SPECIAL ANNIVERSARY ISSUE! 10 YEARS OF GREAT BEER

Brew Your Own®

SEPTEMBER 2005, VOL.11, NO.5

THE HOW-TO HOMEBREW BEER MAGAZINE

the WIZARD reveals...

10 fixes to classic brewing problems

(and we reveal his secret identity!)

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10 KEYS TO BETTER BEER

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Ashton Lewis, AKA Mr. Wizard, in his brewhouse at Springfield (MO) Brewing Co.

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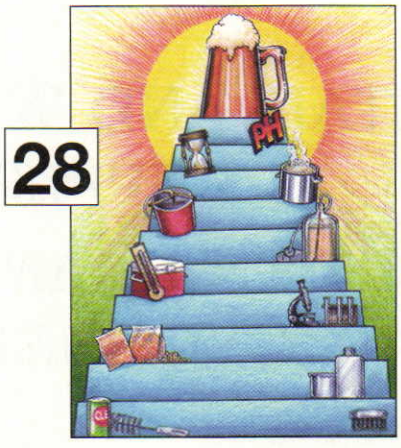
SEPTEMBER 2005
Volume 11 Number 5

10 YEAR Brew Your Own ANNIVERSARY

Departments

Features

BYO 10th ANNIVERSARY: 10 YEARS OF GREAT BEER!



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RECIPE INDEX

BYO RECIPE STANDARDIZATION

Extract efficiency: 65%
(i.e. — 1 pound of 2-row malt, which has a potential extract value of 1.037 in one gallon of water, would yield a wort of 1.024.)

Extract values for malt extract:
liquid malt extract (LME) = 1.033–1.037
dried malt extract (DME) = 1.045

Potential extract for grains:
2-row base malts = 1.037–1.038
wheat malt = 1.037
6-row base malts = 1.035
Munich malt = 1.035
Vienna malt = 1.035
crystal malts = 1.033-1.035
chocolate malts = 1.034
dark roasted grains = 1.024-1.026
flaked maize and rice = 1.037-1.038

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

Brew Your Own

THE HOW-TO HOMEBREW BEER MAGAZINE

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Which Wheat for Wit?

In Steve Bader's Belgian Wit recipe (in "10 Thirst Quenching Summer Beers" July-August 2005), Belgian wheat malt is listed as an ingredient. I have been unable to find this malt. My local home brew shop said that Dingemans is the source for Belgian grains, but they did not have any. Can you suggest either a source or tell me what would be a good substitute? Would a German wheat malt be acceptable? Thanks in advance and keep up the good work.

Darren Whaley
Sandwich, Illinois

A German wheat malt would indeed be a good substitution. The recipe only calls for a half pound (0.45 kg) per 5-gallon (19-L) batch of beer, so any small differences between Belgian wheat malt and German wheat malt will likely be too small to notice. If you need Belgian wheat malt, a Google search will turn up on-line shops if your local retailer does not stock it.

Gonzo for Grolsch

I almost cancelled my subscription to *BYO* only because I found a lot of the subject matter consisted of ale, ale, ale. It's like being a fisherman and only finding press about bass. Well, my little heart of Dutch descent jumped when I saw "Green Bottle Full Throttle" on the cover of the July-August issue. The brewing tips are great, but only one recipe? I shouldn't have judged the magazine by its cover. I expected a recipe for Grolsch, which I know for a fact has no corn or adjuncts in it. Either that or they're lying about the Reinheitsgebot on the label. Please deliver a Grolsch recipe to match what is promised on the cover! Thanks. And by the way, I like ale too. I just don't want to read about it all the time.

Gary Elderman
Mount Hope, Ontario

"International Lagers" author and BYO *editor Chris Colby responds: "Our topic coverage (at least hopefully) mirrors what our readers are interested in. We devote more space to ales than lagers because more homebrewers brew ales than brew lagers. However, we do try to cover all beer styles because we know tastes differ in the homebrewing community.*

"On Grolsch's web site, they do claim that their beer is brewed with only malt, hops, water and yeast. And, for all I know, that's accurate. However, I also know from the "research" (glug, glug) I did for the article that Grolsch tastes very similar to Heineken, Becks, St. Pauli Girl and all the other international lagers I sampled. The Grab My Heinie recipe in the article will make a very Grolsch-like beer.

"If it makes you feel better, you could swap some 2-row Pilsner malt for the corn and maybe extend the mash rest at 140 °F (60 °C) by 10 minutes to ensure you're making a highly-fermentable wort.

"Incidentally, many international lagers claim to be 'brewed in strict compliance with the German Beer Purity Law.' Keep in mind that this law, the Reinheitsgebot, allows adjuncts like corn or rice to be used in beers not sold in Germany. Selling corn or rice lagers to non-Germans is in strict compliance of the law."

Give Me a Belt

The article on Heineken-like beers got me thinking. The brewery in my old hometown (August Schell's) recently revived Grain Belt, a beer that was popular in the Midwest when I was growing up — along with Hamms, Schlitz, Olympia and bunch of others. More out of nostalgia than anything else, I was wondering if it would be possible to brew a beer like that at home. If I could come up with a decent recipe, how close could I get?

Dan Larsen
St. Paul, Minnesota

We actually get quite a few requests for clones of regional American beers from the 1950's, 1960's and 1970's. To make a generic American Pilsner recipe, just replace the 2-row malt in the Heinie clone with 6-row malt. Increase the percentage of adjunct to 30–40% and shoot for a beer with an original gravity around 10–11 °Plato (approximately 1.040–1.044). Decrease the IBUs a bit and you're in the right ballpark.

To make a clone of Grain Belt, or any other American beer, specifically you will have to experiment with different yeast strains, adjunct percentages and bittering levels.

Lightly-flavored American Pilsners are among the most difficult for homebrewers to brew successfully. However, with a little practice, an experienced homebrewer can make a very good rendition of this style.

What Do You Think?

A friend of mine had a problem with some brewer's yeast. The problem is that worms were found in a jar of the yeast. He eats brewers yeast as a nutritional supplement and wondered if the worms could be parasitic or are they the type that can be digested with no health effects?

Paul Asher
via email

The "worms" your friend encountered are most likely insect larvae. Without knowing what kind of insect (or worms, if they are true worms), we cannot tell you if they are harmful or not. However, let us present you with a simple rule that we follow. Although perhaps not infallible, it has served us well throughout the years. Here it is: DON'T EAT FOOD WITH INSECTS IN IT! We hope this is helpful.

Word Choice

I bought *Brew Your Own* for the first time this month. I found your articles interesting. However, please look up the meaning of the word "premise." You have misused the word on page 46 (of the January–February 2005 issue)

— "Brew on premise places" should be "premises." Unfortunately, many people misuse the word "premise" and it makes my skin crawl to read it. Only the plural of the word refers to land with buildings.

"Neednul1"
via email

Yes, it should have been "Brew on premises."

Reader's Guinness clone

Here is my Guinness Draught clone in response to your December 2004 article, "How to Clone." I arrived at this recipe after a tour of the Guinness brewery in Dublin. The ingredients are listed right there on the wall. I spent 3–4 batches perfecting the flaked barley to roasted barley ratio. I was bottling the beer and getting too much roasted barley flavor. Finally, I had the roasted barley reduced to a point that if I went lower, the stout would be very light in color. I decided to plunge into kegging and that was the solution. The roasted barley flavor was diminished and I had my Guinness clone. The nitrogen and CO_2 mix was the key.

Ryan's Guinness Clone
(10 gallons/38 L, all-grain)

Ingredients

12 lbs. (5.4 kg) British pale malt
3.2 lbs. (1.5 kg) flaked barley
1.0 lb. (0.45 kg) black roasted barley
19 AAU Kent Golding hops (60 mins)
(3.45 oz./97 g of 5.6 alpha acids)
White Labs WLP004 (Irish Ale) yeast

Step by Step

Mash at 151 °F (66 °C). Boil wort for 60 minutes. Ferment for 1 week in primary and 1 week in secondary. Keg and push with nitrogen through Guinness tap.

Ryan Furstenau
via email

Thanks for the recipe. It's very similar to the recipe we published in the May-June 2005 issue (in the story "10 Classic Clones"), although we used more roasted barley proportionally.

Ashton Lewis has been the technical editor of *Brew Your Own* since it began in 1995 and is the Master Brewer of Springfield Brewing Company. The brewery, located in Springfield, Missouri, is a state-of-the-art brewery built by the Paul Mueller Company to showcase its equipment fabrication. As such, it has many features that would normally only be found in much larger breweries making it one of the most technologically advanced brewpubs in the world.

Over the years Ashton has written a number of feature stories for the magazine and if the cover hasn't yet given it away, he is the mysterious Mr. Wizard who answers all of your questions — over 300 in his 10 years behind the veil!

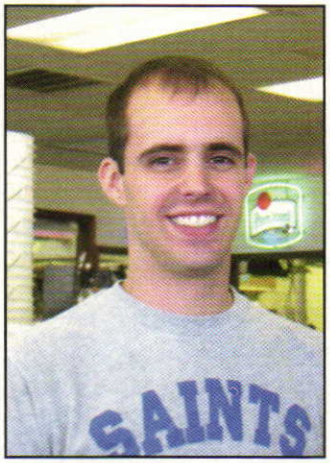
Glenn BurnSilver is a frequent contributor to *Brew Your Own* and current Entertainment Editor at the *Fort Collins Weekly* in Fort Collins, Colorado, home to New Belgium and Odell breweries, where he exploits his influence for free beer. Although situated near some fine breweries, he prefers his own homebrew, and is particularly proud of his East African Maasai Cucumber Beer, which was featured in *BYO* in the January 2001 issue. For some odd reason, many of his articles in recent years have fallen in the December issue. In the December 2002 issue, he wrote about brewing with coffee. In December 2003 issue, he wrote about brewing with spices. In this issue he wrote "10 Clones From the Dark Side" which includes recipes for famous dark brews.

Terry Foster was born and educated in London. He holds a doctorate in chemistry and has been brewing for more than forty years. Terry wrote two books in the Classic Beer Style series — "Pale Ale" and "Porter." He is also the author of "Dr. Foster's Book of Beer," which was published in 1978. He divides his time between Connecticut and the United Kingdom and keeps himself busy by homebrewing, helping out at a New Haven brewpub and playing lots of tennis. When not doing any of the above, he manages to find the time to write an occasional article for *Brew Your Own* magazine. His first *BYO* contribution was the January–February 2003 cover story on "Perfect Porter." In this issue, Terry supplies us with the feature story on mild ale that begins on page 20 and includes five recipes for the style.

brewer PROFILE

Mark Bohrer • Minneapolis, Minnesota

I work with Mark Bohrer at Midwest Homebrewing Supplies in Minneapolis. As he is too modest to write about himself, I decided to submit this profile to *BYO*. I've known that Mark has been an avid and adventurous brewer for seven years, but what caught my attention recently was his casual mention of receiving awards for some of his brews. We knew he had been experimenting with a couple of recipes, but I had no idea to what extent. His most recent awards are the 1st place for his American Classic Lager and a 1st place for his Oatmeal Stout at the Mid South Fair in Memphis, Tennessee. At the 2004 Minnesota State Fair, the latest incarnation of his "Lemon Basil Ale" gave him a 2nd place in the spice, herb/vegetable category. I guess this kind of thing runs in his family. His Aunt received 3rd place for her dill pickles with garlic and his parents a 3rd place for their white wine at the same fair.

