit the mainstream, with major supermarkets devoting whole sections to organic produce and packaged food.

There are also plenty of organic beers on store shelves these days, from hand-bottled beers crafted by the smallest microbrewery all the way up to organic beer offered by Anheuser-Busch. To many homebrewers who have tried an organic beer, brewing one at home seems to be the next logical step. Brewing organic beer might be a scary move into the unknown, but it is easier than one might think.

The first question many brewers have is what makes organic beer organic? The word organic has several definitions. If referring to the scientific definition organic means "of, relating to, or derived from living organisms." Based upon this, it would be correct to call any beer organic since it is made from plant products and fungus (brewers yeast). However, when it comes to the modern everyday use of the word in reference to food products, the word organic is now defined as grown and processed without chemical pesticides, herbicides, or fungicides, artificial fertilizers, sewage sludge or artificial additives. In addition, specific substances or processes such as radioactive byproducts, irradiation, or genetically modified organisms (commonly labeled GMO's), are not allowed in the production of organic food in the USA.

In the US, the use of the word organic in food production is regulated by the USDA through The National Organic Program (NOP). The NOP is responsible for the legal definition of organic, administering organic certification nationwide, and enforcing organic standards. What this means is that anything sold as organic has to have documented proof that the standards were followed from the grower to the final product. Unless buying direct from the farmer, these days the certified organic label is the best way to be sure the product is organic. Every food product that is certified organic must list the certifying agency on the label, and most carry the USDA organic seal familiar to many shoppers. Commercial producers of organic beer also have to meet national organic standards, and have to go through a certification process. Homebrewers, of

course, do not need to worry about government regulations, just their own personal standards.

The next step to brewing organic beer at home is to seek out the ingredients. When choosing ingredients, try to get ingredients that are as fresh as possible and check for the certified organic seal on the label. The selection of organic brewing ingredients available to homebrewers is still very limited in most areas. One place to look, if the local homebrew store does not stock organic malt or hops, is the local health food store. Many health food stores regularly stock flaked grains, organic herbs and spices, fresh organic produce and sugar alternatives such as agave syrup, molasses and malt extract, all of which could be a part of an organic recipe. Many shops carry a few items or can at least special order a sack of organic grain. For some organic brewing ingredients, the only option is mail order.

One thing is certain — the selection of organic brewing ingredients pales in comparison to the selection of conventionally grown ingredients that is available to homebrewers today. In fact, choosing the right substitutes for ingredients is one of the biggest challenges an organic brewer faces. This has required organic beer brewers to be resourceful and creative. The challenge to brew organic beer just as good if not better than conventionally brewed beer has made the truly dedicated organic brewer a better brewer. No organic bitter orange peel? Why not try a blend of sweet orange peel and lemon peel instead. No dark malt extract? Make a tea with organic chocolate malt and add it to the brew.

Like a seasoned chef, working with just fresh seasonal ingredients, a skilled brewer will smell and taste unfamiliar ingredients before brewing, and then choose a recipe that highlights the best characteristics of those ingredients. Becoming familiar with the unique characteristics of each ingredient really helps when working with organic hops, since some of the organic hops on the market are unknown to most homebrewers.

For instance, New Zealand Pacific Gem is a hop rarely found except as organic. It is a very high alpha hop averaging 16% alpha acid and has a striking blackberry characteristic which works very well in a stout or porter. Organic hop farming on a large scale is a challenge, and to succeed, farmers in New Zealand, Germany, and Belgium have had to dramatically change their growing techniques. The end result of their efforts are very high quality, fragrant hops that rival the best conventional hops on the market. Although the reasons to brew organic beer are many, there is one thing that just about every organic homebrewer can agree on: Organic beer is clean, great tasting beer, rich with flavor, and good for you and the environment too.

Amelia Slayton is a Founding Member and President of Seven Bridges Cooperative Organic Brewing Supplies.

Organic BEER CLONES

SIX BREWS MADE WITH ORGANIC INGREDIENTS.

by Glenn BurnSilver

Everyone likes to think that the beer we drink is brewed with only the finest natural ingredients. If we are to believe the advertising campaigns and well-crafted labeling of several large-scale brewers (and a number of smaller ones), then probably we are. And while that may be true, a new movement in brewing is looking to implement a new standard in brewing ingredients for the beers they brew.

Though the average palate may not be able to detect a discernable difference, organic beers are beginning to show up on store shelves with an ever-increasing frequency. A recent tally indicates no less than 40 offerings available from breweries as diverse as New Belgium, Deschutes, Peak, Lakefront, Crannog and Samuel Smith. New Glarus perhaps says it best for organic brewing, name-wise at least, with their Organic Revolution.

It is a revolution of sorts, one that slips easily into a growing green movement of environmental consciousness and a desire for sustainable practices. Just as more and more consumers are exploring the option of purchasing food products raised without any chemical intervention or biogenetic interference, the time is right to enjoy that food with a beer equal to the task.

Even though organic beers have been produced commercially — albeit on a very small scale — from a few breweries for more than decade, one deterrent to larger and more widespread production has been an overall lack of resources. But as quality organic grains, malts and hops become more readily available on a consistent basis, it's likely even more breweries will begin turning out organic beer.

For many brewers, the costlier choice to brew organically is a combination of creating the best beer possible while using ingredients that may do some good for, or at least no harm to, the planet. It starts at the most basic level, with the production of the grains. While every brewer uses the best ingredients at their disposal, you have to consider who produces most those grains. In most cases, it is your average farmer, some contracted to grow for the brewery, some simply getting whatever they can to the marketplace. And every farmer squeezing out an existence knows that the greater the yield, the greater the profit. If conventional modern farming techniques are any bellwether, this could mean utilizing assorted fertilizers, possibly chemical, and/or genetically modified seeds to support that yield.

"Agribusiness with their modern farming practices are heavily dependent on oil-based fertilizers while traditional methods take advantage of the cycles of nature. The environmental harm wrought in chasing that few extra bushels of yield isn't worth it in our opinion," explains Steve Parkes, brewmaster at Vermont's Wolaver's Organic Ales, which brewed their first organic beer in 1997. "Our primary reason (to brew organically) is to support organic farming in the United States."

Daniel Del Grande of Bison Brewing Company in Berkeley, Calif., concurs, noting that all beer was organically produced as late as the 1950s. "Back then farmers cared about the soil," he states. "Today, they use soil simply as a matrix for holding up a genetically modified seed, feeding it chemical fertilizers and spraying it with pesticides. Organic production will improve the soil structure, reduces erosion, and avoids soil acidification."

What is Organic?

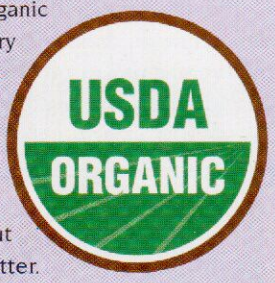
Nailing this question down is more difficult than it might appear on the surface. In the most basic sense, an organically produced product is defined by how it cannot be made as opposed to how it can be made. The National Organic Program (NOP) of the U.S. Department of Agriculture (USDA) established in December 2000 a national standard for the term "organic." That definition states organic food, must be produced without the use of most synthetic fertilizers, sewer-sludge fertilizers, pesticides, growth hormones, antibiotics, genetic engineering and irradiation.

One concept of organic production is that it also lessens the impact on the soils by allowing more natural and sustainable land use (such as introducing earthworms into the soil and allowing birds and rodents to clear off pests) that should continue to produce longer and more consistently than non-organic farms.

"The very strict measures that the organic certification bodies round the world have placed on producing organic products mean that the beers produced are much purer and more natural," says Mark Slater, Brewmaster at St. Peter's Brewery Co. Ltd, Suffolk, England.

"Organic beer drinkers can feel better about their choice because they are promoting sustainability," adds Larry Berlin, Brewmaster, Butte Creek Brewing Company. "Organic ingredients promote sustainability because they are grown without the use of pesticides and herbicides."

"From a holistic point of view (organic beers) are much better," agrees Larry Sidor, brewmaster at Deschutes Brewery.



So this brings up a question important to many beer drinkers: does organic beer taste better?

There is some disagreement about whether organic foods taste better. Proponents of organic foods point to studies that indicate that organically-produced foods taste better and contain more nutrients. Fruits are sweeter and juicier, vegetables are more flavorful and even prepared foods (like canned soups) offer more depth, say organic proponents. Skeptics point out that, of the many studies done, some back the claims of organic proponents and others don't. Looking at all the available data does not support the idea that organic foods taste better. Not surprisingly, with beer many brewers are on the fence about the taste of organic beer. Some say it always does, others won't take that leap.

Organic ingredients "don't necessarily produce a better tasting beer than non-organic ingredients," Berlin says. Yet, he adds: Our "Pilsner won a gold medal at the Great American Beer Festival in 2006 . . . Great beer can be brewed organically."

Brewing Organically at Home

Brewing organically at home is no different that creating a non-organic brew. The difference is what goes in it. Be aware of the

source of your ingredients, including finings, hops, grains, malts, etc. Look for an organic symbol on the package, or find a person or company to buy from that you trust. Perhaps the biggest challenge might be finding those ingredients. It's not that they can't be ordered online, or maybe right at your local brewing supply shop, it's finding everything you need.

Right now, according to most of the brewmasters interviewed for this article, organic hops are in short supply — especially whole flower hops. Butte Creek imports most of theirs from New Zealand, for example, and others have contracted farmers to grow specifically for them.

"There are not enough acres planted," Del Grande says, "and as the organic marketplace explodes, farmers have not kept up." And, of course, with the current hop crisis still in full swing. Many brewers are willing to pay the premium for organic hops, even if they are not brewing organic beers. Furthermore, there's little incentive for current hop farmers to switch to organic methods when the price of hops is so high. Switching to a lower-yielding form of agriculture doesn't make sense when high yields equal high profits — something hop farmers haven't seen for decades.

That said, some organic beers currently do not use organic hops, such as Deschutes Green Lakes Organic Ale, because there simply aren't enough available. Current organic brewing regulations and guidelines specify beers can still be called organic even if the hops aren't, as long as all the other ingredients are. That, however, is expected to change in the near future.

Several brewers indicated organic ingredients could, depending on their quality, cause some subtle adjustments to the brewing process, including potentially slower fermentations, extended conditioning times and longer settling periods for clarity. The slower fermentations can be headed off by pitching with an active yeast starter with a high cell count. Adjusting for the additional conditioning and clarity time simply requires a little patience. In the grand scope of homebrewing, these are minor issues.

Another important aspect of organic brewing is making sure your equipment is purged of any non-organic ingredients or residues. Since homebrewers generally work in smaller batches and hygiene is tantamount, this shouldn't be a problem. But if there is any question of organic and non-organic mixing, designating grain bags, racking tubes and canes, stir spoons, maybe even carboys — anything that could come into contact with the beer — strictly for organic-only production might be prudent.

What Does the Future Hold?

As more people want to make an environmental difference, restore the earth to a healthier state and generally take better care of all that's around us (including our own bodies), producing and consuming organic beer is a natural progression in helping the planet and ourselves. (That sounds like a good reason to brew, if you need one.) With rising market demand and the increased availability of organic malts, grains and hops, a growing number of brewers are making the switch to organic brewing.

Thus, it seems inevitable this movement will become the future of craft brewing.

"I can see a time when we look back," says Sidor, "and wonder why we didn't make it happen sooner."

Glenn BurnSilver wrote "Five Belgian-Inspired Clones" in the July-August 2008 issue of Brew Your Own.