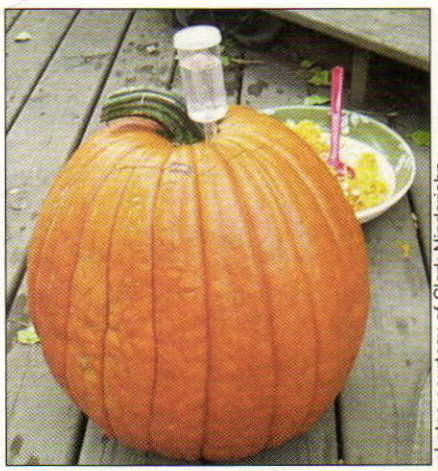


Mark Bohrer means business when it comes to putting pumpkin in his beer, or beer in his pumpkin!

I hope I can describe "the pumpkin brew" without knocking any of Mark's credibility that I've just worked so hard to establish. Maybe he had too much time on his hands, or maybe he consumed a few too many of his own homebrews, but while contemplating a somewhat bulbous pumpkin, he was struck with the thought, "Gee, that looks almost like a little carboy." The lights went on and this quickly led to the idea of actually fermenting a pumpkin ale in a pumpkin! He enlisted the help of another midwest brewer, Cory Carter, to develop a plan. They used two pumpkins: one for pumpkin flavor and one to ferment in. They roasted the one pumpkin with a few spices, used low IBU hops, added a few grains for color, then Wyeast American Ale yeast to get it going. They kept part of the wort in the other pumpkin, but only for a few days, as it wasn't airtight. Surprisingly, it didn't leak any wort during the fermentation, but did start to smell a little funky when the lid was taken off. They said it tasted "a little squashy" but good. It now resides in a standard carboy where it will age until it gets its much awaited kegging and final tasting.

The current debate at Midwest Homebrewing Supplies is whether to call the fermenter a "pumpboy," a "carkin," or "primary pumpkinator," but we'll let the readers decide. I had my own debate as to whether I should submit this to *BYO* as a "brewer profile" or a "homebrew system that makes you drool." Regardless, I look forward, as I always have, to tasting any of Mark's brew, even if it spent some time in an overripe gourd.

– Clark Niederjohn



photos courtesy of Clark Niederjohn

homebrew CALENDAR

September 09, 2005
FOAM Cup
Tulsa, Oklahoma

Entries for this year's FOAM Cup must be received by Friday September 9. This competition is one of the qualifying rounds for High Plains Brewer of the Year. Category and BOS winners will receive custom cast medallions for 1st, 2nd, and 3rd place in each category. Other prizes include the Okie Cup for the highest scoring Oklahoma brewer, the Plastic Cup for the brewer with the most entries and FOAM Cups for multiple awards. For more information call (918) 906-7964, email philosopher@alemakers.com or visit the event Website at www.alemakers.com.

September 17, 2005
Schooner Homebrewing Championship
Racine, Wisconsin

This year's Schooner Homebrewing Championship will be held in Racine, Wisconsin on September 17 and is an AHA sanctioned competition that uses BJCP guidelines. All BJCP styles will be accepted. Some categories may be combined. The event is held in conjunction with the Great Lakes Brew Fest in Racine, Wisconsin. Entries must be received by September 3, and the fee is $5.00 per entry. For more information call (262) 639-7953, email grommit@execpc.com or visit the event Website at http://hbd.org/kbs/schooner.

September 29, 2005
Great American Beer Festival
Denver, Colorado

According to the Guinness Book of World Records, there is no other place on earth where a beer aficionado can find more beers on tap. The Great American Beer Festival will run from September 29 to October 1st and is the American brewing industry's top public tasting and competition. Tasting sessions will offer attendees the opportunity to try more than 1,500 different beers. For more information call (888)U-CAN-BREW or visit the event Website at www.beertown.org.

homebrew CLUB

Lehigh Valley Brewers • Bethlehem, Pennsylvania

Tailgate Ale is the illegitimate brainchild of the Lehigh Valley Brewers. The club had only been in existence for about a year when we made this brew. This story starts far, far away from Lehigh Valley, Pennsylvania. Last fall, three of us had driven almost an hour south of the Lehigh Valley to attend a brewing contest. By chance we happened to sit next to each other in the bar area and began talking about beer and where we were from. We were surprised to find fellow brewers from our area and decided to form a club so we could meet more people who shared our hobby.

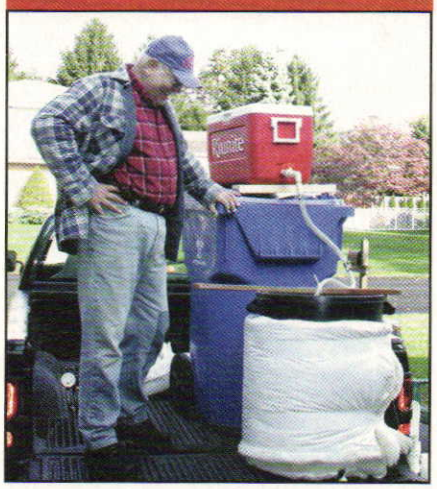
We held a few meetings in different homes and, over the summer, we all made the same Anchor Steam clone with different brew systems. We were pleased to find subtle differences between all-grain, extract and other brewing methods. In September, we had our first dinner meeting at a local brewpub in Bethlehem. It was brought to our attention that several club members had never done an all-grain batch. We decided to hold one big brew day and let the extract brewers try their hand at all-grain. This time we would all start with the same beer so only our fermentation and bottling techniques would be a factor.

Brewing started at 8 a.m. on a brisk October day, but preparation had begun weeks before. A 30-gallon (114-L) trashcan was converted into a mashtun with a false bottom. A recipe was formulated, grains were weighed and water was calculated. Several of us brought over burners, brew kettles and chillers — it was a brewing invasion! We used the tailgate of a pickup truck to hold the mashtun. We added water and grains and slowly stirred and waited for the magic to happen.

We were careful to mix our runnings to keep the specific gravity close in each of three brew kettles. Hop additions were many and often. You just can't have too many hops. We had a maze of hoses running to and from the chillers. All went well except for the one hot brew kettle which got slightly stuck to the pickup's plastic bed liner. Our final volume of Tailgate Ale was just over 23 gallons (87 L). Everyone went home with a carboy of wort already pitched with yeast and an ounce of hops for dry hopping.

During the brew, I shared my previous brewing experiences with the party and we created two different batches of beer from one mash. Everyone is very anxious to come up with recipes for a spring party where we will try to make three different beer styles from one mash. Who knows what we will come up with next. If you live in the Lehigh Valley of Pennsylvania and would like more information on us, go to http://mysite.verizon.net/vze6vkj4/lvbrewers. Until then, cheers!

– Jim Green



The Lehigh Valley Homebrewers (top) made their first 23-gallon (87-L) batch of Tale Gate Ale as a club.

we want you

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

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

big winning RECIPE

Scott Dewalt's Saison
(5 gallons/19 L, all-grain)
OG = 1.072 FG = 1.010
IBU = 23 SRM = 7–8
(1st Place at Bluebonnet Brew-off, Irving, Texas)

Ingredients
12.0 lb (5.5 kg) Belgian pale malt (3–4 °L)
0.7 lb (0.3 kg) biscuit malt (22 °L)
0.7 lb (0.3 kg) CaraVienne® malt (22 °L)
0.33 lb (0.2 kg) CaraPils malt (6–9 °L)
0.75 lb (0.35 kg) cane sugar
6.4 AAU Styrian Goldings hops (60 min) (1.2 oz./37 g of 5.3% alpha acids)
3.5 AAU Czech Saaz hops (10 min) (1.0 oz./28 g of 3.5% alpha acids)
3.5 AAU Czech Saaz hops (0 min) (1.0 oz./28 g of 3.5% alpha acids)
0.5 oz. (14 g) coarsely crushed coriander (2 min)
0.5 oz. (14 g) bitter orange peel (2 min)
0.05 oz. (1.4 g) coarsely crushed black cardamom seeds (2 min)
White Labs 565 (Belgian Saison)

Brewer's specifics: Mash temperature 150 °F (66 °C) for 90 minutes, fermentation at 69 °F (21 °C) for 4 weeks in the primary and at 69 °F (21 °C) for 2 weeks in secondary.

Brewer's comments:

"This is a great summer beer - easy to drink after a hot day working around the house. Though the alcohol level may not quite make it a session beer, the spices, fruitiness, and dry finish make it quite refreshing." For special fermentation techniques, Scott advises that "a large starter is important when using WLP565. I use 2 liters for a 5 gallon batch. This beer will take a month in primary to finish fermentation. The WLP565 yeast is slow but, if temperature is maintained, a larger starter is pitched and the wort is well aerated, it will finish."

homebrew systems that will MAKE YOU DROOL

Steve Smyczek • Brookfield, Wisconsin

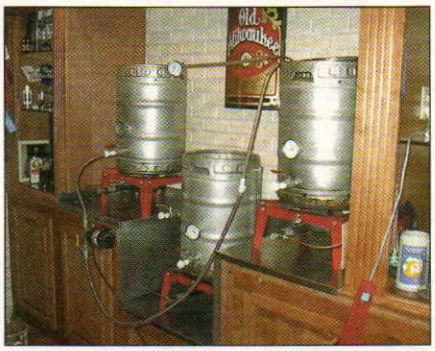
My system is set up to be symmetric. A low brew kettle allows for gravity runoff and only one pump is needed. The burners stand on top of a spill proof custom made stainless steel counter. I had natural gas hard piped to all burners, and put in a ventilation system.

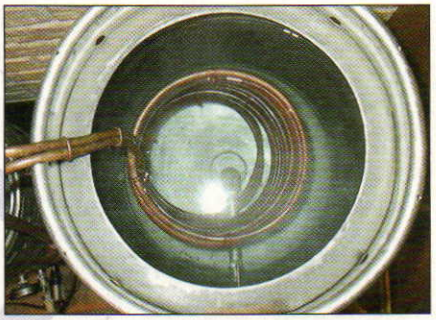
I made a HERMS (50' copper coil in the HLT) for step mashing, then use the hot water for my sparge. I put a vorlauf into the brew kettle to reduce particle transfer, and I have a hop back I use for my signature American Pale Ale (with home grown hops). I cool things down with a counter flow wort chiller before pumping it into a 12 gallon temperature controlled stainless steel conical fermenter. After primary fermentation, all beer is put into 5 or 10 gallon corny kegs. I have a fridge in the back room for lagering, and a commercial 3 keg beer cooler under the bar for serving and storage. I have the ability to have 4 beers on tap.

I decorated the entire area with vintage advertising from the heyday of Milwaukee breweries, and a tin ceiling reminiscent of many a Milwaukee pub. Since brew sessions are long, I included a few creature comforts too. I have about 2,000 watts of stereo and an 84" big screen TV along with a dart board and foosball table.

I love having friends over for a brew session where we can drink and talk about beer. I frequently offer my brewery to others interested in the hobby. My standing policy is "You pick the style, we split the cost of ingredients, you help brew and clean, and we split the beer 50/50". I even have an extra dispensing system I lend out since I really don't like bottling.

What fun. It's great for brewing while playing bar sports, watching a game or a race. It's my version of the ultimate home brewery.





1. Steve's HERMS brewing setup makes step mashing effective.
2. This coil for the HERMS was custom-made by Steve for his hot liquor tank.
3. Here you can see the hot wort return and the sparge arm in the mash tun.
4. The brewing setup is the focal point of Steve's bar in his basement.

replicator

by **Steve Bader**

Dear Mr Replicator,

I recently returned from a visit to Portland, Oregon and had the opportunity to visit BJ's Brewery in Jantzen Beach. While there I was able to sample a Belgian beer called BJ's Grand Cru. This beer is brewed seasonally by their Head Brewer, Dan Petersen. It was exceptionally light and smooth with hints of orange and spice. I would love to get the recipe, can you help?

PJ Blount
Hazel Dell, Washington

BJ's Brewpub is a local favorite here in the Pacific Northwest. Their Jantzen Beach location on the Washington border is only four miles from my homebrew shop, so I have tasted more than a few of Dan's beers — and this one is awesome! Dan has been brewing at BJ's since 1998 and was named "Large Brewpub Brewmaster of the Year" at the 2002 Great American Beer Festival, where his Rauchbier was a Gold Medal winner and his Grand Cru and Piranha Pale won Silver medals.

In talking with Dan, he gave me quite a few pointers on how to make this beer at home. He says "the Grand Cru is complex, with a pleasant fruity, spicy and alcoholic nose, is medium to full bodied, nicely balanced, slightly sweet, with a very complex palate and a lingering finish. It is very pale in color with a faint orange hue." Dan says that as far as beer style goes, it is somewhat *Tripel-esque*.

Dan goes on to say that since this is a high gravity beer, the keys to successfully making it are to pitch lots of healthy yeast (with a starter) and give it plenty of oxygen. Coriander loses flavor rapidly when you boil it, so be sure to put it in near the end of the boil. Also, the candi sugar used does not need to be boiled for the entire boil — add it near the 20 minute mark. I know where I am headed for New Year's Eve this year . . . Enjoy! For more information you can visit the BJ's Restaurant and Brewery Website at www.bjsbrewhouse.com or call (503) 289-5566.

BJ's Restaurant and Brewery "Grand Cru"

5 gallons (19 L), extract with grains
OG = 1.075 FG = 1.015
IBU = 18–22 SRM = 8 ABV = 7.9%

Ingredients

6.6 lbs. (3.0 kg) Briess unhopped light malt extract syrup
0.5 lbs. (227 g) Belgian pale malt
2.0 lbs. (907 g) crystal malt (15 °L)
2.0 lbs. (907 g) candi sugar (beet sugar, boil 20 min.)
0.75 oz (21 g) bitter (Curacao) orange peel (boil 60 min.)
0.75 oz (21 g) crushed coriander seeds (boil 5 min.)
5.25 AAU Czech Saaz hops (bittering hop, boil 60 min.) (1.5 oz./42 g of 3.5% Alpha acid)
5.25 AAU Czech Saaz hops (aroma hop, boil 5 min.) (1.25 oz./35 g of 3.5% alpha acid)
White Labs WLP530 (Abbey Ale) or Wyeast 1762 (Belgian Abbey II)
0.75 cup (180 mL) of corn sugar (for priming)

Step by step

Steep the crushed malts in 3 gallons (11 L) of water at 152 °F (67 °C) for 30 minutes. Remove grains from wort, add the malt syrup and bring to a boil. Add the Saaz bittering hops and bitter orange peel and boil for 60 minutes. Add the candi sugar for the last 20 minutes of the boil. Add the crushed coriander and second addition of Saaz hops for the last 5 minutes of the boil.

Now add the wort to 2 gallons (7.5 L) of cool water in a sanitary fermenter, and top off with cool water to 5.5 gallons (21 L). Cool the wort to 75 °F (24 °C), aerate the beer and pitch your yeast.

Allow the beer to cool over the next few hours to 68 °F (20 °C), and hold at this temperature until the beer has finished fermenting. Dan recommends holding the beer at 68 °F (20 °C) for another 3 days for a diacetyl rest, and then to cool the beer to 32 °F (0 °C) for another 3 days to drop the yeast out of suspension and clear the beer. Then bottle and keg your beer and enjoy!

All-grain option:

This is a single step infusion mash. Replace the malt syrup with 9.5 lbs. of Belgian Pale malt (for at total of 10 lbs. (4.5 kg) Belgian pale malt), along with the 2 lbs. (907 g) of crystal malt. Mash the 2 grains together at 152 °F (67 °C) for 60 minutes. Collect approximately 7 gallons wort (26 L) to boil for 90 minutes and have a 5.5-gallon yield (21-L). As with the extract version, add the Candi sugar the last 20 minutes of the boil. Lower the amount of the Czech Saaz hops in the first addition of the boil to 1.25 ounces (35 g) to account for higher extraction ratio of a full boil. The remainder of the recipe is the same as the extract.

10 Best for Beginners

Top 10 stories for those just getting started

by **Garrett Heaney**

In our eyes, all *BYO* readers are equal in importance, whether you are a beginner picking up the magazine for the first time or a seasoned veteran who has been a subscriber from the beginning — 10 years ago! This column, geared to our beginners, is celebrating our 10th Anniversary Issue with a nod to the authors who have written the best stories to welcome readers to the hobby. So, without further ado . . . the ten best stories for beginners:

1. Brewing Basics for Beginners: If you can boil water, you can brew your own!
by David Weisberg • Premier Issue 1995

What could be better for a beginner than a story with the word "beginner" right in the title? In this story, David Weisberg, author of "50 Great Homebrewing Tips" (Lampman Brewing Publications) introduces beginners to brewing in three sections: basic equipment, beer ingredients and the brewing process, which makes it a natural starting place for anyone.

2. Keep it Clean: Tips on brewery cleaning and sanitation
by Steve Parkes • May–June 2003

This story acknowledges the fact that cleaning and sanitation are the most important of all brewing skills. Steve Parkes, head brewer at Otter Creek Brewing in Vermont, walks you through the brewery laying out exactly what needs to be cleaned and how. He then gives the reader an overview of cleansing agents, sanitizers, disinfectants and general sanitation practices.

3. 24 Brewing Tips and Rules of Thumb
by John Oliver • March 1998

This story points out that although there is no one correct way to brew beer, there are several tips and rules of thumb that hold true for everyone. John Oliver, Brewmaster for southern California's BJ's Brewhouse, discusses fermentation, gravity readings, yeast, formulas, recipes and equipment.

4. 20 Facts You Should Know about Brewing
by John Oliver • March 1999

If there was a list of things that you were supposed to know, wouldn't it be nice to find them listed all in one place? Here Oliver does just that: 1. Simple is better, 2. If it's not clean, it's not sanitary, 3. Directions are there for a reason . . . to learn the rest, dig into your back issues or check the story out on our Website.

5. Don't Do It!: 8 common brewing errors
by Gretchen Schmidhausler • February 2000

Sometimes when you're just getting started, it's easier for someone to tell you what not to do — this might not teach you how to brew, but you'll have a better chance of avoiding mistakes if you know what the mistakes are. Gretchen Schmidhausler writes about the follies of using old ingredients, skimping on the boil, disrespecting yeast and other mistakes that account for many a bad batch of homebrew.

6. Five FAQs Answered
by Mr. Wizard • September 2000

This column, written by our beloved wizard, answers the five most commonly asked questions. Learn the answers to the yeast mystery, the fermentation enigma, the hops dilemma, the mashing quandary and the extract debate.

7. Simplify Your Brewing: Beer made easy
by Marty Nachel • May–June 2002

This Marty Nachel (author of "Homebrewing for Dummies" (IDG Books)) article does something every beginner can appreciate: makes the brewing process easier. This cover story is a collection of techniques, shop owner tips and no-boil beer recipes that can be prepared in as little as 30 minutes.

8. Rx for Brewing Problems
by Marty Nachel • September 2002

Nothing is more common to beginners than problems. When your beer lags, gets stuck in fermentation, lacks attenuation or becomes over carbonated, there are certain troubleshooting methods to get things back in order. Equipped with a glossary of common off-flavors and aromas, this article will help you solve common problems.

9. Homebrew "U": Learn skills by brewing
composed by Chris Colby and Ashton Lewis • entire September 2001 issue

The entire feature lineup of stories in this issue is broken up into homebrew courses — Homebrew 101, 201, etc. This issue is good for any beginner to pick up because it eases you into the hobby and helps you along as your skills progress to the next level.

10. 17 Foolproof Extract Recipes compiled from shop owners across the U.S. • October 2003

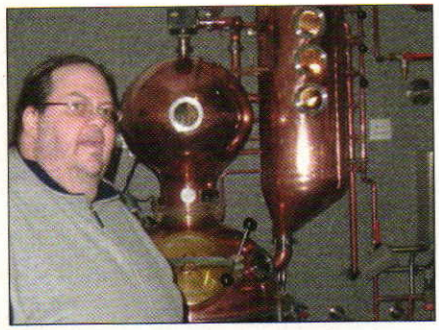
Once you've had a chance to fill your brain with all this useful brewing knowledge, you owe it to yourself to test your skills. This collection of recipes was gathered from homebrew shop owners across the United States and consists of many styles that can be made with ease. Shop owners swear that they're "foolproof!"

Temperature Control

Keep your brewing climate stable for fermentation

by Thomas J. Miller

We all know it's true, because it's printed on the side of yeast packages — fermentation temperatures matter. Some yeast works better warm, some cold, but did you ever ponder what happens to your brew when temperatures fluctuate from warm to cold and back again? Our tipsters did and their ideas might someday help you out of a hot spot.



Todd Ashman began as a homebrewer in 1987 before going through a craft brewers apprenticeship program. Todd became the head brewer of Flossmoor Station in Flossmoor, Illinois in 1996 and worked there until last year. He is now the Staff Brewmaster at Titletown Brewing in Green Bay, Wisconsin.

Understanding what happens during fermentation when temperatures fluctuate better helps the brewer determine what needs to be done. The quality of the beer and vitality of the yeast both need to be examined.

The pitching temperature of wort depends on the yeast strain — some ale strains routinely start fermenting around 70 °F (21 °C) and others start much warmer. Fermentation is exothermic, which means it will create its own heat. Having the ability to cool the fermentation once it starts to take off is an imperative. I've heard of fermentations rising in temperature as much as 20 °F (11 °C) in six hours. The reality is if you aren't keeping your fermenters cool, there may be a limit to what you can expect from your brewing efforts. However, since yeast growth and fermentations are exothermic and therefore generate heat, figure that the temperature within the fermenter can be as much as 8 °F (4 °C) higher than outside of the fermenter during the early days of fermentation. So beers that are fermenting in refrigerators set at 65 °F (18 °C) are most likely fermenting at about 72 °F (22 °C).

If you pitch when the wort is on the cool side (below 70 °F or 21 °C), you face a sluggish start and leave yourself open to bacterial or wild yeast contamination. Obviously, brewing is a series of compromises — sort of a damned if you do, damned if you don't type of practice — so be prepared.

If you have day-to-day environmental temperature changes in the 65–90 °F (18–32 °C) range, chances are, your beer isn't actually cooling down that much.

The only time external temperature fluctuations may legitimately be a factor is during the first 12 hours of fermentation. If temperatures do swing drastically in these initial hours, the fermentation may become sluggish and a good deal of your yeast may drop out of suspension. The only way I could see this happening would be a major "environmental" change, like putting the fermenter in a very cold ice bath or refrigerator. This assumes that an adequate pitch of viable yeast was made and the wort was properly oxygenated.

There are a variety of methods of cooling down wort. If you just need to get the temperature down a few degrees, try applying cool towels around your carboy. If you are looking for more of a shift, immerse about half the height of the carboy into an ice bath to cool it.

Temperature will also affect the rate of growth of the yeast. If the temperature is too high, yeast growth will be too vigorous, producing an excessive demand on nutrients and your beer will be depleted in these nutrients. This can have an effect on subsequent conditioning.

In addition to this, and probably more importantly, a higher growth temperature will change the yeasts metabolism, producing a different range of by-products, which can have a major effect on flavor. If the temperature is too cool, the fermentation will be sluggish, resulting in an opportunity for the growth of contaminants, such as wild yeast and bacteria.