ORGANIC Clone Recipes

Wolaver's Oatmeal Stout clone

(5 gallons/19 L, all-grain)

OG = 1.060 FG = 1.016
IBU = 40 SRM = 60 ABV = 5.6%

Ingredients

9.5 lbs. (4.3 kg) organic 2-row malt
1.4 lbs. (0.64 kg) organic roasted barley
0.7 lbs. (0.32 kg) organic rolled oats
0.5 lbs. (0.23 kg) organic crystal malt (120 °L)
0.7 lbs. (0.32 kg) organic Munich malt (10 °L)
0.28 lbs. (0.13 kg) organic unmalted wheat
9.2 AAU Magnum hops (60 mins) (0.65 oz./19 g of 14% alpha acids)
0.4 AAU organic Hallertau hops (15 mins) (0.1 oz./2.8 g of 4 % alpha acids)
2.4 AAU Cascade hops (15 mins) (0.48 oz./14 g of 5% alpha acids)
ale yeast (Wolaver's uses a proprietary alt strain) (1.5 qt./1.5 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

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

Wolaver's Oatmeal Stout clone

(5 gallons/19 L, extract with grains)

OG = 1.060 FG = 1.016
IBU = 40 SRM = 60 ABV = 5.6%

Ingredients

0.42 lbs. (0.19 kg) organic 2-row malt
1.4 lbs. (0.64 kg) organic roasted barley
0.7 lbs. (0.32 kg) organic rolled oats
0.5 lbs. (0.23 kg) organic crystal malt (120 °L)
0.7 lbs. (0.32 kg) organic Munich malt (10 °L)
0.28 lbs. (0.13 kg) organic unmalted wheat
1.5 lbs. (0.68 kg) Briess organic light dried malt extract
4.63 lbs. (2.1 kg) Briess organic light liquid malt extract (late addition)
9.2 AAU Magnum hops (60 mins) (0.65 oz./19 g of 14% alpha acids)
0.4 AAU organic Hallertau hops (15 mins) (0.1 oz./2.8 g of 4 % alpha acids)
2.4 AAU Cascade hops (15 mins) (0.48 oz./14 g of 5% alpha acids)
ale yeast (Wolaver's uses a proprietary alt strain) (1.5 qt./1.5 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Steep grains for 45 minutes at 152 °F (67 °C) in 5.0 qts. (4.7) of water. Add dried malt extract to wort from steeping, bring wort volume to 2.5 gallons (9.5 L) and boil for 60 minutes, adding hops at times indicated in the ingredient list. Add liquid malt extract for final 15 minutes of the boil. Ferment at 68 °F (20 °C).

Bison Organic Chocolate Stout clone

(5 gallons/19 L, all-grain)

OG = 1.058 FG = 1.020
IBU = 25 SRM = 67 ABV = 4.8%

Ingredients

7.5 lbs. (3.4 kg) organic 2-row pale malt
1.5 lbs. (0.68 kg) organic Munich malt
2.0 lbs. (0.91 kg) organic CaraMunich®

malt
1.0 lbs. (0.45 kg) organic chocolate malt
0.5 lbs. (0.23 kg) organic roasted barley
1.0 oz. (28 g) cocoa
6 AAU Magnum hops (60 mins)
(0.5 oz./14 g of 12% alpha acids)
2 AAU Cascade hops (2 mins)
(0.4 oz./11 g of 5% alpha acids)
ale yeast (Bison uses a proprietary strain and suggests you use an alt yeast)
(1.5 qt./1.5 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Mash at 152 °F (67 °C). To mash in, add one-third of the grains and stir in cocoa. Layer remaining two-thirds of grain bed over this. Boil for 75–90 minutes. Ferment at 70 °F (21 °C).

Bison Organic Chocolate Stout clone

(5 gallons/19 L, extract with grains)

OG = 1.058 FG = 1.020
IBU = 25 SRM = 67 ABV = 4.8%

Ingredients

1.5 lbs. (0.68 kg) organic Munich malt
2.0 lbs. (0.91 kg) organic CaraMunich® malt
1.0 lbs. (0.45 kg) organic chocolate malt
0.5 lbs. (0.23 kg) organic roasted barley
1.0 oz. (28 g) cocoa
1 lb. 14 oz. (0.85 kg) Briess organic light dried malt extract
4.0 lbs. (1.8 kg) Briess organic light liquid malt extract (late addition)
6 AAU Magnum hops (60 mins)
(0.5 oz./14 g of 12% alpha acids)
2 AAU Cascade hops (2 mins)
(0.4 oz./11 g of 5% alpha acids)
ale yeast (Bison uses a proprietary strain and suggests you use an alt yeast)
(1.5 qt./1.5 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Steep grains for 45 minutes at 152 °F (67 °C) in 4.4 qts. (4.1 L) of water. Stir cocoa in steeping grains. Add dried malt extract to wort from steep, bring wort volume to 2.5 gallons (9.5 L) and boil for 60 minutes. Add hops at times indicated in the ingredient list and liquid malt extract with 15 minutes left in the boil. Cool wort and transfer to fermenter. Top up 5 gallons (19 L) and pitch yeast. Ferment at 70 °F (21 °C).

Blue Dot Double India Pale Ale clone

(5 gallons/19 L, all-grain)

OG = 1.072 FG = 1.010
IBU = 100+ SRM = 6 ABV = 7.9%

Ingredients

13.17 lbs. (6.0 kg) organic Pilsner malt
1.76 lbs. (0.80 kg) organic flaked rye
64 AAU Warrior hops (75 mins)
(4.0 oz./110 g of 16% alpha acids)
56 AAU Magnum hops (40 mins)
(4.0 oz./110 g of 14% alpha acids)
48 AAU Columbus hops (10 mins)
(4.0 oz./113 g of 12% alpha acids)
5.0 oz. (140 g) Warrior hops (dry hop)
5.0 oz. (140 g) Amarillo hops (dry hops)
Wyeast 1728 (Scottish Ale) yeast
(2.0 qt./2 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Mash at 154–156 °F (68 °C). Boil for 180 minutes. Ferment at 68 °F (20 °C).

Blue Dot Double India Pale Ale clone

(5 gallons/19 L, extract with grains)

OG = 1.072 FG = 1.010

IBU = 100+ SRM = 6 ABV = 7.9%

Ingredients

2.24 lbs. (1.0 kg) organic Pilsner malt
1.76 lbs. (0.80 kg) organic flaked rye
2.0 lbs. (0.91 kg) Briess organic light dried malt extract
5.25 lbs. (2.4 kg) Briess organic light liquid malt extract (late addition)
64 AAU Warrior hops (75 mins) (4.0 oz./110 g of 16% alpha acids)
56 AAU Magnum hops (40 mins) (4.0 oz./110 g of 14% alpha acids)
48 AAU Columbus hops (10 mins) (4.0 oz./113 g of 12% alpha acids)
5.0 oz. (140 g) Warrior hops (dry hop)
5.0 oz. (140 g) Amarillo hops (dry hops)
Wyeast 1728 (Scottish Ale) yeast (2.0 qt./2 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Steep grains for 45 minutes at 154–156 °F (68 °C) in 5 qts. (4.7 L) of water. Add dried malt extract to wort from steep, bring wort volume to 6.5 gallons (25 L) and boil for 90 minutes. (You need to perform a full wort boil to get the right bitterness and character from the hops.) Add hops at times indicated in ingredient list and liquid malt extract for final 15 minutes of boil. Ferment at 68 °F (20 °C).

St. Peter's Organic Best Bitter clone

(5 gallons/19 L, all-grain)

OG = 1.041 FG = 1.011
IBU = 37 SRM = 12 ABV = 3.9%

Ingredients

7.8 lbs. (3.5 kg) organic 2-row pale malt
0.77 lbs. (0.35 kg) organic crystal malt (90 °L)
7.4 AAU organic First Gold hops (60 mins) (0.95 oz./27 g of 7.8% alpha acids)
5.0 AAU organic Goldings hops (15 mins) (0.94 oz./27 g of 5.3% alpha acids)
English ale yeast (your choice) (1 qt./1 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Mash at 147 °F (64 °C). Boil for 75 minutes. Ferment at 68 °F (20 °C).

St. Peter's Organic Best Bitter clone

(5 gallons/19 L, extract with grains)

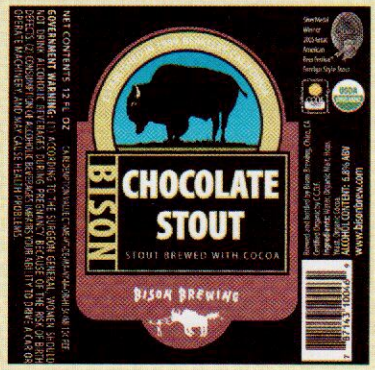
OG = 1.041 FG = 1.011
IBU = 37 SRM = 12 ABV = 3.9%

Ingredients

1.23 lbs. (0.56 kg) organic pale malt
0.77 lbs. (0.35 kg) organic crystal malt (90 °L)
1.13 lbs. (0.51 kg) Briess organic light dried malt extract
3.3 lbs. (1.5 kg) Briess organic light liquid malt extract (late addition)
7.4 AAU organic First Gold hops (60 mins) (0.95 oz./27 g of 7.8% alpha acids)
5.0 AAU organic Goldings hops (15 mins) (0.94 oz./27 g of 5.3% alpha acids)
English ale yeast (your choice) (1 qt./1 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Steep grains for 45 minutes at 147 °F (64 °C) in 2.5 qts. (2.4 L) of water. Add dried malt extract to wort from steep, bring wort volume to 2.5 gallons (9.5 L) and boil for 60 minutes. Add hops at times indicated and liquid malt extract for final 15 minutes of the boil. Cool wort and transfer to sanitized fermenter. Top up with cool water to 5 gallons (19 L). Aerate, pitch yeast and ferment at 68 °F (20 °C).

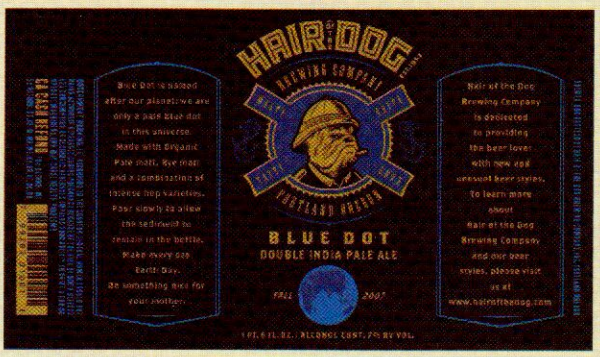


"If Joe-6-pack chooses organic beer, he would be supporting one-eighth of an acre for sustainable agriculture, equivalent to a typical suburban single-family home lot here in Berkeley. Imagine that, tear down your house to grow a crop of barley to produce your favorite beverage."

— Daniel Del Grande, Owner and Brewer
Bison Brewing Company

"I am trying to make a beer full of hop flavor without being overly bitter, it is also at the low end of alcohol for the style. For me it is special because you can drink more than one glass, unlike my other beers."

— Alan Sprints, Brewmaster/Owner
Hair of the Dog Brewing Company



Deschutes Green Lake Organic Ale clone

(5 gallons/19 L, all-grain)

OG = 1.054 FG = 1.014
IBU = 45 SRM = 22 ABV = 5.3%

Ingredients

9.25 lbs. (4.2 kg) organic 2-row malt
0.5 lbs. (0.23 kg) organic crystal malt (60 °L)
1.0 lbs. (0.45 kg) organic Munich malt (10 °L)
0.5 lbs. (0.23 kg) organic dextrine malt
4.0 oz. (0.11 kg) organic chocolate malt
2 AAU Brewers Gold hops (60 mins) (0.25 oz./.1 g of 8% alpha acids)
2 AAU Centennial hops (60 mins) (0.20 oz./5.7 g of 10% alpha acids)
2.5 AAU Amarillo hops (30 mins) (0.31 oz./8.8 g of 8% alpha acids)
2.5 AAU Cascade hops (30 mins) (0.5 oz./14 g of 5% alpha acids)
7.6 AAU salmon-safe Sterling hops (15 mins) (1.0 oz./28 g of 7.5% alpha acids)
2.3 AAU Liberty hops (15 mins) (0.5 oz./14 g of 4.5% alpha acids)
English ale yeast (1.5 qt./1.5 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Mash at 152 °F (67 °C). Boil for 90 minutes. Ferment at 65 °F (18 °C).

Deschutes Green Lake Organic Ale clone

(5 gallons/19 L, extract with grains)

OG = 1.054 FG = 1.014
IBU = 45 SRM = 22 ABV = 5.3%

Ingredients

0.5 lbs. (0.23 kg) organic crystal malt (60 °L)
1.0 lbs. (0.45 kg) organic Munich malt (10 °L)
0.5 lbs. (0.23 kg) organic dextrine malt
4.0 oz. (0.11 kg) organic chocolate malt
2.0 lbs. (0.91 kg) Briess organic light dried malt extract
4.0 lbs. (1.8 kg) Briess organic light liquid malt extract (late addition)
2 AAU Brewers Gold hops (60 mins) (0.25 oz./.1 g of 8% alpha acids)
2 AAU Centennial hops (60 mins) (0.20 oz./5.7 g of 10% alpha acids)
2.5 AAU Amarillo hops (30 mins) (0.31 oz./8.8 g of 8% alpha acids)
2.5 AAU Cascade hops (30 mins) (0.5 oz./14 g of 5% alpha acids)
7.6 AAU salmon-safe Sterling hops (15 mins) (1.0 oz./28 g of 7.5% alpha acids)
2.3 AAU Liberty hops (15 mins) (0.5 oz./14 g of 4.5% alpha acids)
English ale yeast (1.5 qt./1.5 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Steep grains in 2.8 qts. (2.6 L) of water fo
45 minutes at 152 °F (67 °C). Add dried ma
extract to wort from steep, bring wort vo

ume to 3 gallons (11 L) and boil for 90 minutes. Add hops at times indicated and liquid malt extract with 15 minutes left in boil. Ferment at 65 °F (18 °C).