In terms of fermentation, lager yeasts are routinely fermented between 40–54 °F (4–12 °C) while ale yeast is used from 55–70 °F (13–21 °C). The optimal fermenting temperatures of yeast vary considerably.

Some ale yeasts for example, do not perform well below 65 °F (18 °C). The Narragansett (Chico) strain is notorious for this, as well as certain Belgian and wheat beer strains. Common symptoms of fermenting too cold are stuck fermentations, poor attenuation (high finishing gravities) and off-flavors — especially diacetyl.

If you want to ferment cold, it may be necessary to acclimate your starter to a lower temperature to prevent cold shocking them. This can be done by slowly lowering the temperature of the starter the day before.

Jesse Williams attended Sullivan University's culinary arts program and spent 8 years as a sous chef in and around Louisville, Kentucky. He took over the New Albanian Brewery in New Albany, Indiana in April 2005.

Monitoring temperature and responding appropriately to shifts throughout the brew cycle, particularly during the fermentation period will make or break your beer. So, my first tip, if you do not already possess one, get yourself a thermometer! A typical bi-metal meat thermometer will suffice, but many floating and digital models are also available. Whatever thermometer you get, calibrate it to 32 °F (0 °C) degrees in 50/50 ice and water, and you're ready to go.

Yeast lives and dies according to the temperature, so be aware of yours! Most strains of brewer's yeast can survive temperatures in excess of 110 °F (43 °C), but it's not a good idea to let your brew get anywhere close to that extreme. Unless your yeast strain is geared for warmer temperatures, pitching should be commenced around 70 °F (21 °C), with plenty of oxygen incorporated. A cold water fed garden hose and a wort chiller should get you close to this temperature.

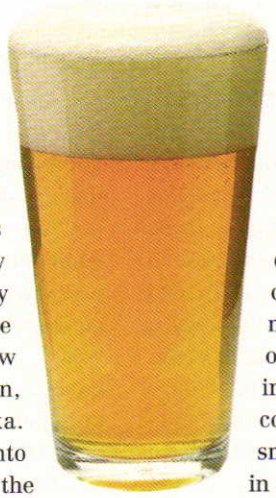
A little clear thinking can lessen the fluctuating fermentation temperatures common in homebrewing. Never under any circumstances leave fermenting beer where the sun can get to it. UV light can skunk a hoppy beer while it's still fermenting. A dark basement or closet that stays within a reasonable temperature range is a decent place. Yard sales and classified ads can also yield serviceable old refrigerators for the garage that make temperature controlled brewing much more convenient. Home refrigerators always have some temperature fluctuation, but a small standing thermometer can give you a good idea what's going on in there. Any working refrigerator has less temperature fluctuation than the floor of your garage.

All right, so you still can't control your temperatures and don't feel like spending the money on your grandmother's old refrigerator. You and your homebrew do have the option to coexist and cooperate with mother nature. Simply put, follow the seasonal temperatures of your climate and brew accordingly. In the warm summer months, brew crazy Belgians (in which yeasts can withstand temperatures of 80 °F/27 °C) and save your winter months for lagers who like it cold.

Putting the India in IPA

A new twist on an olde English brew

by Horst D. Dornbusch



India Pale Ale (IPA) is a variant of the traditional British pale ale. It was first brewed in the 1790s just for export. As the name implies, its key market was the British colony of India, which in those days included what are now the countries of Pakistan, Bangladesh and Sri Lanka. Casks of IPA were loaded into the holds of sailing ships of the East India Company, which had a trade monopoly for goods from the Subcontinent. Outbound, these trading vessels were filled with the amenities of British life for the distant merchants.

Initially, the overseas brew for India was made just in London, but in later decades most IPAs came from the breweries of Burton-on-Trent. As is the case with most brews predating the 20th century, we unfortunately have only a vague notion of how these trading ales were made. The conventional, though only partially correct, wisdom maintains that they were brewed stronger and hoppier than regular ales. Plenty of alcohol and hop-bitterness acted as preservatives so that the beer would not spoil on its six-week voyage across the equator en route to the thirsty soldiers and administrators of the Empire.

IPA Strength and Bitterness: Setting the Record Straight

It is likely that IPAs were indeed much hoppier than ordinary ales at the time, but they were not necessarily brewed stronger, at least according to British ale expert Terry Foster, who made that point emphatically in a 2004 speech at the New England Real Ale Festival in Somerville, Massachusetts. According to Foster, there isn't a shred of evidence to support the concept of a stronger-than-normal IPA. Foster's correction of the conventional wisdom, indeed, makes sense if one considers that, except for the small beers, ordinary brews in Britain at that time tended to be much heftier than they are today. Strong and weak are obviously relative terms. The four-percent ales put out by many commercial breweries in Britain nowadays ought not to be construed as a yardstick for the common brews of about two centuries ago. These old beers often had an original gravity of 1.070 or greater. Worts of this density produced ales of at least 7% abv, assuming they finished at about FG 1.015. There was simply no need to "strengthen" pale ales destined for India compared to the regular ales destined for home consumption.

The opening of a domestic British market for the bitter IPA occurred apparently by accident, when, in 1827, a ship bound for India foundered off Liverpool and its cargo, which included casks of IPA, was salvaged and sold locally. Because the bitter export ale disappeared quickly down the Liverpudlian hatches, the Burton brewers realized they had a home market, too, their "bitter," as the beer soon became known. Because this new domestic IPA no longer had to travel through the tropics to reach the consumer, its bittering level soon started to drop, making it less and less distinct from the ordinary pale ale. Not surprisingly, after its appeal in the first half of the 19th century, it suffered a gradual decline in popularity. By the 20th century, especially after steamships had made the voyage to

INDIA PALE ALE by the numbers

OG	1.072 (18 °P)
FG	1.015 (3.75 °P)
SRM	approx. 8.5
IBU	approx. 60
ABV	approx. 7.2

RECIPE

Well-Traveled IPA

(5 gallons /19 L, all-grain)

OG = 1.072 FG = 1.015

SRM = 7 IBU = 60 ABV = 7.3%

Ingredients

14.5 lbs. (6.6 kg) 2-row pale ale malt (3–4 °L)

16.5 AAU East Kent Goldings or Fuggles hops (75 mins) (3.3 oz./94 g of 5% alpha acid)

2 oz. (57 g) East Kent Goldings or Fuggles hops (0 mins)

2 tsp Burton salts

1 tbsp Irish moss

2 packages Wyeast 1028 (London Ale) or White Labs WLP013 (London Ale) yeast

2 cups oak chips

3 oz. (116 g) dried malt extract or corn sugar (for priming)

Step by Step

Mash in at 152 °F (67 °C). Let the mash rest for 60 minutes. Then sparge for about 90 minutes while raising the temperature of the mash gradually to 170 °F (77 °C). Add the Burton Salts to the wort and boil for 90 minutes. Add bittering hops 15 minutes into the boil. Add Irish Moss, flavor and aroma hops at shut down. Take a gravity reading and compensate for evaporation losses if needed. Heat-exchange to about 70 °F (21 °C). Ferment for about 2 weeks at 60–70 °F (16–21 °C). Rack into a secondary fermenter and leave for another 2 weeks. Rack again. Make an oak chip tea as described in the main

continued on page 16

recipes continued

continued from page 15

text. Add the "tea" to the brew and let it mature in a warm chamber at roughly 85 °F (30 °C) for six weeks. Let the matured brew cool off to room temperature and rack again. Add a fresh package of yeast and the priming agent. Bottle or keg. Let the brew condition for another two weeks. Omit the new yeast and priming agent if you carbonate your brew artificially in a keg.

Well-Traveled IPA

(5-gallons/19 L, extract only)

OG = 1.072 FG = 1.015
SRM = 9 IBU = 60 ABV = 7.3%

Ingredients

10 lbs. 14 oz. (4.9 kg) Muntons pale ale extract
16.5 AAU East Kent Goldings or Fuggles hops (75 mins) (3.3 oz./94 g of 5% alpha acid)
2 oz. (57 g) East Kent Goldings or Fuggles hops (0 mins)
2 tsp Burton salts
1 tbsp Irish moss
2 packages Wyeast 1028 (London Ale) or White Labs WLP013 (London Ale) yeast
2 cups oak chips
3 oz. (116 g) dried malt extract or corn sugar (for priming)

Steps by Step

Heat your brewing liquor and stir in the extract. Bring the wort to a boil and add the Burton Salts and bittering hops then follow the all-grain instructions.

India shorter and more predictable, IPA had faded almost into oblivion. Today, however, the style has been rediscovered . . .not so much in England, but in North America's craft brew (and homebrew) revival.

A new approach to an old brew

All the literature out there concerning IPA deals just with the beer's life cycle in the brewery. This means that brews made according to those prescriptions taste the way they would have tasted when they were loaded onto the boat in England. But nobody, it seems, shows much interest in replicating an IPA the way it might have tasted once it was loaded off the boat in India. After all, the voyage must have had some effect on the brew. At the very least, hop compounds deteriorate in finished beer over time. Our modern IPAs lack one key ingredient: Cask-maturation during a hot, six-week sea voyage. This realization led me to a completely novel approach to this classic ale: I decided to send my IPA on a fake trip half-way around the world.

The "land phase" of IPA

Making an IPA is really simple. To maintain the theme of a classic brew, all ingredients should be traditionally British. Just brew a standard pale ale, at an OG of at least 1.070 or 17.5 °P), as was done in the Burton brew houses. In typical English fashion, employ a single-step infusion mash at 152–154 °F (~ 68 °C) for the all-grain brew. Make it from a grist of Maris Otter or Golden Promise malt. Make the extract version from a British pale ale extract (I used Muntons Pale Ale). This brew does not require any specialty grains, so there is no extract-plus-grain recipe.

Because Burton water is unusually hard, add two teaspoons of Burton Salts to the kettle. Use a 90-minute boil with two hop additions, one at the beginning, the other at the end of the boil. Flavor the brew with generous amounts of English hops to achieve an IBU level well over 50. Goldings hop varieties are considered the classic flavoring for all British pale ales, but Fuggles and Northern Brewer work well too. Ferment the brew at or slightly below room temperature. For yeast, use the standard London 1028 (Wyeast) or WLP13 (White Labs). Rack the brew twice, first after two weeks, then again after four weeks.

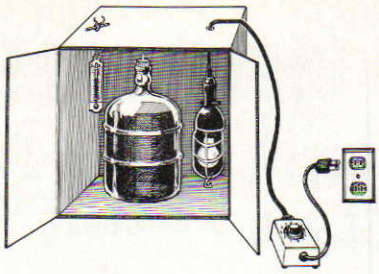
The "sea phase" of IPA

After fermentation, however, abandon all that you have internalized about proper beer husbandry. Let's depart radically from standard ale-making practice and do unto the beer what nature might have done unto it way back when it had to cross the equator twice. With any luck, the result will be a brew that tastes as it might have tasted upon its arrival in India, not upon its departure from the shores of Ye Olde England.

The sacrilegious part of my zany maturation scheme involves aging the finished hop-head beer in a WARM (yes!) place for about six weeks. Assuming the beer's voyage started in England sometime in early June, after circumnavigating Africa, it would have reached India perhaps in late July or early August. Clearly, the beer must have been exposed frequently to temperatures well above 85 °F (30 °C). If you live in the right climate, you can raise your brew's temperature to this level by simply placing it outside in the sun. In my house in Massachusetts, I have kept a Cornelius keg of extremely hopped classic India Pale Ale on a glass-encased porch that works like a hothouse. There the beer was exposed to the "tropical" heat for about two months without ill effect.

During warm-conditioning, it is essential that no light reaches the brew! Otherwise it will get light-struck and end up tasting skunky. The traditional aging container for an IPA, of course, was a wooden cask. It not only kept light energy out of the brew but also imparted tannins and other wood compounds to the brew, which gave it a greater depth of flavor. If you do not have a wooden cask handy, which probably applies to most modern brewers, completely cover the carboy with aluminum foil. Aluminum foil is the perfect medium because it will block light and will not run the risk of igniting, as aluminum is not a flammable

ESTUFA 101



If you do not have such a sun-powered "tropics simulator," you can easily build a heat chamber modeled on a home estufa used for aging batches of Madeira, Port or Sherry wines. For this, use a sturdy cardboard box that has enough room for your carboy and its fermentation lock or for a Cornelius keg. Place the box with the small side up and cut a slot into the top. Thread the cord of a mechanic's droplight through the slot. Close the box and plug in the droplight. Because heat rises, place the droplight near the bottom of the box. Measure the temperature inside the closed box. It should be around 85 °F (roughly 30 °C). Make adjustments to the estufa temperature by varying the wattage of the bulb (and thus the heat it produces), cutting vent holes in the top of the carton to allow heat to escape, putting the light on a timer so that it produces heat only part of the day, or using a combination of these techniques.

CAUTION: Remember that lightbulbs burn very hot and that cardboard is flammable! Make sure that the droplight does not touch any portion of the box. Do not let it rest on the bottom, and suspend it away from the walls of the box. Remember to protect the carboy from light. A method I have found useful, as it blocks light and is not flammable, is to completely cover the carboy in aluminum foil.

material (at least not at heat levels created by an estufa). To imitate the cask aspect, simply make an oak chip tea. After the second racking, before aging, throw about two cups of oak chips into to a quart or a liter of roughly 180 °F (roughly 80 °C) water. Steep the chips for about half an hour to sterilize them. Then pour the tea with the chips into the brew. The warm tea will slightly dilute your beer, but it will also help raise the brew's temperature to the "tropical" level that we want.

After about six weeks in your fake tropics, let the brew cool back to room temperature, rack it off the chips and dead yeast and, from here on, treat it again like a normal ale. Because the heat has brutalized the yeast, it is not likely that it has enough viability left to metabolize the priming agent. Therefore, if you do not have the equipment to carbonate your beer artificially, add a fresh pack of yeast at priming time.

One final word about our fake tropics: We can only speculate which effect the endless swaying of the brew in the ship's belly had on the beer. The ship's motion must have been particularly severe in the rough seas around Cape Horn, the southern tip of Africa. Clearly, the motion would have kept the yeast in suspension — a fact that probably increased the yeast's oxygen absorption and thus lengthened the brew's shelf life. If we want our IPA to be truly authentic, perhaps we should periodically rouse the sediment during warm-conditioning to imitate that aspect of the brew's tropical "aging." Once packaged and conditioned, serve the finished beer at around 50–55 °F (10 – 13 °F).

With my brew, I have sent my itinerant IPA on a fake, two-month sea voyage around the world in a Cornelius keg parked on my hot-house porch. Frankly, I thought the experiment would ruin the brew, but to my surprise, it did not. Even though I had the brew loaded with lots of hops in the kettle, after "warm-aging" it tasted more like a malty, heavy doppelbock than a mouth-tingling IPA. Yet, the brew also had a slightly acrid hop note at the very tail-end of the finish. Interestingly, the brew left totally different taste perceptions depending on the serving temperature. Only when drank chilled right out of the refrigerator, did the beer have a faint sharpness up-front. When served at room temperature, the predominant taste sensation was flat, almost insipid. However, when poured at cellar temperature, it tasted truly pleasant.

Horst Dornbusch writes the "Style Profile" department in every issue of Brew Your Own *magazine.*

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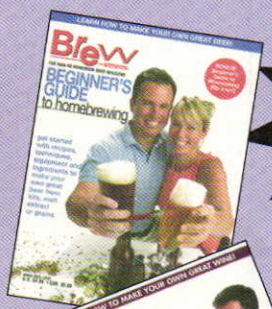

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It's not dead yet!

photo by Charles A. Parker/Images Plus

MILD ale

by
Terry Foster

"MILD ALE is the lowest of the low!" "Mild ale is dead!" In Britain, where it originated, it is seen as weak, uninteresting and old-fashioned. It has the reputation of being a "cloth cap" beer, drunk by the sweaty working classes as they swarmed out of the factories and coal mines, eager to slake their thirst after long hours of hard physical labor.

Mild is generally the lowest-strength beer in any brewer's portfolio. It is often very difficult to find, especially in London and the South-East of England. The bigger brewers are not interested in brewing a slow-selling, low-volume beer. And publicans are not interested in selling a beer that has low turnover and does not keep well in cask because of its low strength.

Bitter ales and pale lagers are now the most popular beers in Britain, and mild ale makes up only about 3% of total draught beer consumption. Many see mild ale as, if not already extinct, at least a highly endangered species. Some brewers have succeeded in increasing poor sales of mild by simply renaming it, leaving out the word "mild" all together. And CAMRA (The Campaign for Real Ale) has run promotions for some years making May a "Drink Mild" month, in order to keep the beer going. It wasn't always that way, though. From around the end of the nineteenth century until just after the Second World War, mild ale was the most popular English beer.

Looking for a great **SESSION BEER?** Then look no further than **MILD ALE.** This low-alcohol brew has a complex **MALT PROFILE.**

from **DESCRIPTION** to **STYLE**

The term "mild" seems to have become relatively common in the eighteenth century, although there are even earlier references to it. At this time it did not really apply to any particular style of beer, but merely to beers that had not been kept, and were sent out for drinking within a matter of weeks after brewing. It was often applied to porter, the most popular beer in England in the late eighteenth century. But this was only to distinguish new porter, from "stale" porter, which had been kept in wooden vats for as much as six months to over a year.

Going into the nineteenth century there was a change in popular taste, and more and more of the beer brewed was new, rather than long-vatted. These new beers were sometimes called mild, still as a descriptive term only, or more commonly "running beers," a term still sometimes used by modern English brewers. Even by the middle of the nineteenth century, there does not appear to have been an actual style designated as mild ale. That may be because most brown beers were simply called "ales" if they were not porter or stout. The use of "mild" to designate a new beer somewhat fell out of use as virtually all ales became running beers. Those that were meant to be kept were now termed "stock ales."

An important development in English brewing around the 1820's was the development of India pale ale in Burton upon Trent. Pale ales had been around before, but had not been widely popular until IPA came on the scene. By the second half of the eighteenth century, most brewers were producing pale ales of one sort or another, and the popularity of porter and stout had waned drastically. So they had to come up with another name for their brown, non-porter beers, and "mild ale" was the term they chose.

the **HIGHS** and **LOWS** of mild

Nowadays, we think of mild ales as the lowest-strength English beers, but that was a later development. In the latter half of the eighteenth century, a particular brewer often charged more for his mild ale than he did for his pale or bitter ale. One publication of the 1880's lists Burton Mild with an OG of 1.080 (19.3 °P), compared to bitter at 1.064 (15.7 °P). Around the turn of that century, mild ales were still being brewed at gravities of 1.055–1.060 (12.4–14.7 °P) on average. By this time, porter had almost entirely disappeared in England, and the most popular beers were pale and mild ales, with the latter predominating.

From around 1900 onwards, there was a general decline in strength in British beers. This may have been a gradual trend anyway, as a result of an 1880 Act of Parliament that taxed beers according to their original gravity. But a drastic acceleration came during the First World War, with the average original gravity of all beers falling as low as 1.031 (7.8 °P) by 1918. This was partly due to a shortage of raw materials, and partly because the government limited both the volume and strength of beer which individual brewers could produce.

Beer strengths in Britain did increase after World War I, but they were never to return to pre-war levels. Even today the average original gravity is only around 1.038 (9.5 °P). It took a while, since many breweries still brewed more than one mild, but bitter soon became the stronger of the two for a given brewer. More to the point, after World War II, bitter became increasingly popular, as tastes changed and drinkers became more affluent. The position of mild was not helped by it gaining a reputation for being the beer to which the publican added back all the slops collected during serving. It wasn't helped either by other tricks practiced by unscrupulous brewers, such as producing a very light bitter, then coloring part of the beer with brewer's caramel and calling it mild ale.

MILD ALE
by the numbers:*

Dark Mild
OG 1.030–1.037 (7.5–9.3 °P)
FG 1.004–1.008 (1–2 °P)
SRM 17–34

IBU 15–24

ABV 3.2–4.0%

Pale Mild
OG 1.030–1.037 (7.5–9.3 °P)
FG 1.004–1.008 (1–2 °P)

SRM 8–17

IBU 15–24

ABV 3.2–4.0%

*numbers given are the author's opinion, and differ slightly from the BJCP Style Guideline numbers.

NO LONGER number one . . .

It seems to have been around the 1960's when bitter took over from mild as the most popular drink in Britain, and it continued to forge ahead of mild. In some geographical areas, notably the Midlands and parts of the North, mild was still the favored drink; even in the 1970's there were close to twenty breweries producing not just one but two milds. But both mild and bitter were to drop in consumption as lager became more popular, with the latter taking over from bitter as the most-drunk draught beer, sometime around 1990. The once-mighty mild ale has now dwindled from being the star to being just a bit-player whose part could be quickly written out of the play.

. . . but **NOT DEAD YET!**

But, perhaps the picture is not quite as bad as I have painted it. There are still something like 50 breweries in Britain who produce a mild, albeit in small quantities. A few of these are producing milds at something approaching their original strengths. Noticeable among these is Sarah Hughes Dark Ruby (which has dropped the word mild in recent years) at around 6% ABV, and Father Mike's Dark Rich Ruby, from Brunswick Brewery, at 5.8% ABV.

And just this year, a 4.4% ABV dark mild from Rudgate was overall champion at the Society of Independent Brewers' North Region Festival and Competition.

Mild ale, as defined above, is clearly a low-alcohol session beer, meant to be suited to drinking several pints in a few hours, without falling over. With a low hop-rate too, it can never be a dramatic beer, like so many new American breweries prefer to produce. So you would think it would never be commercially successful here.

Yet, what about Southern Tier from New York and their "mild," an excellent version of pale mild? Also, in last year's New England Real Ale Festival, there were three mild ales from New England Brewers — one from Martha's Exchange and one from The Tap in Haverhill. The third came from BRU Rm @ Bar, in New Haven Connecticut; despite being a classic 3.7% ABV dark mild, it has sold very well and is produced regularly. It's called Raven Hair Beauty, and a recipe for it appears in the recipe section on page 24.

brewing **MILD ALE**

You may be wondering why there is both a dark and a pale version of mild ale. It is quite logical when you consider that "mild" originally meant any fresh, non-vatted beer, and the distinction between them is as much geographical as anything.

Dark mild originated in the London area, but is now more common in Wales and the Midlands of England, while pale mild is more likely to be found in the North of England. This makes for some difference in brewing them, in that a lot of the taste in mild comes from roasted malts, and the color puts a restriction on how much of these you can use in pale mild.