Butte Creek Organic Pilsner clone

(5 gallons/19 L, all-grain)

OG = 1.044 FG = 1.010
IBU = 22 SRM = 3 ABV = 4.2%

Ingredients

8.1 lbs. (3.7 kg) organic Pilsner malt
0.9 lbs. (0.41 kg) organic CaraPils® malt
3.8 AAU Sterling hops (60 mins) (0.5 oz./14 g of 7.5% alpha acids)
3.1 AAU Sterling hops (20 mins) (0.41 oz./12 g of 7.5% alpha acids)
lager yeast (Butte Creek uses a proprietary strain that exhibits 76% apparent attenuation) (3.5 qt./3.5 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Mash at 152 °F (67 °C). Boil for 80 minutes. Ferment at 54 °F (12 °C).

Butte Creek Organic Pilsner clone

(5 gallons/19 L, extract with grains)

OG = 1.044 FG = 1.010
IBU = 22 SRM = 3 ABV = 4.2%

Ingredients

1.1 lbs. (0.5 kg) organic Pilsner malt
0.9 lbs. (0.41 kg) organic CaraPils® malt
1 lb. 7 oz. (0.65 kg) Briess organic light dried malt extract
3.3 lbs. (1.5 kg) Briess organic light liquid malt extract (late addition)
3.8 AAU Sterling hops (60 mins) (0.5 oz./14 g of 7.5% alpha acids)
3.1 AAU Sterling hops (20 mins) (0.41 oz./12 g of 7.5% alpha acids)
lager yeast (3.5 qt./3.5 L yeast starter)
0.75 cup corn sugar (for priming)

Step by Step

Steep grains in 2.5 qts. (2,4 L) of water for 45 minutes at 152 °F (67 °C). Add dried malt extract and water to bring wort volume to 2.5 gallons (9.5 L). Boil for 80 minutes, adding liquid malt extract with 15 minutes left in boil. Ferment at 54 °F (12 °C).

the DARK SIDE OF PARTIAL MASHING

by **Chris Colby**

Most homebrewers identify themselves as either extract brewers or all-grain brewers. There is, however, a middle ground between these two approaches — partial mashing. Partial mashing gives you much of the flexibility of all-grain brewing while retaining some of the convenience of extract brewing. However, there is a dark side to partial mashing.

The Problem

One problem I've discovered with brewing dark beers using a partial mash is that the pH of the mash can easily drop too low. Imagine for a minute a dry stout. If you brewed an all-grain version of the stout, your grain bill would contain roughly 90% pale malts (or pale malts and flaked barley) and about 10% darkly-roasted grains. When you mashed this all-grain stout, you would likely add a little carbonate to your water to keep the mash from getting too acidic, unless your water was already rich in carbonates. This is because dark grains are acidic and will drive your mash pH down. Carbonates, on the other hand, absorb acidity. Without the carbonates, the mash pH would drop below the recommended range and your extract efficiency would suffer.

Now imagine a stout made with a partial mash. You'll still have the same amount of dark grains in your grist, but the amount of pale malt will be decreased. With a partial mash method that mashes 4.0 lbs. (1.8 kg) of grain — like my countertop partial mashing protocol — the amount of dark grains can get up to around 50% of the mash.

In order to counteract all the acid from the dark grains, you'd need to add a fair bit of carbonate to your mash water. And, you'd need the amount to be within a certain window. Too little carbonate and the mash pH would be too low; too much and the pH would be too high. With a pH meter, you

A PROCEDURE TO DEAL WITH pH ISSUES

could do this fairly easily, but it seems a bit complicated for a stovetop brew. Fortunately, there's an easier way.

The Solution

Recall that some grains need to be mashed, while others can be steeped — and almost all darkly-roasted grains fall in the latter category. Given that, one way to approach making a dark beer with a partial mash would be to make a mash predominantly from pale malts and separately steep the dark grains. This way, with most brewing waters, your mash would settle into a reasonable pH. In the steep, hitting a certain pH range is not critical. You aren't counting on enzymes to do anything in the steep, so a low pH would not matter much.

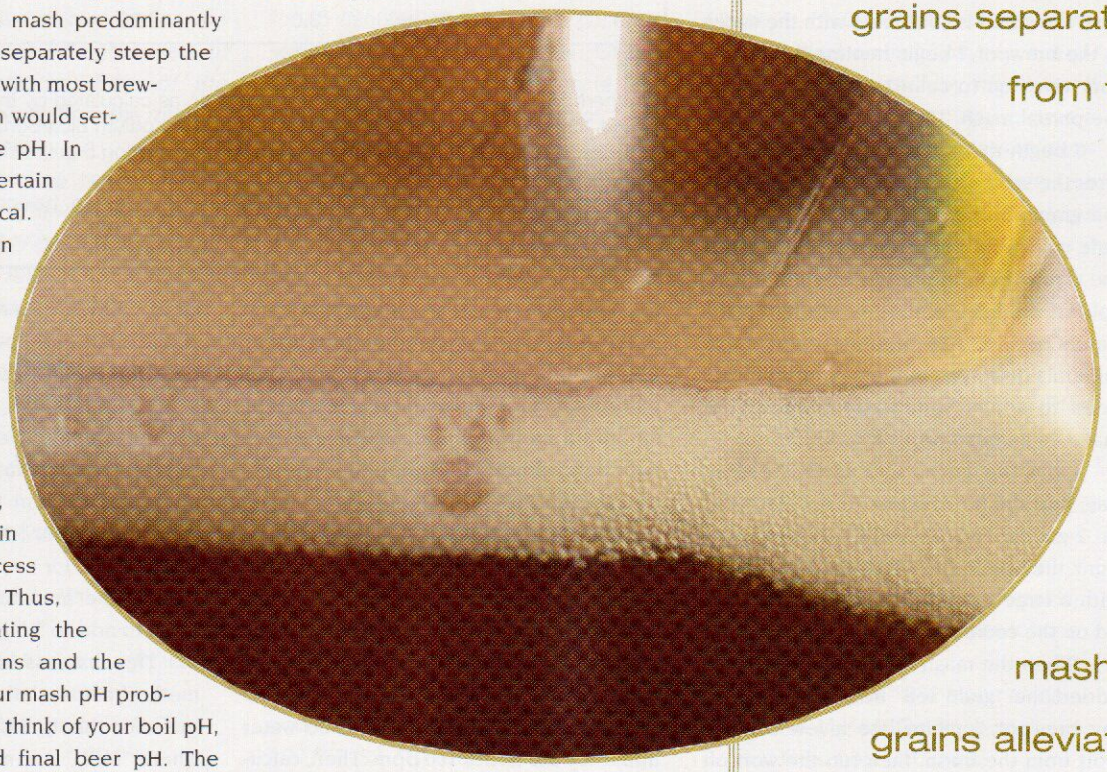
The Other Problem

The mash, however, isn't the only time in the brewing process when pH matters. Thus, even though separating the steepable dark grains and the base malts solves your mash pH problem, you still need to think of your boil pH, fermentation pH and final beer pH. The solution here is to add some carbonates somewhere along the line, to counteract the acidity of the dark grains. In the recipes presented with the article, I have calculated the total amount of carbonates required. I add half of this amount to the steeping water and the rest to the boil.

So, the basic idea is to make a pale or amber wort from a small mash, combine this with the dark "grain tea" from your steeped grains and add enough carbonate ions to keep the boil pH in line. This entails a bit more work than your average extract brew, but once you try it, I think you'll see the results are worth the trouble. For the recipes in this article, I use the countertop partial mashing method. However, there are many ways to do a partial mash and you can adapt these recipes and techniques presented here to your favorite partial mash technique.

Protocol for Dark Beers

I begin by heating 5.5 qts. (5.2 L) of water to strike temperature, the temperature of the water added to the grains in a mash, in a big kitchen pot.



This is the water that will be used for mashing and my strike temperature is usually about 13 °F (~6 °C) over mash temperature (but this will vary for different brewers). At the same time, I begin heating some water in my brewpot up to 170 °F (77 °C). How much water depends on how much liquid will come from the steep. I will collect around 2.5 gallons (9.5 L) from the partial mash and try to work it so that this volume plus the "grain tea" from the steep plus the water in the brewpot gives me approximately 3.0 gallons (11 L) of pre-boil wort.

I put the crushed steepable grains in a steeping bag. In a soup pot, I steep the grains in 2.5 qts. of water per pound of grain

The large percentage of dark roasted grains in a partial mash for a dark beer can lead to overly low mash pH levels. Fortunately, steeping the darkest grains separately from the mashed grains alleviates this problem. A little carbonate (from baking soda) added to the steep and boil will correct any issues with acidity.

(~5 L/kg) at approximately the same temperature as the mash. Because the dark grains are acidic, I add some sodium bicarbonate (baking soda) to the steep water. I calculate the total amount I would add if I were brewing an all-grain batch, then add half of that to the steep.

When the steep is done, I lift the bag out and place it in a colander over my brewpot (now with water at 170 °F/77 °C). With a measuring cup, I scoop 2–3 cups of water out of the brewpot and rinse the grains. Then, I pour the "grain tea" from the steep through the grains (to filter out any solid bits of grain). Once the liquid from the steep is combined with the water in the brewpot, I begin heating it to a boil and move on to collecting the wort from the partial mash.

I begin the partial mash immediately after the start of the steep. In the recipes, the grains in the partial mash are mostly pale malts, but I usually add a little bit of the crystal from the recipe to yield a dark golden to light amber wort. For most waters with low to medium amounts of minerals dissolved in them, you shouldn't need to adjust your water chemistry to make an amber wort.

I put the grains in a large steeping bag, add the strike water to my mash tun (a 2-gallon/7.6-L beverage cooler) and dunk the bag in the water. I stir the grains with a large brewing spoon, then put the lid on the cooler.

When the mash is over, and after I've added the "grain tea" from the steep to my brewpot, I recirculate a few cups of wort from the mash, then run the wort off to the kettle. In most of the recipes, I end up with about 3.0 gallons (11 L) of pre-boil wort. At this point, I add the remainder of the carbonates to the wort and begin the boil. From this point, I proceed as I would for any extract beer.

Water Chemistry

So let's backtrack and look at the water used in these dark, partial mash brews. Getting the right level of carbonates is one of the keys to brewing a great dark beer — whether extract, partial mash or all-grain. But, water chemistry can be a daunting subject for some. Below I give a simple water treatment plan that will work for the partial mash recipes and any partial mash procedure that is similar. When performing a separate mash and steep, you may need to adjust both the steeping water and the boiling wort. Keep in mind that you do not need the level of carbonates to fall into a narrow range; anywhere in the right ballpark will yield good results.

The mashes in the recipes produce amber colored wort. In all likelihood, your tap water will be fine to use for the mash. If you want to fine-tune it, you have two options. For the first option, you will need a copy of your local water report. Look at the level of carbonates in your water and dilute it, if necessary, with distilled water until they are under 100 ppm. Then, calculate the level of calcium ions left after dilution. Add calcium, if needed, to the water until it has 150–200 ppm calcium ion. Half a teaspoon of gypsum or calcium chloride in one gallon (3.8 L) of water adds almost 125 ppm of calcium.

A second option, if you have high-carbonate water, would be to shift some of the darkest grains to be steeped over to the mash so that the mash contained 5–10% dark grains.

To counteract the acidity from the dark grains, you will need some carbonate ions. I add half the carbonates to the steep water and the rest to the boil. To estimate how much sodium bicarbonate (baking soda) to add, first look at the level of carbonates in your water and the calculated SRM for your beer. Refer to the above chart and line up the color of your beer and the level of carbonates and pick a value where the appropriate row and column intersect. Next, look at the level of calcium in your water. If it is below 100 ppm, add calcium to bring it up to this value. If it is over 100 ppm, add 0.25 tsp. of baking soda for every additional 50 ppm. That is the amount of baking soda you need to add to 5.0 gallons (19 L) of beer.