And these are not easy beers to brew in that it is difficult to avoid making them taste watery. David Crease, the Head Brewer at Woodforde's prize-winning Norfolk brewery, thinks that 3.8% ABV is the cut-off point. Above this figure it is relatively easy to make a flavorful brew; below that point the brewer faces a much more difficult task.

boosting **BODY**

Commercial brewers have a couple of tricks up their sleeves, in order to give the beer some residual sweetness

(continued on page 26)

MILD ALE mania

Standard Dark Mild

(5 gallons/19L, all-grain)

OG = 1.035 FG = 1.009
IBU = 20 SRM = 24 ABV = 3.5%

Ingredients

6 lb. 10 oz. (3 kg) mild ale malt
¾ lb. (0.34 kg) crystal malt (60 °L)
2.0 oz. (57 g) chocolate malt
5.3 AAU Fuggles hops (90 mins)
(1.33 oz./38 g at 4% alpha acids)
Wyeast 1098 (Whitbread) yeast
½ cup dried malt extract (for priming)

Standard Pale Mild

(5 gallons/19L, all-grain)

OG = 1.037 FG = 1.010
IBU = 23 SRM = 13 ABV = 3.6%

Ingredients

6 lb. 8 oz. (2.9 kg) mild ale malt
1 lb. 6 oz. (0.62 kg) crystal malt (20 °L)
6 AAU Willamette hops (90 mins)
(1.2 oz./34g at 5% alpha acids)
0.5 oz. (14 g) Goldings hops (5 mins)
Wyeast 1098 (Whitbread) yeast
½ cup dried malt extract (for priming)

Step by Step

Use a single-step infusion mash at 152–154 °F (66.7–67.8 °C) for the dark mild or 153–155 °F (67.2–68.3 °C) for the pale mild for 1–1.5 hours. Sparge one hour, with water no hotter than 175 °F (80 °C), until run-off reaches SG 1.010–1.012. Boil 90 minutes, with bittering hops added at the start. Strain, or siphon off from the hops, and adjust wort volume with cold water, and cool to about 70 °F (21 °C). Pitch with yeast starter, and allow to ferment. By 5–7 days, final gravity should have been reached; rack into a glass fermenter. One week later, rack again, prime with dried malt extract, and rack into keg or bottles. To ensure good fermentation, it is best to make a half-gallon starter of the original yeast culture.

Brainstorm Dark Mild

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

OG = 1.037 FG = 1.009
IBU = 24 SRM = 22 ABV = 3.7%

Ingredients

4.5 lb. (2.0 kg) amber malt extract
(Muntons or Alexanders)
14 oz. (0.40 kg) crystal malt (40 °L)
3 oz. (85 g) chocolate malt
6.3 AAU Goldings hops (90 mins)
(1.4 oz./40g at 4.5% alpha acids)
Wyeast 1098 (Whitbread) yeast
½ cup dried malt extract (for priming)

Yorkshire Pale Mild

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

OG = 1.034 FG = 1.008
IBU = 24 SRM = 14 ABV = 3.5%

Ingredients

4.0 lbs. (1.8 kg) amber malt extract
(Muntons or Alexanders)
1.0 lb. crystal malt (20 °L)
1.0 oz. (28 g) chocolate malt
6.4 AAU Northern Brewer hops (90 mins)
(0.8 oz./23g at 8% alpha acids)
1.0 oz. (28 g) Fuggles hops (15 mins)
Wyeast 1098 (Whitbread) yeast
½ cup dried malt extract (for priming)

Step by Step

Add crystal and chocolate malts to 1 gallon (3.8 L) water, bring to about 150–160 °F (66–71 °C), hold for ½ hour and strain off malts. Add water to about 3 gallons (11.4 L), and bring to a boil. Turn off heat and add malt extract, stirring well to ensure the extracts dissolve properly. Bring to a boil, add the bittering hops, and boil one hour. Strain, or siphon off from the hops, and add cold water sufficient to obtain the starting gravity. Cool to around 70 °F (21 °C), pitch with yeast starter, and allow to ferment. By 5–7 days, final gravity should have been reached; rack into a glass fermenter. One week later, rack again, prime with DME or corn sugar, and rack into keg or bottles.

To ensure good fermentation, it is best to make a half-gallon starter of the original yeast culture.

Raven Hair Beauty

(5 gallons/19L, all-grain)

OG = 1.043 FG = 1.016
IBU = 19 SRM = 25 ABV = 3.6%

This is simply the 11-barrel brew made at Bru Rm @ BAR scaled down to 5 gallons (19 L) and adjusted to match BYO's standard recipe assumptions. Details courtesy of Jeff Browning, the brewer.

Ingredients

2.5 lb. (1.1 kg) mild ale malt
2.5 lb. (1.1 kg) US 2-row pale malt
1 lb. 11 oz. (0.77 kg) Briess Munich malt
14 oz. (0.40 kg) crystal malt (60 °L)
4.5 oz. (0.13 kg) Belgian Special B malt
7.0 oz. (0.20 kg) Briess Extra Special Roast malt
14 oz. (0.40 kg) Briess Vienna malt
1.1 oz. (32 g) Briess black malt flour
3.33 AAU Mount Hood hops
(90 mins)
(0.47 oz./13 g at 7.1% alpha acids)
1.25 AAU Willamette hops
(30 mins)
(0.25 oz./7 g at 5% alpha acids)
2.5 AAU Liberty hops
(5 mins)
(0.5 oz./14 g at 5% alpha acids)
Wyeast 1098 (Whitbread) yeast
½ cup dried malt extract (for priming)

Step by Step

Use a single-step infusion mash at 154 °F (67.8 °C) for 1.5 hours, keeping the black malt flour to one side. Sparge one hour, with water no hotter than 175 °F (80 °C), until run-off reaches SG 1.010–1.012. Boil 90 minutes, with bittering hops added at the start. Add the flavor hops 30 minutes, and the aroma hops 5 minutes before the end of the boil. Add the black malt flour*, stir gently, and allow to sit for ½ hour. Strain, or siphon off from the hops, adjust wort volume with cold water, and cool to about 70 °F (21 °C). Pitch with yeast starter, and allow to ferment. By 5–7 days, final gravity should have been reached; rack into a glass fermenter. One week later, rack again, prime with ½ cup DME, and rack into keg or bottles (after filtration if desired). To ensure good fermentation, it is best to make a half-gallon starter of the original yeast culture.

* As discussed earlier, if you do not have this flour, but only whole grain black malt, then add it the mash along with the rest of the grist.

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continued from page 23

making the beer taste a little fuller. First they mash at higher temperatures, 153–155 °F (67.2–68.3 °C), in order to give a higher level of unfermentables in the wort. This allows some sweetness and body to carry through to the beer. Second, if the beer is got out to the pub and served quickly after arriving in the cellar, there will be some residual sweetness from the priming sugar. The first "trick" works for the homebrewer, but the second does not, since we usually just don't get through 5 gallons (19 L) or more quickly enough, and the priming sugar has fermented out by the time we drink it. In any case, for me, just making the beer with a little sweetness doesn't do a lot for flavor. We need to make the beer more complex.

complex **MALT**

Since this is not a hoppy style, you have to make the flavor with crystal, or roasted malts such as chocolate and even black malt. But first, if you are an all-grain brewer, your base malt should be mild ale malt, not pale malt. Mild malt is kilned at a slightly higher temperature than pale malt, is a little bit darker, and adds some roasted/nutty flavor to the beer.

For a dark mild ale brewed from malt extract, start with an amber extract; for a pale mild ale, you would be better off starting with a pale malt extract, since this allows you to use a little more roast malt, without the beer becoming too dark.

Crystal malt is a common mild ingredient, at rates of about 10–15% of the total grist, or up to about one half pound (0.23 kg) for a 5-gallon (19-L) brew. Use the more highly-colored crystals, 60 or 80 °L, for dark mild ale, as these give a nice nutty flavor and ruby red color. For pale mild, you should go to 20 or 40 °L, so that you don't overshoot the color. With a dark mild, you can eliminate crystal malt, if you use relatively high levels of chocolate malt (up to about 5% of total grist, or 4–6 oz. (113–170 g) per 5 gallons (19L)). Pale mild will require lower levels — about 1–2% of total grist, or 1–2 oz. (28–57 g) per 5 gallons (19 L). I prefer a combination of the two, since you want to make the beer as complex as possible.

Black malt can be used for dark mild ale, either alone, or more preferably in combination with crystal malt. You must use it sparingly, about 2% of grist maximum or 2 oz. (57 g) per 5 gallons (19 L), or the beer will finish up harshly bitter and one-dimensional.

Crystal and roasted malts are normally mashed with the mild ale malt. In extract brewing they should be steeped in hot water (150–160 °F/66–71 °F) for 30–45 minutes, then the grains removed and the liquor run into the boiler.

However, when we brewed Raven Hair Beauty, we used a somewhat different approach. We had a black malt flour (from Briess). The malt was very fine, as the name suggests, and not as whole or just broken grains, as black malt is normally obtained. This flour was added to the copper at the end of the boil. That meant it sat in the hot wort for 30 minutes — that is, a 10 minute rest after turning off the heat, 10 minute whirlpool and a final 10 minute rest. That meant that a good deal of the black malt was removed with the trub; anything that wasn't would sit in the fermenter, and be removed from the beer during filtration. You could try this if you can get the flour and filter your beer. If not, it might be better to add the black malt to the mash, or pre-steep in the case of extract beers.

english **HOPS**

Hops are a simple matter with mild ale, as they are used only for bittering. In general, English hops such as Fuggles and Goldings are best, or English-derived types, such as Willamette or Styrian Goldings. Northern Brewer also works quite well. Although many milds do not use aroma or flavor hops, it is permissible to do so, but you don't want this to stand out, so Goldings in moderate amounts is probably the favored approach. However, in Raven Hair Beauty we used Mount Hood and Liberty (both Hallertauer derivatives) for bittering and aroma respectively, with Mount Hood for flavor.

any **WATER**, ale **YEAST**

Water is pretty straightforward. Use what you have! The only possible problem would be very hard water, such as that from Burton, which can make the beer taste somewhat harsh, and we're looking for a mellow flavor. Having said that, at least one British brewer — Marston's — has used Burton water for brewing mild ale for many years. Others have used very soft water, whilst yet others, notably in the London area, have successfully used high-carbonate water. Therefore, I would only make adjustments if making an all-grain brew and I was having problems getting the mash pH in the 5.2–5.5 range. In that case, I would simply add a little gypsum (5–10 g for a 5-gallon (19 L) brew) to bring the pH into the required range.

Yeast is also straightforward, almost any top-fermenting strain will work well. We use Wyeast 1098, a Whitbread strain, at Bru Rm @ BAR, but White Labs WLP002 also works well, as it tends to leave some residual sweetness. Wyeast 1028 (London Ale) yeast is also a possibility; it does tend to give relatively high levels of diacetyl, but if you are not averse to this flavor note, it can add a welcome richness to this style of beer.

i'll have **ANOTHER ROUND**

Mild ale is a simple beer, meant for pleasant drinking in a long session. However, with care, it can be made into a quite tasty, interesting beer, and should not be at all bland or boring. You need to get some complexity into the beer, and that is going to come from the malt. Although I've given you a couple of quite simple recipes, you will see that Raven Hair Beauty from Bru Rm @ BAR has a complex grain bill, using no less than 8 different malts. I've also thrown in a couple of recipes for mild ales which don't fit the profile given at the beginning, but rather more resemble what mild might have been like a century or more ago. So don't be afraid to experiment, and you will find yourself making some very tasty mild ales, which will make you wonder why on earth it should be losing popularity in its homeland! And remember, "mild" in this context means fresh!

Terry Foster wrote "Old Ales" in the September 2004 issue of BYO.

BYO 10th ANNIVERSARY ALE

To celebrate BYO's 10th anniversary, we've formulated an imperial American stout, made with 10 grains and 10 hop additions (of CenTENnial hops), that weighs in at 10% ABV.

BYO 10th Anniversary Ale
(Imperial American Stout)
(5 gallons/19 L, all-grain)

OG = 1.103 FG = 1.026
IBU = 60 SRM = 69 ABV = 10%

Ingredients

13 lbs. 2 oz. (6.0 kg) 2-row pale malt
2.75 lbs. (1.25 kg) Munich malt (10 °L)
5.0 lbs. (2.3 kg) flaked barley
2.0 oz. (57 g) biscuit malt
5.0 oz. (142 g) crystal malt (40 °L)
3.0 oz. (85 g) crystal malt (60 °L)
2.0 oz. (57 g) crystal malt (90 °L)
4.0 oz. (113 g) chocolate malt
12.0 oz. (340 g) roasted barley (500 °L)
2.0 oz. (57 g) black patent malt
25 AAU Centennial hops (10 additions) (2.5 oz./71 g of 10% alpha acids)
1/4 tsp yeast nutrients
1 tsp Irish moss
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) yeast (4 qt./4 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

To develop a highly-fermentable wort, follow this step-mash procedure. Heat 7.25 gallons (27 L) of water to 142 °F (61 °C) and stir the grains into this water (in your kettle). Adjust temperature, if needed, to 131 °F (55 °C) and rest for 15 minutes. Heat mash to 140 °F (60 °C) and hold for 15 minutes. (Stir nearly constantly when heating mash. Raise temperature at rate of about 2 °F (1 °C) per minute.) Heat again to 149 °F (65 °C) and hold for 45 minutes. Heat to 162 °F (72 °C) and hold for 5 minutes, then heat to 167 °F (75 °C) and transfer mash to lauter tun. Recirculate for 15–20 minutes, then begin running off wort. Heat about 7 gallons (26 L) of sparge water to 170 °F (77 °C). (Use180–190 °F/82–88 °C sparge water if grain bed temperature drops below 165 °F/74 °C.) Collect 11.5 gallons (44 L) of wort and boil for about 5 hours to reduce volume to about 5.33 gallons (20 L) at the end of the boil. Divide hops into ten 0.25 oz. (7.1 g) charges and add one charge with 90, 80, 70, 60, 50, 40, 30, 20 and 10 minutes left in the boil. Add the final hop addition at the end of the boil. Add Irish moss and yeast nutrients with 15 minutes left in boil. Cool wort, let hops and trub settle and transfer clear wort to fermenter. Aerate wort (preferably with a 2-minute shot of oxygen) and pitch yeast sediment from starter. Ferment at 68 °F (20 °C) until fermentation is complete (about 2–3 weeks). Rack to secondary and let condition for about 2 months — at around 40 °F (4.4 °C), if possible. Bottle with corn sugar or force carbonate in keg.

BYO 10th Anniversary Ale
(Imperial American Stout)
(5 gallons/19 L, extract with grains)

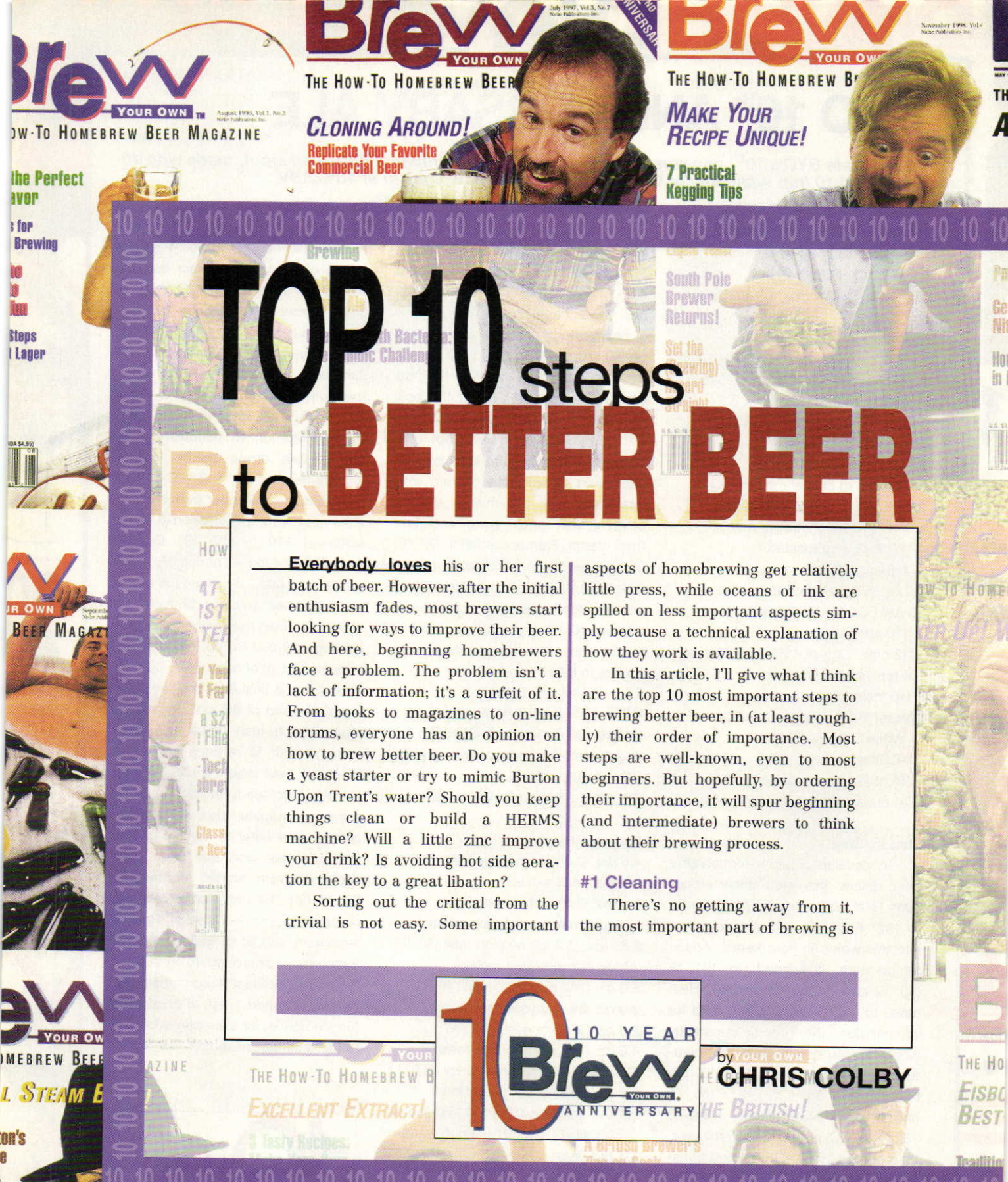
OG = 1.103 FG = 1.026
IBU = 60 SRM = 68 ABV = 10%

Ingredients

4.5 lbs. (2.0 kg) Coopers light dried malt extract
6.6 lbs. (3.0 kg) Muntons light liquid malt extract (late addition)
2.66 lbs. (1.2 kg) Munich malt (10 °L)
2.0 oz. (57 g) biscuit malt
5.0 oz. (142 g) crystal malt (40 °L)
3.0 oz. (85 g) crystal malt (60 °L)
2.0 oz. (57 g) crystal malt (90 °L)
4.0 oz. (113 g) chocolate malt
12.0 oz. (340 g) roasted barley (500 °L)
2.0 oz. (57 g) black patent malt
25 AAU Centennial hops (10 additions) (2.5 oz./71 g of 10% alpha acids)
1/4 tsp yeast nutrients
1 tsp Irish moss
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) yeast (4 qt./4 L yeast starter)
0.75 cups corn sugar (for priming)

Step by Step

For best results, you will need a brewpot big enough to boil 4 gallons (15 L) of wort and a grain bag big enough to hold 4.5 lbs. (2.0 kg) of grain. In your brewpot, bring 1.75 gallons (6.6 L) of water to 163 °F (73 °C). Put crushed grains in grain bag and submerge bag in the brewpot water; the temperature should drop to about 152 °F (67 °C). Hold at around this temperature for 45 minutes. (When temperature drops below 150 °F (66 °C), heat to 155 °F (68 °C).) Place grain bag in a colander over brewpot and rinse grains with 1 gallon (3.8 L) of water at 170 °F (77 °C). Discard grains, add water — about 0.5 gallon (~2 L) — to make 4 gallons (15 L) and heat "grain tea" to a boil. Shut off heat and stir in dried malt extract. Resume heating and boil for 90 minutes, add 0.25 oz. (7.1 g) of hops every 10 minutes with the final hop addition coming at the end of the boil. Add liquid malt extract, Irish moss and yeast nutrients with 15 minutes left in boil. (Shut off heat when you stir in the extract.) Cool wort, let hops and trub settle and transfer clear wort to fermenter. Add water to make 5 gallons (19 L), aerate wort and pitch yeast sediment from starter. Ferment at 68 °F (20 °C) until fermentation is complete (about 2–3 weeks). Rack to secondary and let condition for about 2 months — at around 40 °F (4.4 °C), if possible. Bottle with corn sugar. You may wish to add 1 tsp. of dried yeast (Safale US-56, for example) at bottling to facilitate carbonation.



TOP 10 steps to BETTER BEER

Everybody loves his or her first batch of beer. However, after the initial enthusiasm fades, most brewers start looking for ways to improve their beer. And here, beginning homebrewers face a problem. The problem isn't a lack of information; it's a surfeit of it. From books to magazines to on-line forums, everyone has an opinion on how to brew better beer. Do you make a yeast starter or try to mimic Burton Upon Trent's water? Should you keep things clean or build a HERMS machine? Will a little zinc improve your drink? Is avoiding hot side aeration the key to a great libation?

Sorting out the critical from the trivial is not easy. Some important aspects of homebrewing get relatively little press, while oceans of ink are spilled on less important aspects simply because a technical explanation of how they work is available.

In this article, I'll give what I think are the top 10 most important steps to brewing better beer, in (at least roughly) their order of importance. Most steps are well-known, even to most beginners. But hopefully, by ordering their importance, it will spur beginning (and intermediate) brewers to think about their brewing process.