This chart assumes you use the Morey method of calculating beer color. The formula for this is SRM = 1.49 x ($MCU^{0.69}$), where "MCU" are malt color units, calculated as the weight of the malt (in pounds) times the color of the malt (in °Lovibond) divided by the volume of the beer (in gallons). This calculation is fairly accurate for light-colored beers, but calculated values drift high the darker the beer gets.

Carbonate Addition Chart for Dark Beers

SRM (Morey)	tsp (0)	tsp (100)	tsp (200)	tsp (300)
10	1.0	0.50	-	-
14	1.25	0.75	-	-
17	1.5	1.0	0.25	-
22	1.75	1.25	0.50	-
26	2.0	1.5	0.75	0.25
33	2.5	2.0	1.25	0.75
41	3.0	2.5	1.75	1.25
49	3.5	3.0	2.25	1.75

Where "SRM (Morey)" is the color of your beer, as calculated by the Morey formula and "tsp (X)" is the total number of teaspoons of sodium bicarbonate to add if your water has X ppm carbonates, assuming you are making 5 gallons (19 L) of beer.

This assumes that Ca++ = 100 ppm. Add an extra 0.25 tsp. baking soda for every 50 ppm Ca++ over 100 ppm in your water.

Conclusion

So say goodbye to thin, acidic dark beers and hello to brews with a rich, roasty flavor, full body and wonderful dark-grain aroma. The partial mash method outlined is a little more convoluted than a typical partial mash, but the results will more than justify the extra effort.

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

DARK PARTIAL MASH RECIPES

Dawkin's Dark (Dark Mild Ale)

(5 gallons/19 L, countertop partial mash)

OG = 1.036 FG = 1.010
IBU = 17 SRM = 32 ABV = 3.4%

This is a low-gravity, English-style session beer with a rich, smooth flavor and a surprising amount of body. Great for drinking while in long discussions — or arguments — with friends. It will ferment and condition quickly, and can be ready to drink in as little as a week (if you force carbonate). 64% of the extract weight comes from the mashed and steeped grains.

The Step by Step section in this recipe gives an extended explanation of the partial mash procedure for dark brews. You can refer to it for help on brewing any of these recipes.

Ingredients

3 lb. 7 oz. (1.6 kg) British pale ale malt (PM)
9.0 oz. (0.56 kg) crystal malt (60 °L) (PM)
7.0 oz. (0.20 kg) crystal malt (90 °L) (steep)
7.0 oz. (0.20 kg) chocolate malt (steep)
2.0 lbs. (0.91 kg) Muntons Light liquid malt extract (late addition)
4.5 AAU Kent Goldings or First Gold hops (60 mins)
(0.64 oz./18 g of 7% alpha acids)
0.5 oz. (14 g) Fuggles or Glacier hops (0 mins)
Wyeast 1099 (Whitbread Ale), White Labs WLP005 (British Ale) or Safale S-04 yeast
(no yeast starter required if pitching from Wyeast Activator pack, White Labs tube or dried yeast)
4.0 oz. (110 g) corn sugar (for priming)

Step by Step

Start by heating water in three pots — 2.0 qts. (~2.0 L) in a soup pot (for steeping), 5.5 qts. (5.2 L) in a large kitchen pot (mash liquor) and 1.25 qts. (~1.25 L) in your brewpot. Add 0.5 tsp. of sodium bicarbonate (baking soda) to the steep water. Heat steeping water to 165 °F (74 °C), place crushed crystal malt (90 °L) and chocolate malt in a steeping bag and place in pot. (Temperature should fall to around 154 °F/68 °C.) Heat mash liquor to 167 °F (75 °C) and pour in 2-gallon (7.6-L) beverage cooler. Put crushed pale malt and crystal malt (90 °L) in large steeping bag and submerge in cooler, stir and seal cooler. Let mash for 45 minutes at 154 °F (68 °C). Heat water in brewpot to 170 °F (77 °C) and begin heating a second 5.0 qts. (4.7 L) of water in your large kitchen pot. Heat this water to 180 °F (82 °C).

When mash is almost done, take the steeping bag out of the soup pot and place it in a large strainer or a colander over the brewpot. Scoop out about a quart (or liter) of water from the brewpot and pour this through the grain bag. Then, pour the "grain tea" from the soup pot through the grain bag (to filter out any solid pieces of grain in the "tea"). Begin heating brewpot while you collect wort from mash. (In higher-gravity recipes, some dried malt extract might be added here.)

When mash is done, recirculate about 3 qts (~3 L) of wort to clear it up a bit. Then, start collecting wort. Collect 2 cups from the cooler and pour it into the brewpot. Take 2 cups of 180 °F (82 °C) water from the large kitchen pot and pour it on top of the grain bed. Repeat until you are out of 180 °F (82 °C) water, then collect the remaining wort from the cooler and add to brewpot. Bring the wort to a boil, add bittering hops and 0.5 tsp. baking soda and begin the 60-minute boil. Add liquid malt extract with 15 minutes left in boil and aroma hops at the end of the boil. Cool wort in brewpot, then transfer to your fermenter. Top up to 5 gallons (19 L) with cold water and aerate. Pitch the yeast and ferment at 68 °F (20 °C). Let the beer ferment to completion, which should take 3–4 days, then let the beer sit for another day before kegging or bottling. If kegging, carbonate to 2.0 volumes of CO_2. This session beer should be slightly less carbonated than the average homebrew.

Deth Stout (Dry Stout)

(5 gallons/19 L, countertop partial mash)

OG = 1.038 FG = 1.008
IBU = 26 SRM = 41 ABV = 4.0%

This is a dry stout in the style of Murphy's. Its color is "blacker than the blackest black times infinity" (or actually dark brown with ruby highlights if you hold it up to a light). If you have a stout tap, you can push this with nitrogen, but I think it's actually better on CO_2. 61% of the extract weight comes from grains.

Ingredients

3 lb. 14 oz. (1.8 kg) 2-row pale ale malt (PM)
2.0 oz. (57 g) crystal malt (90 °L) (PM)
10 oz. (0.28 kg) roasted barley (500 °L) (steep)
3.0 oz. (85 g) chocolate malt (steep)
1.25 lbs. (0.57 kg) Muntons Light liquid malt extract (late addition)
12 oz. (0.34 kg) cane sugar (15 mins)
6 AAU Columbus or Tomahawk hops (60 mins)
(0.5 oz./14 g of 12% alpha acids)
0.5 oz. (14 g) Kent Goldings or First Gold hops (10 mins)
White Labs WLP007 (Dry English Ale) yeast
(no yeast starter required)
5.0 oz. (140 g) corn sugar (for priming)

Step by Step

Steep chocolate malt and roasted barley at 152 °F (67 °C) in 2.0 qts. (~2 L) of water. Mash pale ale malt and crystal malt (90 °L) at 152 °F (67 °C). Add 0.75 tsp of sodium bicarbonate to steep water. Heat 1.25 qts. (~1.25 L) of water to 170 °F (77 °C) in brewpot while grains steep and mash. Add 0.75 tsp. of sodium bicarbonate to brewpot and boil for 60 minutes, adding hops at times indicated in ingredient list. Add

sugar and liquid malt extract with 15 minutes left in boil. Ferment at 70 °F (21 °C).

Newkbrownomicon (Brown Ale)

(5 gallons/19 L, countertop partial mash)

OG = 1.048 FG = 1.012
IBU = 22 SRM = 33 ABV = 4.6%

Legend has it that the Necronomicon (the Book of the Dead) contains the necessary incantations to raise an army of the dead to wage war on the living. The Necronomicon's lesser-known companion volume, the Newkbrownomicon, is a collection of 5-gallon (19-L) extract brown ale recipes. This recipe won't help you raise the dead, but it does taste very chocolatey. 44% of the extract weight comes from the steeped and mashed grains.

Ingredients

3 lb. 4 oz. (1.5 kg) 2-row pale malt (PM)
9.0 oz. (0.26 kg) crystal malt (30 °L) (PM)
3.0 oz. (85 g) Briess Victory® malt (PM)
6.0 oz. (0.17 kg) chocolate malt (steep)
2.0 oz. (57 g) debittered black malt (500 °L) (steep)
0.5 lbs. (0.23 kg) Briess Light dried malt extract
3.3 lbs. (1.5 kg) Briess Light liquid malt extract (late addition)
6 AAU Northern Brewer hops (60 mins)
(0.75 oz./21 g of 8% alpha acids)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Safale US-05 yeast
(1.5 qt./1.5 L yeast starter)
6.0 oz. (170 g) corn sugar (for priming)

Step by Step

Steep chocolate malt and black malt at 154 °F (68 °C) in 1.25 qts. (~1.2 L) of water. Add 0.5 tsp of sodium bicarbonate to steep water. Mash pale malt and crystal malt (30 °L) at 154 °F (68 °C) for 45 minutes. Heat 2.0 qts. (~2 L) of water to 170 °F (77 °C) in brewpot while grains steep and mash. Once wort is collected, add dried malt extract and boil for 60 minutes, adding hops at beginning of boil. Add 0.5 tsp of sodium bicarbonate at beginning of boil. Add liquid malt extract with 15 minutes left in boil. Ferment at 70 °F (21 °C).

Dunkel Schön (Munich Dunkel)

(5 gallons/19 L, countertop partial mash)

OG = 1.052 FG = 1.013
IBU = 20 SRM = 21 ABV = 5.0%

When I first saw the movie, Ferris Bueller's Day Off, *I thought that the song Matthew Broderick lip-synched on the float — "Danke shoen" — was sung by a woman. In fact, it was sung by a young Wayne Newton. With this dunkel, there are no surprises — it's a malty, bready dark lager. 37% of the extract weight is from the grains.*

Ingredients

3 lb. 5 oz. (1.5 kg) Munich malt (10 °L) (PM)
8.0 oz (0.23 kg) dark Munich malt (20 °L) (PM)
3.0 oz (85 g) melanoidin malt (PM)
3.0 oz. (85 g) Carafa® Special II malt (steep)
0.75 lbs. (0.34 kg) light dried malt extract
4.0 lbs. (1.8 kg) Munich liquid malt extract (late addition)
5.5 AAU Tettnang or Santiam hops (60 mins)
(0.85 oz./24 g of 6.5% alpha acids)
Wyeast 2206 (Bavarian Lager) or White Labs WLP820 (Octoberfest/Märzen) yeast
(3 qt./3 L yeast starter)
5.0 oz. (140 g) corn sugar (for priming)

Step by Step

Steep Carafa® Special II malt at 153 °F (67 °C) in 0.5 qts. (~0.5 L) of water. Add 0.25 tsp of sodium bicarbonate to steep water. Mash Munich and melanoidin malts at 153 °F (67 °C) for 45 minutes. Heat 2.75 qts. (~2.75 L) of water to 170 °F (77 °C) in brewpot while grains steep and mash. Once wort is collected, add dried malt extract and boil for 60 minutes, adding hops at beginning of boil. Add 0.25 tsp of sodium bicarbonate at beginning of boil. Add Munich liquid malt extract with 15 minutes left in boil. Ferment at 52 °F (11 °C), letting temperature climb to 60 °F (16 °C) after fermentation is two-thirds finished. Hold at 60 °F (16 °C) for two days, then rack to secondary and lager at 40 °F (4.4 °C) for 4–5 weeks.

Twoflower's Luggage (Robust Porter)

(5 gallons/19 L, countertop partial mash)

OG = 1.060 FG = 1.015
IBU = 49 SRM = 63 ABV = 5.8%

Don't skip making a yeast starter with this yeast strain. 43% of the extract weight is from the grains.

Ingredients

3 lb. 10 oz. (1.6 kg) 2-row pale ale malt (Maris Otter) (PM)
6.0 oz. (0.17 kg) crystal malt (60 °L) (PM)
12 oz. (0.34 kg) crystal malt (40 °L) (steep)
8.0 oz. (0.23 kg) chocolate malt (steep)
7.0 oz. (0.20 kg) black malt (500 °L) (steep)
3.0 oz. (85 g) roasted barley (500 °L) (steep)
1.0 lb. (0.45 kg) Briess Light dried malt extract
3.75 lbs. (1.7 kg) Coopers Light liquid malt extract (late addition)
11 AAU Newport hops (60 mins)
(0.73 oz./21 g of 15% alpha acids)
0.5 oz. at 5% Tettnang or Santiam hops (15 mins)
0.5 oz at 5% Tettnang or Santiam hops (10 mins)
0.5 oz at 5% Fuggles or Glacier hops (5 mins)
0.5 oz at 5% Fuggels or Glacier hops (0 mins)
Wyeast 1968 (London ESB Ale) or White Labs WLP002

(English Ale) yeast
(2 qt./2 L yeast starter)
5.0 oz. (140 g) corn sugar
(for priming)

Step by Step

Steep crystal malt (40 °L), chocolate malt, roasted barley and black malt at 152 °F (67 °C) in 4.5 qts. (~4.2 L) of water. Add 1.0 tsp of sodium bicarbonate to steep water. Mash pale malt and crystal malt (60 °L) at 152 °F (67 °C) for 45 minutes. Heat 0.5 qt. (~0.5 L) of water to 170 °F (77 °C) in brewpot while grains steep and mash. Once wort is collected, add dried malt extract and 1.0 tsp of sodium bicarbonate and boil wort for 60 minutes, adding hops at times indicated in ingredient list. Add liquid malt extract with 15 minutes left in boil. Ferment at 68 °F (20 °C).

No Pants Scotch Ale (Wee Heavy)

(5 gallons/19 L, countertop partial mash)

OG = 1.081 FG = 1.020
IBU = 20 SRM = 27 ABV = 7.8%

Scottish ales are fermented at low temperatures and take a while to ferment and condition. 26% of the extract weight comes from the grains.

Ingredients

3 lb. 12 oz. (1.7 kg) 2-row pale ale malt (Golden Promise) (PM)
4.0 oz. (0.11 kg) crystal malt (60 °L) (PM)
3.0 oz. (85 g) crystal malt (90 °L) (steep)
2.0 oz. (57 g) chocolate malt (steep)
2.0 oz. (57 g) roasted barley (300 °L) (steep)
1.75 lb. (0.79 kg) Muntons Light dried malt extract
6.6 lb. (3.0 kg) Muntons Light liquid malt extract (late addition)
6 AAU Kent Goldings or First Gold hops (60 mins)
(0.85 oz./24 g of 7% alpha acids)
Wyeast 1728 (Scottish Ale) or White Labs WLP028 (Edinburgh Scottish Ale) yeast
(3.5 qt./3.5 L yeast starter)
5.0 oz. (140 g) corn sugar (for priming)

Step by Step

Steep crystal malt (90 °L), chocolate malt and roasted barley at 154 °F (68 °C) in 1.0 qts. (~1 L) of water. Add a little less than 0.5 tsp of sodium bicarbonate to steep water. Mash pale ale malt and crystal malt (60 °L) at 154 °F (68 °C) for 45 minutes. Heat 2.25 qts. (~2.2 L) of water to 170 °F (77 °C) in brewpot while grains steep and mash. Once wort is collected, add dried malt extract and boil for 60 minutes, adding hops at beginning of boil. Add a little less than 0.5 tsp of sodium bicarbonate at beginning of boil. Add liquid malt extract with 15 minutes left in boil. Ferment at 60 °F (16 °C).

Octarine Ale (Cinnamon Rum Raisin Holiday Ale)

(5 gallons/19 L, countertop partial mash)

OG = 1.082 FG = 1.020

IBU = 27 SRM = 37 ABV = 8.4%

During the holidays, we spend a lot of time with our family. ABV takes into account the rum and slight sugar contribution of the raisins. 29% of the extract weight comes from the grains.

Ingredients

3 lb. 8 oz. (1.6 kg) 2-row pale ale malt (PM)
8.0 oz. (0.23 kg) crystal malt (60 °L) (PM)
8.0 oz. (0.23 kg) crystal malt (40 °L) (steep)
3.0 oz. (85 g) crystal malt (90 °L) (steep)
8.0 oz. (0.23 kg) chocolate malt (steep)
2.0 lbs. (0.91 kg) Briess Light dried malt extract
8.0 oz. (0.23 kg) brown sugar (15 mins)
5 lb. 4 oz. (2.4 kg) Alexander's Pale liquid malt extract (late addition)
½ tsp. cinnamon (2 mins)
4 oz. (0.11 kg) raisins
6.0 fl. oz. (180 mL) dark rum
8 AAU Summit hops (0.44 oz./13 g of 18% alpha acids)
Wyeast 1056 (American Ale), White Labs WLP001 (California Ale) or Safale US-05 yeast (2.5 qt./2.5 L yeast starter)
5.0 oz. (140 g) corn sugar (for priming)

Step by Step

Steep the crystal malt (40 °L), crystal malt (90 °L) and chocolate malt at 152 °F (67 °C) in 3.0 qts. (~3 L) of water. Add a little less than 0.75 tsp of sodium bicarbonate to steep water. Mash pale ale malt and crystal malt (60 °L) at 152 °F (67 °C) for 45 minutes. Heat 0.5 qts. (~0.5 L) of water to 170 °F (77 °C) in brewpot while grains steep and mash. Once wort is collected, add dried malt extract and boil for 60 minutes, adding hops at beginning of boil. Add a little less than 0.75 tsp of sodium bicarbonate at beginning of boil. Add brown sugar and liquid malt extract with 15 minutes left in boil. Add cinnamon for the final 2 minutes of the boil, then begin cooling wort. Ferment at 66 °F (19 °C).

A few days after brewday, add the raisins to a clean glass and pour the dark rum over them. Cover the glass with cling wrap and refrigerate. Wait for the beer to quit fermenting and give it two or three days to clear up a bit. Take a sanitized bucket fermenter and place the rum-soaked raisins (and any remaining rum in glass) at the bottom. Rack beer onto rum raisins and let condition — optimally at around 60 °F (16 °C) — for two months. Rack to keg or bottling bucket.

Power of Sour

Harnessing bacteria for better beer

by Dave Green

Have you caught the sour love yet? Are you the type of person that will only buy or try to clone Guinness in its Extra Stout version? Fan of Flemish or lambic style beers? Soured beers can be some of the most refreshing to the palate on a hot summer day, or after a long day at work. If you don't believe me, try picking up a bottle of Rodenbach, or if you can find one, a Berliner Weisse.

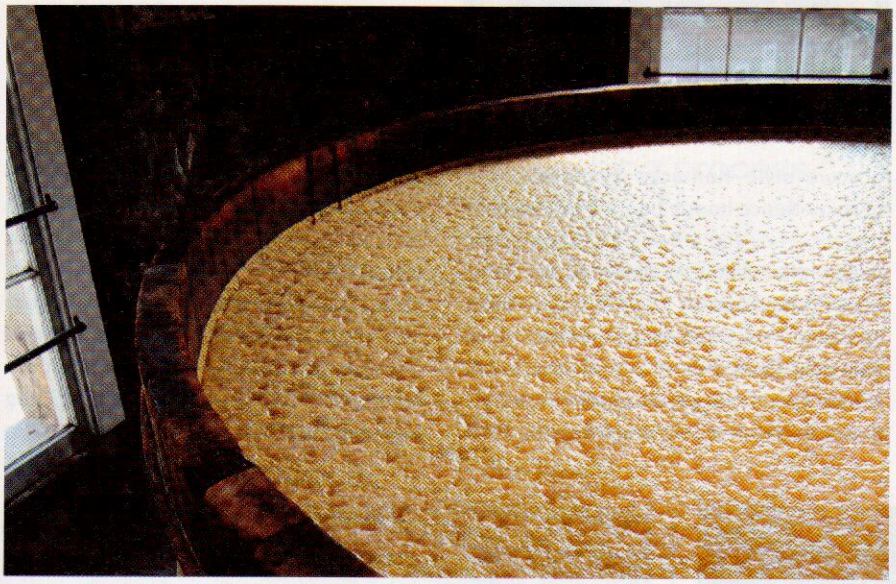


Photo by Dean Croshere

Sour mashing is a technique traditionally employed to biologically acidify beer to comply with the Rheinheitsgebot Purity Law. These days, brewers are using sour mashing methods to emulate the sour characteristics of certain styles.

Soured beers are quickly gaining popularity among beer lovers and brewers alike. Greg Noonan at Vermont Pub & Brewery in Burlington, Vermont is one brewer getting in on sour mashing currently with four beers in his line-up, a wheat beer, a Flanders red, a wit beer, and a framboise. While a sour mash is not traditional with these beer styles, it is one technique you can utilize to create the sour characteristics in these beers. It doesn't matter whether you are an extract or all-grain brewer, a sour mash is a fairly easy process that requires little in the way of special equipment.

Traditionally there were two reasons for a brewer to purposefully sour mash. The first was to biologically acidify the mash to comply with the Rheinheitsgebot Purity Law. Utilizing a sour mash for biological acidification of pale brews produces a "softer" malt profile. The second reason was to make a true sour beer like a Kentucky Common, which distillers in the Appalachian Region of the US made as an offshoot to their sour-mashed whiskey.

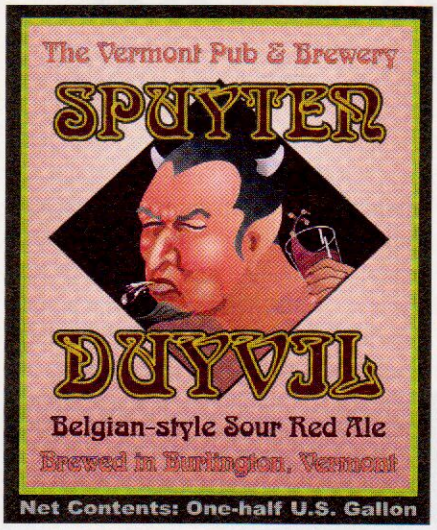
There are several methods you can employ to create a soured beer. Simple techniques include adding lactic acid to your brewing water or including acidulated malt to your grain bill. Both techniques are going to lower the pH levels of both the mash and final wort, giving a tart, sour edge to the final beer depending how much is added. More advanced techniques include adding either cultured lactic acid bacteria or *Brettanomyces*, a mixed lambic culture of *Brettanomyces*, *Pediococcus* and *Lactobaccillus* or oaking the beer with unsanitized oak ingredients while the beer is in secondary stages of fermentation. The final technique in the homebrewers quiver would be performing a sour mash, which is the only technique I will be discussing in this article.

The goal of a sour mash is to employ the work of *Lactobaccillus delbruckii* to a great extent while limiting the work of other critters such as fungi or bacteria like *Acetobacter* or *Clostridium*. You can accomplish this by pitching a live culture of *Lactobaccillus*, by controlling the temperature of the mash and by limiting the oxygen introduced to the mash. *Acetobacter*, as the name implies will produce acetic acid, the key acid in vinegar. *Acetobacter* will only play a significant role if the sour mash is incubated for an extended time period. You will know when *Acetobacter* has taken hold when the mash vessel, upon opening, has a cidery-like vinegar smell. While you would like to minimize the vinegar included in the mash, it will not spoil your attempts at creating a clean sour beer if kept in check. *Acetobacter* needs oxygen and will only grow on the top of the mash. If you seal the top of the mash by laying some plastic wrap across the top, pushing all the air bubbles out in the process then you can greatly decrease the opportunity for *Acetobacter* to act. *Clostridium* on the other hand produces butyric acid, which is a foul-smelling acid, faintly resembling my freshman year dorm, a mixture of rank locker room smell mixed with vomit. If *Clostridium* takes hold in the mashing vessel, it is rather apparent right away and make sure to keep away from significant others if you enjoy their company. I would advise dumping the mash if *Clostridium* takes hold. But some people seem to be okay adding this rank concoction to their beer stating that the odor can be boiled away. In general, a foul-smelling mash is going to yield a foul-smelling beer. A little "funk" in the mash is OK (some aromas will get scrubbed in the boil and fermentation), but too much and it should be discarded. Skimming the top of the mash can get rid of many off odors. A good sour mesh smells "cleanly" sour. L. *delbruckii* produces lactic acid, an odorless acid that got its name because it is the spoiling agent in milk when lactose is broken down.

There are some basic items you will want to have in your possession before attempting a sour mash. In my opinion a

pH meter is important, especially if you're an all-grain brewer. They will start at $30 for a simple digital meter plus you will want to buy a calibration kit, which you can get for under $10. Other key pieces include a thermometer and a small mash container that you can seal up tight. A small, insulated cooler will work well in a pinch. This will also help regulate the temperature of the mash over the course of several days. If you have a space in your house that can hold the temperature above 100°F (38 °C) for several days like a furnace room or hot water heater then you can also utilize a gallon jug or even smaller, depending on the size of your sour mash. One key to a good clean sour mash is that your container be filled right to the top for the incubation period.

So what type of beers might you utilize a sour mash for? Really the sky is the limit, but a short list of good examples would include, but not limited to Berliner Weisse, lambic-styled beers, Flemish reds and browns, stouts, porters, summer ales, weizens, wits, saisons and the more



obscure style Kentucky Common. From my experience hoppy beers don't seem to benefit from the effects of souring but maybe that is the reaction of my taste buds. The sour mash will add a nice twang to the beer if a moderate percentage of the total grain bill is added and a full pucker face if a large percentage of soured grains are added. Utilizing 5% of the total grist for the sour mash is generally the lowest end of spectrum. This is in the realm of using the sour mash for mash acidification. That means that if your recipe calls for 10 lbs. (4.5 kg) of grist then your sour mash would contain 0.5 lb (0.23 kg) of your base grain.

The question on how much sour mash that one should add is really dependent on the brewing water you will be utilizing, the end pH of the sour mash, and the extent of sourness you are looking to achieve. The stronger the buffering capacity of your brewing water, the higher the carbonate levels, the more sour mash you will need to add to achieve your desired effects. A 10% sour mash using soft water may produce the same results as a 15% mash when hard water is utilized. Trial and error is really the only way a homebrewer will achieve their desired level of sourness. The end pH of the mash is also very important, especially to all-grain brewers because ideal mash pH should lie in the range of 5.2–5.4. According to Greg Noonan, "a 2-day sour mash will give a

better flavor but half the acidity of a 3-day mash." In acidified beers, the sour mash is stirred into the main mash to hit a proper mash pH. In sour beers made with a full sour mash (Kentucky Commons, for example), the malts are mashed normally, then allowed to cool and sour. A brewer could also make a sour beer by stirring a large sour mash into the main mash after conversion has taken place. This would work well for moderately souring experimental beers. The percentage of mash which is soured will play the biggest role. Souring between 5–20% of the grain bill will give the beer anywhere from barely a touch of sourness to a nice twang. If you sour above 20% of the total grain bill, then you are entering true sour beer territory. Some homebrewers will sour mash upwards of 50% or more of their total grain bill. This quantity is ill-advised for anybody who doesn't want a true pucker-up beer or anybody that suffers from acid-reflux problems.

For first time sour mashers I would recommend souring between 5–20% of the total dry grist. This will give you something to work with for your next sour mashing session. Begin the sour mashing process two to four days prior to brewing the entire batch. Calculate how much of your base malt needs to be soured. You can use crushed 2-row, 6-row, pale ale or Pilsner malt. Begin by heating 1.25 qts. (1.18 L) of water for every 1.0 lb. (0.45 kg) of grain in the mash, up to a temperature of about 162 °F (72 °C). In a pot, slowly mix the water into the grains and stir thoroughly. Wrap the pot in a towel and let the mixture stand for 40 minutes. After the 40 minutes, heat the mash up to 170 °F (77 °C) and hold for 10 minutes. Gently pour the mash into the vessel it will be stored in for the next several days, introducing as little oxygen is possible to the mash while pouring. The less oxygen introduced during this process, the less chance there is for mash spoiling critters to take control. Cover tightly with plastic wrap making sure to expel any air bubbles trapped on top and cool the mash down to roughly 115 °F (46 °C).

"Inoculating (pitching the critters) in the sour mash is the final critical choice in the sour mashing process."

Inoculating (pitching the critters) in the sour mash is the final critical choice in the sour mashing process. The simplest and most straightforward technique is to keep a handful of dry grains from the preceding mashing steps, either crushed or

whole grains work. Simply toss in the grains when the temperature of the mash falls below 120 °F (49 °C). The grains already contain the bacteria L. *delbruckii* in their husks. Another way would be to pitch a culture of live bacteria. Both Wyeast and White Labs have made this strain available to homebrewers, or you may be able to find live cultures in some health food stores as packaged yogurt culture. Again pitch the culture when the temperature falls below the 120 °F (49 °C) threshold. Reseal the vessel and place in a warm spot. The closer you can keep the mash to the 120 °F (49 °C) mark without going over, the better your *Lactobacillus* will fair and the less likely unwanted visitors will take control.

When brew day arrives, extract brewers can pour the sour mash through a strainer or colander to separate the grains from the liquid and add the sour liquid directly to the boil. The all-grain brewer may follow the same procedure as the extract brewer, or if biological acidification is your goal then add the sour mash to the main mash making sure the mash pH doesn't fall below the 5.2 threshold. Begin by mashing the grains as normal in your mash tun. You will want to heat the sour mash up to your first rest temperature to avoid any complications with

"As you gain practice in the technique, it becomes easier over time and you can start culturing your own strains of bacteria . . ."

volume and temperature of strike water to add. If your goal is to make a sour beer then you can add more of the sour mash just after the saccharification rest but before lautering in order to raise the sour intensity.

So now that you have some general guidelines it's time to turn brainstorming into reality. Sour mashing can be both a fun and frustrating side project to brewing. As you gain practice in the technique, it becomes easier over time and you can start culturing your own strains of bacteria or yeasts for souring. *Lactobaccillus* is a nice straightforward bacteria for souring a beer but there are several other strains of bacteria and yeast that can be utilized and provide interesting characteristics. So experiment and don't be afraid to ask questions because a sour beer when done properly is a beautiful thing.

Dave Green is the Advertising Sales Coordinator for Brew Your Own. *He is an avid homebrewer and worked as an assistant brewer at Brickhouse Brewery in Patchogue, New York.*

Beer Color

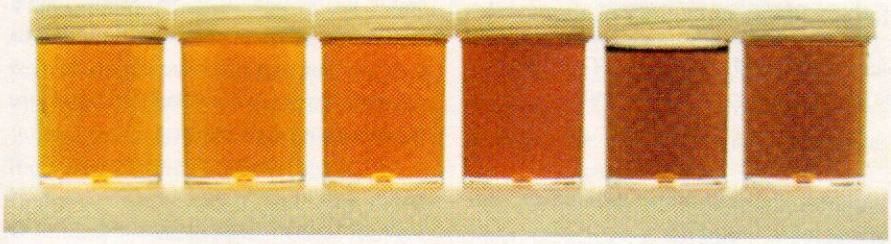
The surprising skinny on SRM

Advanced Brewing

by John Palmer

Recently the Beer Judge Certification Program (BJCP) released a beer color guide for use by all judges at BJCP sanctioned competitions. It is a 2.5 x 5 inch glossy card with instructions for use and is available for free to all current BJCP judges. This is a good tool and should help standardize perceptions of beer color at homebrew contests across the country.

FIGURE 1



The only problem with comparing beer color to a printed standard is that the appearance of actual beers is not consistent for a given value. In other words, you can have two beers that are visually different colors, ex., amber and copper, and these two beers can have exactly the same color value of 10.0 SRM. (In fact, the worts in Figure 1 above all measured 10.0 SRM) How can this be? The problem lies in the test method.

In 1950, the American Society of Brewing Chemists (ASBC) adopted the method of spectrophotometric absorption to measure the amount of light that passes through a standard-sized sample. The cause of the problem is that the particular wavelength of light they picked (430 nm) works best for light lagers. The darker beers (>10 SRM) that are common today are poorly differentiated by that wavelength, and can only be measured by careful dilution to allow enough light to reach the detector. (More information on beer color measurement can be found in my article, "Raise the Colors," in *Brew Your Own*, May-June, 2003.)

Bob Hansen, of Briess Malting and Ingredients Co., brought these shortcomings of the modern method to light at the 2008 Craft Brewers Conference in San Diego. His presentation, "Beyond Lovibond — Understanding Beer Color," is freely available on Briess's website at http://www.brewingwithbriess.com/Assets/Presentations/Briess_2008CBC_UnderstandingBeerColor.ppt.

His presentation was a revelation to most of the brewers there, and certainly was to me. He explained the basis of the light absorption color measurement system, and revealed that there are basically two kinds of malts when it comes to color: kilned and roasted. The kilned malts include everything from base malt to Munich to amber to crystal malt (120 °L) — anything that has experienced a temperature of less than 325 °F (163 °C) during the malting and kilning process.

Roasted malts have experienced temperatures higher than 325 °F (163 °C) and they include chocolate malt, roast barley, and black malt. Another way to differentiate these malts is by the Lovibond color rating, where everything over 200 °L is generally a roasted malt. So, what is this difference between these two malts in terms of color? The answer is that below 325 °F (163 °C), the Maillard reactions predominately produce a color product known as chromophores. The color produced from Maillard reactions above 325 °F (163 °C) are predominately

FIGURE 2

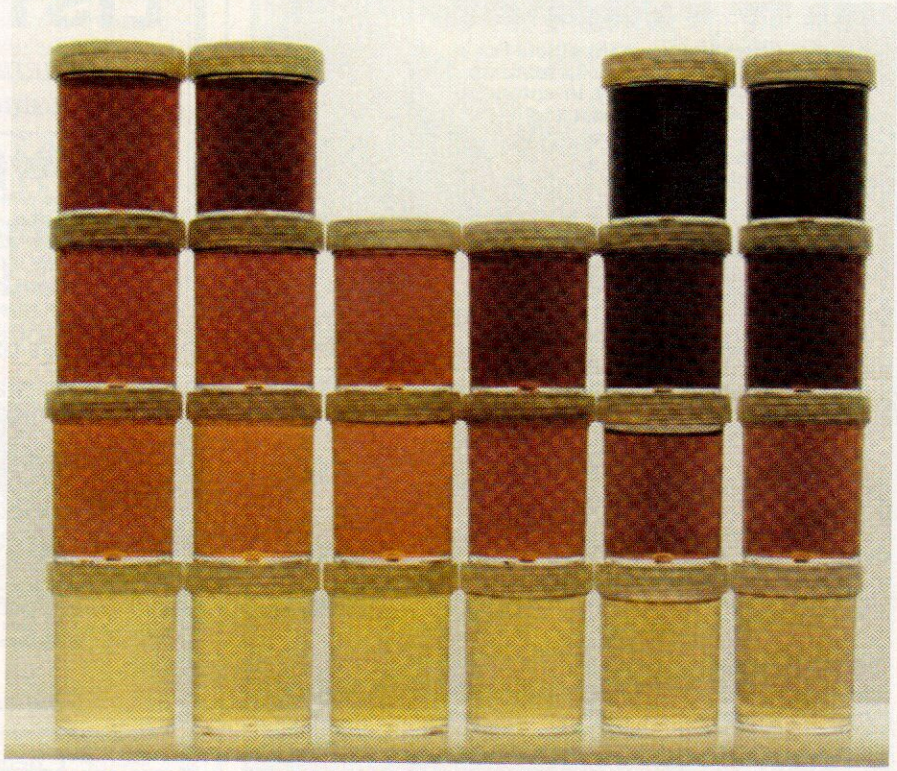
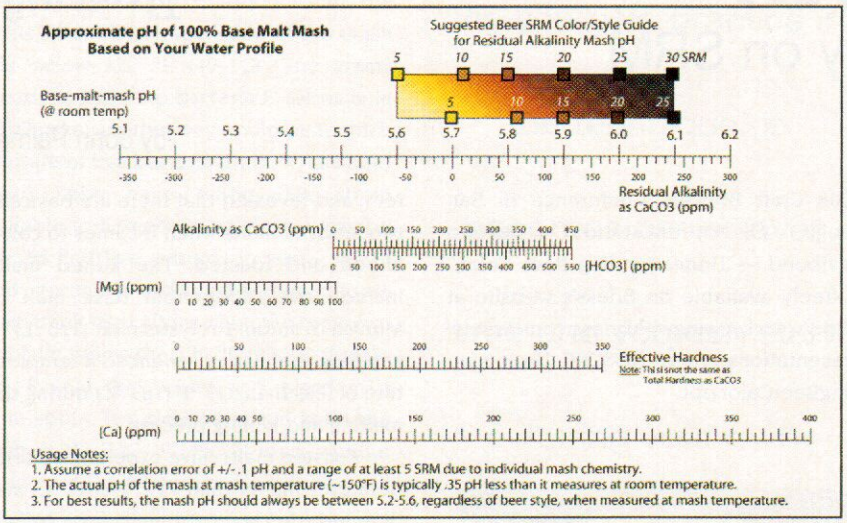


Figure 1: Six worts, each made with different malts, all measuring 10.0 SRM.
Figure 2: The same series of malts at different SRM values. From bottom to top, the rows show 2.0,10.0, 20.0 and 30.0 SRM worts.
Photos used by permission of Briess Malting and Ingredients Co.



For various levels of calcium (Ca^{2+}), magnesium (Mg^{2+}) and carbonate $(CO_3)^{2-}$ ions, there is an optimally-colored beer to brew. (See text for how to use nomograph.)

melanoidins, and these two classes of compounds have different colors — and hence different absorption spectra when measured in a spectrophotometer. The chromaphore malt colors consist of yellow and red, while the melanoidin colors consist of more brown hues.

In addition, the high-color kilned malts have better antioxidant properties than the roast malts.

Effects on beer judging

The color difference can be seen i Figures 1 and 2 on page 57.

Figure 1 shows different 10.0 SRM worts brewed with different malts. Fron the left, the first three malts are Munich (10 °L), Caramel 20, and Caramel 60 and these show an orange colored wort. (In the photo, these worts look slightly different But, according to Hansen, the beers al looked identical and differences in the photo are likely due to slight difference in lighting.) The fourth wort from the left i made with Caramel 120 and, due to highe roasting temperatures, the malt contains small proportion of melanoidins. As result, the color of the wort deepens t red. The last two worts are clearly more chestnut-brown color than red, and are made with roasted malts.

Figure 2 shows the same series o malts, but in worts at four different SRM values. All worts were measured down t one-tenth SRM. The rows are, from the bottom up, wort of 2.0, 10.0, 20.0, and 30. SRM. There is a clear visual difference

between these two groups of malts that the standard ASBC color test measures to be the same. Thus, a beer that is brewed with a greater percentage of roasted malts is going to look visibly darker than the style guidelines would indicate, yet would still measure within the guidelines. I think that BJCP judges are going to need to keep this new understanding in mind when judging the amber, copper, and brown categories, and focus on beer flavor and allow for small differences in color if the flavor is appropriate.

Effects on residual alkalinity

For several years now, I have been preaching the virtues of understanding residual alkalinity (RA) — the key to understanding the mash pH balance between brewing water alkalinity and malt acidity.

In the mash, calcium and — to a lesser extent — magnesium push the pH lower. Alkalinity (from carbonates) resists this drop in pH. Residual alkalinity can be thought of as the amount of alkalinity "left over" after the effects of calcium and magnesium on the mash have been accounted for. When the mash pH is in the right range, and the fermentation is good, the beer pH will be in the right range and the beer will taste like it should. In practical terms, it means that if you have alkaline water and want to brew a pale beer, you need to add hardness (calcium or magnesium) to counter the alkalinity of the water. If you want to brew a dark beer in an area of low alkalinity water, then you need to add alkalinity to counter the acidity of the dark malts. You can add alkalinity by adding either chalk (calcium carbonate) or baking soda (sodium bicarbonate) to your mash. Brewing a pale beer with low alkalinity water and brewing a dark beer with high alkalinity water works just fine because the malt acidity and water alkalinity balance each other.

But how do you know how much alkalinity or hardness to add? Well, that is where my RA nomograph and mash pH spreadsheet step in to help. (See Figure 3 on page 58 and also http://howtobrew.com/section3/chapter15-3.html for more information). Those resources make a correlation between RA and beer color that allows you to estimate a range of residual alkalinity that is appropriate for a recipe of a particular color.

To use the nomograph on page 58, you need to know the level of calcium and magnesium in your water, plus its alkalinity. Mark the points on appropriate number lines that correspond with your calcium, magnesium and alkalinity. Connect the dots on the calcium and magnesium lines with a straight line. Place a dot where this line crosses the "Effective Hardness" number line. Draw a straight line from this point, through the point on the alkalinity line corresponding to your alkalinity and extend this line to the color bar. This will tell you the color of beer your tap water is most suited to brewing. It can also serve as a guide to making water chemistry corrections for beers in other color ranges.

There has always seemed to only be a general relationship between final beer color and malt acidity. And now, thanks to

Briess's work, I think I understand why. Looking at Figure 2 again, it is easy to see how a 10 SRM beer could be mistaken for a 20, and a 20 for a 30, and vice versa. It points out the problem of trying to predict how much residual alkalinity is needed to brew a recipe based on the SRM number listed on a brewery website or in the BJCP style guidelines versus the "perceived" color of a commercial beer.

I had noticed this in my development efforts years ago and compensated by specifying a range of 5 SRM for any particular value of RA, though looking at Figure 2, it may be reasonable to extend that to 10 SRM. Another factor to consider is predicting the beer color from the recipe. You cannot predict the final beer color simply from the malt color units of the recipe (a weighted average of the malts/Lovibond), because the actual color diverges from the MCUs once you get past 10 SRM. There are three popular color models that track this shift (Morey, Mosher, and Daniels) and the results for darker beers tend to be within 5 SRM of each other, so the potential error between models is not that large.

You should also think about the relative proportions of the two specialty malt types in the recipe to help you decide whether to choose the high or low end of the suggested range, instead of relying solely on the estimated color. For example, American amber ale (ex. 15 SRM) contains a lot of color solely from kilned specialty malts like crystal and biscuit making up about 25% of the grain bill. Contrast that with a robust porter (ex. 30 SRM) with about the same overall percentage of specialty malts (25%) except that total is split 50/50 between roast and kilned malts. Pound-for-pound, roast malts are more acidic than the kilned malts, so it would be logical to choose the lower end of the suggested RA range for the amber ale color (15 SRM = 60–120 RA), and the middle of the range for the porter (30 SRM = 244–303 RA). For a Russian imperial stout, with a color of 55 SRM, the spreadsheet calculates an RA range of 549–608. However, I don't recommend exceeding 300 ppm of calcium carbonate ($CaCO_3$), even for Russian imperial stout, unless you are monitoring your mash pH with a pH meter. The point is to not simply rely on the calculations, but to think and use your experience and intuition when formulating your recipe and adjusting your water. The flavor of your resulting beer will tell you if your experience and intuition were correct.

Fortunately, my recommendations for working with the nomograph and spreadsheet have not changed with this new information on malt color. Lots of brewers have used the nomograph and spreadsheet over the years and have reported success in beers they hadn't been able to brew satisfactorily before. The purpose of this article was to make you aware that there are two different types of malt color, and to point out some of the ramifications of this to your brewing. Hopefully this has made you aware that there is a lot more to beer color than meets the eye.

John Palmer is Brew Your Own's *Advanced Brewing columnist.*

Build a Keggle

Convert a Sankey keg into a brew kettle

Story and photos by Forrest Whitesides

If you've been thinking of making the step up to 10-gallon (38-L) batches, you probably experienced sticker shock after shopping for high-volume brew kettles. A 15-gallon (57-L) stainless steel kettle with a ball valve will cost you upwards of $200, but you can make your own for about half that. You'll need a 15.5-gallon (half-barrel/59-L) Sankey-style keg, a weldless kettle fitting kit (unless you know how to weld or have a local welding shop that will do the work), and some basic power tools. The end product is commonly referred to as a "keggle," since it is a keg-to-kettle conversion.

The ethics of obtaining kegs

If you want a used keg (which I recommend, strictly on a cost-savings basis), the best place to start looking is at brew pubs or craft breweries in your local area, which may have kegs that are a little too dinged up to continue a useful life as pressurized beer containers. Since we have no need for a keg that is 100% fit for standard high-pressure usage, these will work fine. You can also order reconditioned or new kegs from vendors like Sabco.

What is NOT cool to do is take a keg from behind a restaurant or just keep a keg from a party after paying the deposit. The restaurant or local liquor store is not the owner of the keg — the brewery who filled the keg is the owner. And the deposit does not generally cover the cost of replacing a keg. If you take a keg in either of the above ways you're costing the brewery a lot of money, and subsequently helping to drive up the cost of high-quality beer. It's a disservice to craft brewers and beer enthusiasts alike. Also, it's stealing. Get your kegs the right way.

Safety precautions

As with most DIY projects, protective eyewear is absolutely required. And given that there are flying, red-hot metal particles involved in this project, I highly recommend safety goggles instead of just glasses. In addition, hearing protection is also recommended. Cutting and grinding metal is very loud and can cause hearing damage. A cheap pair of earplugs will protect your hearing and make the project a lot more comfortable to complete.

First step: vent the keg

Unless you bought your keg reconditioned, you must bleed off the interior pressure. Even empty kegs aren't really empty, in most cases. There will be a small amount of stale beer and a decent amount of pressure still inside. YOU MUST RELIEVE THE PRESSURE ON THE KEG BEFORE ANY CUTTING OR DRILLING. Failing to follow this guideline could result in serious injury.

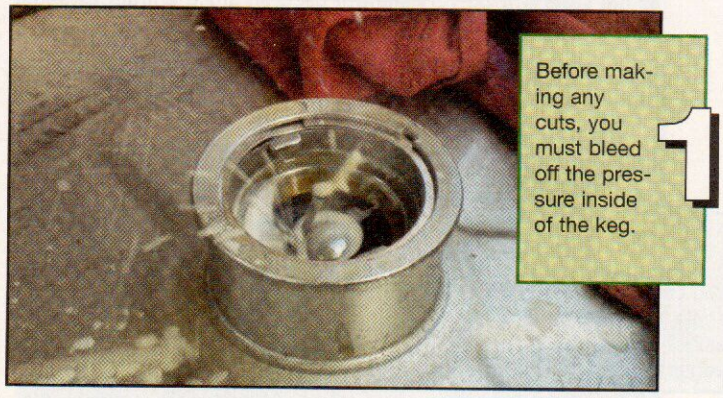
My preferred method for safely depressurizing a keg is to lightly tap a small nail between the valve and the rubber bung (Figure 1). It is advisable to cover the top of the keg with an old towel to prevent a geyser of funky, stale beer from reigning down on you or shooting up in your face. You can also wedge the blade of a flat-head screwdriver between the valve and bung to bleed off the pressure. You can also hook a tap to the keg and just open it . . . that is if you have a tap.

Marking and cutting the top

Use a permanent type marker (a Sharpie, for example) to mark the guideline for the cut. One easy way to do this is to tie one end of a string around the marker and the other end around the center valve on the keg. This low-tech method yields a very nice circle that is pretty close to perfect. If you've got a really steady hand, you can also just lean the marker against the inside edge of the outer rim and run it around the circumference of the keg.

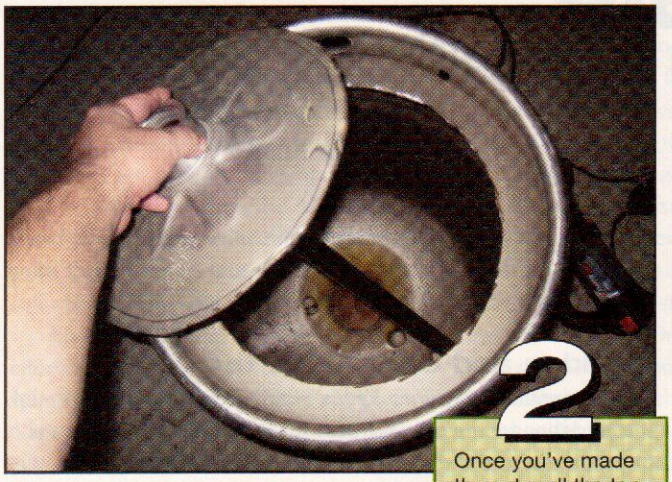
A common diameter for the opening on a keggle is about 12 inches (30.5 cm). I went with 10 inches (25 cm) as the initial cut on mine, then I ground and filed the edge smoother, which widened the opening a bit more. This is totally a personal preference.

For doing the actual cutting, you have a few options. The most elegant choice is a plasma cutter. If you know someone who owns one of these, this is the best way to cut a super smooth opening with minimal fuss. If this isn't an option (which is the case for most of us), you can also use an angle or die grinder or various types of rotary tools. Just to compare results, I used a RotoZip rotary tool for about half of the cut and a Dremel rotary tool for the other half. For both tools, I used their respective heavy duty metal cutting/grinding wheels (part # RZMET2 for the RotoZip and part # EZ456 for the Dremel). I also tried using my air grinder, but my compressor isn't nearly powerful enough to keep the grinder going long enough to make the cutting worthwhile. But if you have a compressor you could do it this way as well.



Before making any cuts, you must bleed off the pressure inside of the keg. 1

The smaller the diameter of the cutting/grinding wheel, the smoother a cut you can make. The tradeoff is that smaller wheels also take longer to do the cutting. In my tests the Dremel (with a 1.5-inch wheel) took about three to four times as long to cut the same distance as the RotoZip (with a 3.5-inch wheel), but the resulting edge was smoother and required less grinding and filing to make it safe for human contact. Either tool did an adequate



2 Once you've made the cut, pull the top of the keg out.

job, however. Expect to use two or three of the RotoZip wheels and six or more of the Dremel wheels to complete the cut. Buy double what you think you'll need, just in case.

You can also use an angle or die grinder to cut out the keg top. This project is an excellent excuse to purchase more power tools. Experiment with different methods to find the best result. Once you've got the top out (Figure 2), you should smooth out the rough edges around the opening. Take extra care during this step, as the steel will be very sharp. I used an angle grinder as a first step to wear down the edge (Figure 3). I followed this up with a finer grinding stone attachment on my Dremel and some manual sanding with very coarse sand paper on a sanding block. My

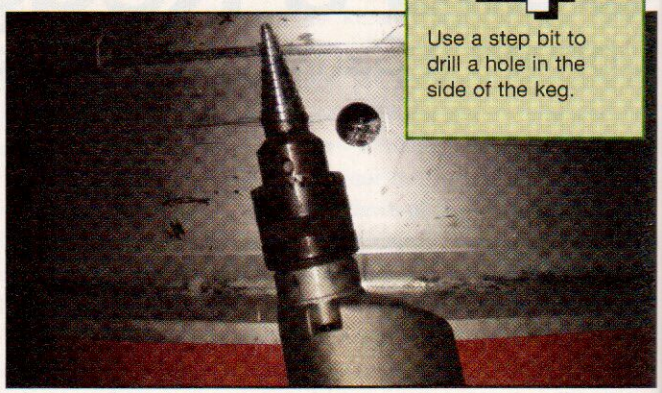
3 You can use an angle grinder to smooth the sharp edges for safety.

resulting edge in these photos, while not the prettiest in the world, is smooth to the touch and safe for general brewing use. The opening doesn't need to prove Pi to 20 decimal points in order to have a working brew kettle, but it does need to be safe for handling.

Adding the ball valve

Now we're going to add a weldless bulkhead and ball valve to round out the keggle. If you plan to go with a welded connection, you can skip this section and consult with the welder. Most homebrewing gear uses ½-inch threaded fittings, so just make sure you standardize on that when welding.

Several homebrew suppliers offer weldless kits that include

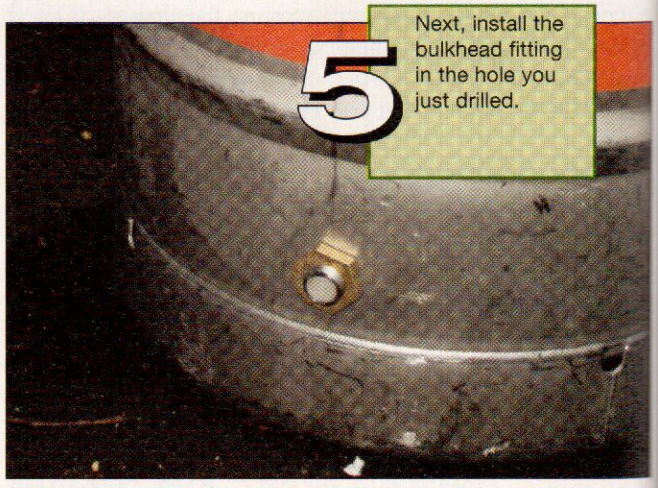


4 Use a step bit to drill a hole in the side of the keg.

the bulkhead and the ball valve. I opted to use Norther Brewer's bulkhead-only kit (catalog #7551) and a Blichmann 3-piece stainless steel ball valve (available from many suppliers). I chose this combination because all of the parts that touch the wort/beer are stainless steel, and the Blichmann valve can be broken down for cleaning. You can use any bulkhead setup or ball valve you like.

For a ½-inch bulkhead, you'll generally need a ⅞-inch hole. However, you should always follow the manufacturer's instructions, so if their guidelines give a size other than ⅞ of an inch, go with what is stated in the instructions.

Mark the spot for drilling a couple inches up from the bottom seam of the keg. The inside bottom of a keg is sloped, so the closer to the bottom you drill, the more of an angle your valve will sit at when attached. Each type and shape of keg varies as to the degree of slope, so make sure you don't drill the hole too low. In my experience, it's better to go a little too high than too low, because you can make up for a high valve with a dip tube.



5 Next, install the bulkhead fitting in the hole you just drilled.

Drilling the keg

Drilling stainless steel can be frustrating sometimes, to say the least. The approach I take is to use a center punch to mark the initial hole, then use a ⅛-inch twist bit to make a pilot hole, and then widen the hole up to the proper diameter with a step bit (Figure 4). You can get inexpensive step bits from Harbor Freight and most big-box auto parts stores such as AutoZone.

The keys to drilling stainless steel are: use lubricant (3-in-1 oil works fine), drill at slow to medium speed, and use a lot of

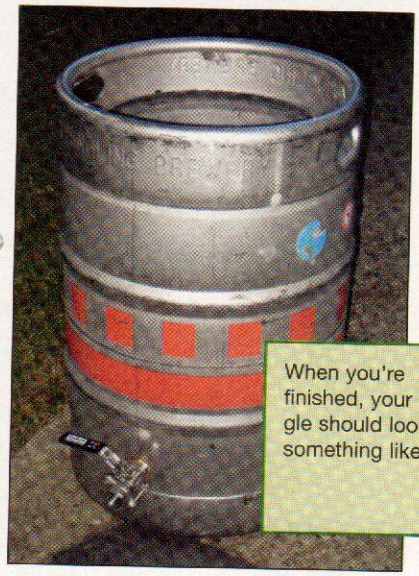
pressure. Lubricant is very important when drilling stainless steel, as it is critical not to get the metal too hot. If it gets too hot, the steel will harden and become virtually impossible to work with. Use the oil liberally, and reapply as necessary during the drilling process. You'll know it's time to apply more when you see the oil evaporate in a small puff of white smoke. At that point, stop drilling and apply more oil.

Instead of a step bit, you can use a hole saw. Some brewers have used hole saws with excellent results, but my experiences have been hit or miss.

Follow the manufacturer's instructions for installing the bulkhead fitting, (Figure 5) and then attach the ball valve (Figure 6). At this point, you could either add a hose barb fitting to the ball valve or connect more complex plumbing, depending on your brewery setup.

Clean that keggle!

Once you've done all the cutting, grinding, drilling, and filing, the inside of the keg is going to be nasty. Rinse it thoroughly with water to remove all of the drilling lubricant and metal filings. Follow up with an overnight soak in warm water and Powdered Brewery Wash (PBW). Rinse thoroughly, and you're ready to brew.


When you're finished, your keggle should look something like this.

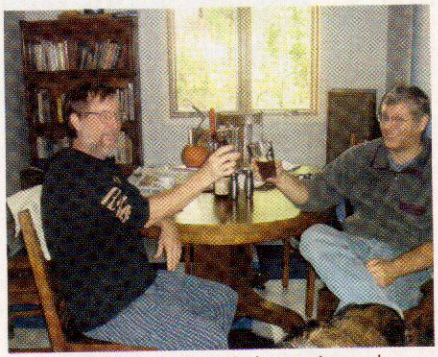
Forrest Whitesides brews beer, plays guitar, and would love to get a Northern New Jersey brew club up and running. He thanks Mike Ashley, for loaning him ethically acquired kegs to complete this project.

Pumpkin to "Tunkin"

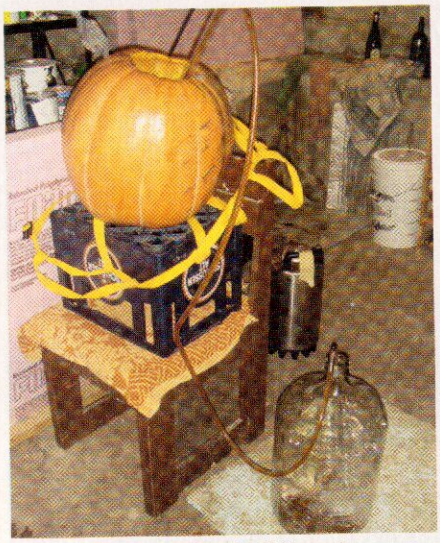
The tale of a pale ale brewed in a winter squash

Nathan Poell and Joe Yoder • Lawrence, Kansas

Did you ever have one of those evenings where you were out on the town with a drinking buddy that your wife rather disapproved of, and after your third pint of barleywine you start talking about how awesome it would be if you were to do that one thing you'd always talked about but can't quite recall now because things got kind of hazy and somebody just had to order you a boilermaker and you vaguely remember walking home — perhaps being chased somewhere along the way — and not much after that, then woke up with a splitting headache, an irate wife on the couch, two large pumpkins in your bed and a palpable sense of unease about what you'd committed yourself to the night before?



Nathan Poell and Joe Yoder eschewed jack-o-lanterns for beer last fall.



Nothing says "Oktoberfest" like a beer brewed in a pumpkin.

Me neither. Let us never speak of it again.

Regardless of who had the original idea, how the pumpkins were acquired, or how dramatically our personal standards had fallen, my friend — hophead and brewer extraordinare Joe Yoder — and I decided to brew a batch of pumpkin ale. The catch, for reasons that we ourselves still don't fully understand, was that we weren't going to make a typical pumpkin pale ale. No, we were going to make a typical pale ale in pumpkin. I know the question on your mind, but no, we don't know why. We just did it.

Brewing using pumpkins as vessels wasn't all that different from brewing with plastic or glass, except for their non-reusability. We started by hollowing out the pumpkin mash tun, or "tunkin." This was the larger of the two pumpkins we used, and it was a big-un. We laid the pumpkin down horizontally then cut a lid out of the side. After that, we scraped out all the guts and seeds and threw them on some newspaper to sort out the seeds later for roasting. We then drilled out a hole for the spigot and fit it and the copper manifold we'd taken from our normal mash tun into the pumpkin. We then heated up the liquor and mashed in more or less as normal. The tunkin did a better-than-expected job at retaining the mash heat and we sparged without much of a problem. The area around the spigot leaked just a little bit as we ran off the wort, but since the tunkin was right above the kettle, there was minimal loss of wort.

As the wort boiled, we carved out the pumpkin fermenter. A small hole was drilled in the lid to fit an airlock, but it probably wasn't really necessary. After sanitizing, we hefted it down to the basement. We figured that, although hauling a huge pumpkin filled with raw wort down a flight of rickety stairs was only marginally dumber than what we'd already embarked upon, it was probably safer to haul the fermenter empty.

Once the boil was complete, we chilled the wort and ran it into a plastic fermenter. We then hauled that downstairs and split the batch; half in plastic, half in pumpkin. This was done to ascertain the effect of the pumpkin fermenter on the flavor of the completed beer, with the in-plastic beer as a "control" batch. Well, that and the fact that we wanted at least a few gallons of it to be drinkable.

We pitched the yeast, aerated the wort, sealed up the fermenters and waited. A couple days later, we checked the pumpkin. A healthy kräusen had formed at the top. Satisfied, we sealed it back up and let it sit.

Then, tragedy struck. We checked in on the beer a few days after we'd confirmed it was fermenting, and the pumpkin's lid had fallen in. It was at that point that we decided (after examining the beer as best we could to make sure it wasn't bacterially infected) to rack it over to a glass secondary fermenter. We racked the "control" beer, which had pretty much finished fermenting, at the same time. A week or so later we kegged both up and gave them a taste. The control beer was copper-colored, light-bodied with an assertive and lasting, earthy hop flavor. Not bad at all, really. We've made worse beers.

Speaking of which, as for the pumpkin-fermented beer, well . . . We took some to our local brew club meeting. One club member said it tasted like the color of lima beans. That person was me, and he was the most charitable of the lot. The beer was dominated by an intense vegetal/raw squash flavor followed by hops. No bacterial sourness was noted by anyone, but it was mentioned that such a flavor would be a vast improvement. Of course then it would be a pumpkin pseudo-lambic — or pp-lambic for short — and the less said about that, the better.

You may say we didn't really go all the way, as the wort was not boiled in a pumpkin. You're right, of course, and you're welcome to give it a shot. Just find a disreputable buddy and hit a bar some night in October, and you'll be well on your way. Here's to hoping you have a king size bed and an understanding spouse.