#1 Cleaning

There's no getting away from it, the most important part of brewing is

10 YEAR Brew Your Own ANNIVERSARY

by CHRIS COLBY

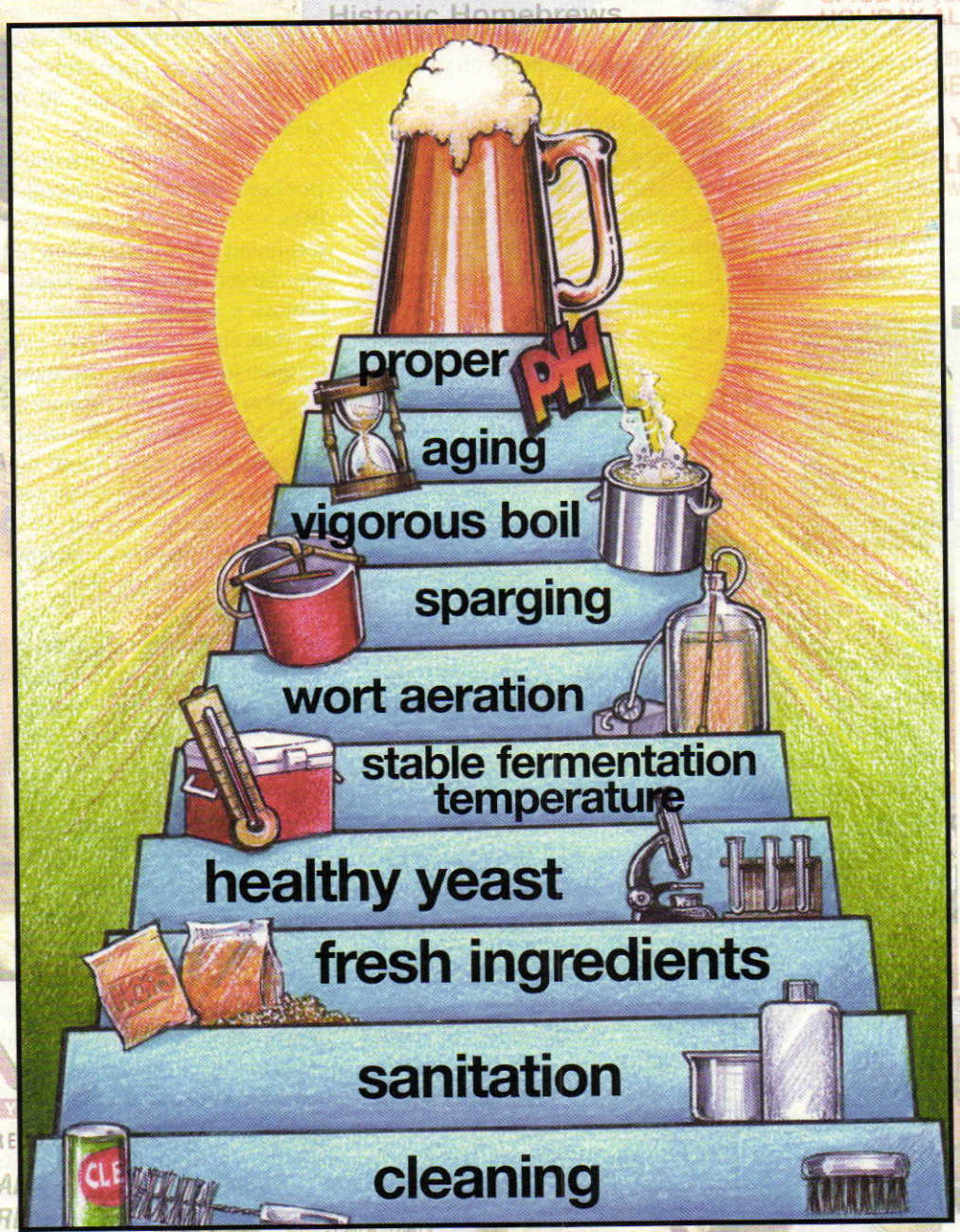


illustration by don martin

also the least glamorous — cleaning your equipment. Without sparkling clean equipment, there's no way to sanitize it and hence no way to brew quality beer.

Everything in your brewery needs to be cleaned. Certainly any surface that touches wort or beer needs to be spotless, but so should other surfaces on equipment and your brewing environment. Otherwise, soil can be transferred from an unclean surface to clean equipment and then come in contact with wort or beer. Keep in mind that your hands touch many things during a brewday. If you're going to handle a cleaned and sanitized piece of equipment after touching anything of suspect cleanliness, wash your hands before proceeding.

> . . . your goal in brewing becomes to make the most of the ingredients.

One of the biggest keys to making cleaning manageable is to clean everything immediately after use. It's relatively easy to clean brewpots, fermenters or empty bottles before the "crud" on them has time to harden. It will take some serious elbow grease after it has sat awhile. Also cleaning immediately prevents the soil on your equipment from becoming a breeding ground for contaminating microorganisms, which brings us to . . .

#2 Sanitation

Wort (unfermented beer) is a rich growth medium for microorganisms. But, the only microorganism you want growing in it is brewers yeast. If bacteria or wild yeast begin growing in your wort or beer, sour, acetic, phenolic or other off flavors and aromas may result. Without proper sanitation, anything else you do on brewday is futile.

The most important pieces of advice a new brewer should learn about sanitation is to use sanitizers only after equipment is clean and only at their proper concentration — more isn't better.

Finally, keep in mind that your beer is not equally prone to contamination throughout the process. Cool, aerated wort is a very good growth medium for a variety of microorganisms. Beer is less so. There are beer-spoiling organisms, but the alcohol content and low pH of finished beer are a partial shield against contamination.

#3 Quality Ingredients

In many ways, brewing is like cooking. This is especially true when it comes to ingredients. You need fresh, quality ingredients to make good beer. So, it pays to review how to identify fresh ingredients.

Hops — whether whole, plug or pellet — should appear green and smell pleasant. Hops that look brown or smell cheesy should not be used. Optimally, your hops should be stored frozen in vacuum-sealed bags.

Grains — including base grains and specialty grains — should smell and taste fresh. Old grain will smell and taste stale. Popping a few kernels in your mouth and chewing on them should tell you instantly whether your grains are fit to brew with. Grains should be stored in a cool, dry place and will last at least eight months if so. Whole grains retain their freshness much longer than crushed grains, which should be used within a couple weeks of being crushed.

Malt extract also needs to be fresh and can be stored under the same conditions as grain. If stored properly, dried malt extract (DME) will last at least a year whereas liquid malt extract (LME) will start going stale after 6 months. (LME contains water, which explains why it ages faster.)

DME should remain as a powder; if it's clumped into a brick, it has absorbed water. Liquid malt extract will turn noticeably brown when it goes stale. You can dissolve a small amount in a glass of hot water and observe it. Look around the edges, where the wort meets the glass, for a brown hue. If the color looks right for the extract type and it smells and tastes good, go ahead and use it. If the dissolved extract looks brown or tastes "off," don't brew with it.

Since most beer is over 90% water, your water must also be of high quality. First of all, it should taste good. If your water has off flavors, so will your beer. For tap water that tastes acceptable, the biggest concern is chlorine (or chloramines). These chemicals are added to water supplies to help keep it sanitary and will react with ingredients in your beer and cause off flavors or make it age prematurely.

To rid water of chlorine or chloramines, there are a couple alternatives — carbon filtration or chemical treatment. A carbon filter, especially the larger under-sink kinds, should remove a sufficient amount of chlorine or chloramines to render your water suitable for brewing. Alternately, treating your water with Campden tablets, at a rate of one per 20 gallons (76 L), will also do the trick. If your equipment is clean and sanitized and your ingredients fresh, your goal in brewing becomes to make the most of the ingredients, which brings us to . . .

#4 Pitch Enough Healthy Yeast

From a practical standpoint, the biggest improvement most beginning homebrewers could make would be to run a good fermentation. And, the biggest key to this is to pitch an adequate amount of healthy yeast. For a 5-gallon batch of ale, the optimal pitching is around 260 million yeast cells, and 95% or more of these cells should be healthy. Getting a reasonably accurate estimate of your cell count and yeast health requires a microscope, a special kind of microscope slide and some methylene blue stain. There is, however, a relatively simple way to be virtually certain you have enough healthy yeast — make a yeast starter.

For moderate strength ales, a 1-2 qt. (~1-2 L) yeast starter will yield a sufficient amount of healthy yeast cells at, or a day or two after, high kraeusen. For moderate strength lagers, a 2-4 qt. (~2-4 L) starter is required.

There's also a way to "cheat" if you are using a liquid yeast strain. Pitch the liquid yeast straight from its smack

pack or tube, but also pitch one to two sachets of a neutral dried yeast. Dried yeast is cheaper than liquid yeast and is an easy way to boost your overall pitching rate. (US-56 works well for ales.) You might expect the presence of a neutral yeast to "dilute" the aroma and flavor from a more distinctive yeast, but anecdotal evidence suggests that any dilution effect is small.

#5 Proper and Stable Fermentation Temperature

If you pitch an adequate amount of yeast, the next most important factor is to ferment your beer in the yeast's preferred temperature range and to keep the wort temperature (at least relatively) stable throughout the fermentation.

If the ambient temperature in your house isn't suitable, some low-tech methods — such as covering a carboy with a wet T-shirt — allow for a small, though, reliable amount of cooling. Likewise, wrapping the carboy in a warm blanket helps the fermenter retain heat. Slightly more high-tech solutions to temperature control include using a chest freezer with a thermostat on it or buying a fermenter with built in cooling.

#6 Wort Aeration

The final important factor to conducting a good fermentation is achieving proper wort aeration. Yeast need oxygen to make compounds called sterols, which help them build healthy cell walls. You can aerate your beer by pouring it back and forth three or four times between two sanitized buckets. A better solution is to get either an aquarium air pump or one of those small red oxygen cylinders used for welding (and a small regulator) and bubble air or oxygen through your wort with a stainless steel air stone.

#7 Avoid Excess Tannins

Fermentation is important, but you need to present the yeast with good wort to ferment. Making wort is relatively straightforward, but there are a few problems that can arise. One of the most common things that goes wrong when mashing, partial mashing or steeping grains is extracting too many

tannins from the grain. If too many tannins end up in your beer, a drying, astringent mouthfeel results. When this happens, the most common culprit is sparging or rinsing the grains with too much water. You should mash with 1–2 quarts per pound (2.2–4.4 L per kg). If you are an extract brewer steeping grain, use 1–3 quarts per pound (2.2–6.7 L per kg). But more importantly, do not oversparge or rinse your grains excessively. All-grain brewers can monitor the specific gravity of their final runnings and stop collecting wort when the gravity drops to 1.008. (Or, if you have pH meter, you can stop when the pH exceeds 5.8.) Extract brewers should just keep the rinse water limited to the same volume or less than they steeped with. And finally, keep the temperature of the sparge or rinse water under 170 °F (77 °C).

#8 Keep Oxygen Away

Yeast need oxygen when they are pitched in order to grow and ferment the wort properly. However, after they have been "fed," you should strive to minimize your wort or beer's exposure to oxygen. Exposure to oxygen while beer ages leads to papery or cardboard-like aromas in beer. And, the presence of oxygen can spur the growth of some beer-spoiling organisms, like *Acetobacter*, which causes a vinegar-like character in beer contaminated with it. To avoid this, keep your buckets sealed and fermentation locks filled, rack your beer quietly and use a container without a lot of headspace for conditioning your beer. If you have a kegging system, you may also want to fill receiving vessels with CO_2 before racking beer into them.

#9 Vigorous, Full-Wort Boil

Proper wort boiling sterilizes the wort, causes proper hot break formation, drives off DMS and lowers wort pH. Wimpy boils lead to cloudy, unstable beers while vigorous boils lead to clear, more biologically stable beer.

Also, it is best to boil the wort at as close to working strength as possible. The common technique of boiling a concentrated wort and diluting the wort in the fermenter is quick and simple, but has a few drawbacks. The main three are the possibility of scorching, lowered hop utilization and poor hot break formation.

When homebrewers boil less than vigorously, it's almost always because of inadequate equipment, not due to lack of knowledge. Many all-grain brewers, and quite a few extract brewers, use a "turkey fryer" propane cooker setup. A propane burner delivers the needed heat to get 5-gallon (19-L), and larger, batches of homebrew boiling well. Some brewers, however, are tied to their kitchen stove as a heat source. If this is the case, all is not lost. Extract brewers can perform a vigorous full-wort boil, or procedure that "fakes" it, with just a little extra energy. A conceptually simple way to do

this is to use the Texas Two-Step technique — boil your wort in two stages. Boil half of the wort one evening and the second half the next day. It takes more time, but works well.

One way for extract brewers to dodge many of the problems of a concentrated wort boil is to use the extract late method. Boil about half the volume of your beer, using roughly half the extract at the beginning of the boil. Late in the boil, or at knockout, add the remaining extract as liquid malt extract.

#10 Proper pH

When the topic of pH comes up in homebrewing circles, it's usually in the context of the mash. Mash pH should fall between 5.2 and 5.6 for proper conversion of starch to wort sugars. However, hitting the proper pH is also important in boiling and post-boil wort and beer.

During the boil, the pH of wort will drop from around 5.6 to around 5.3. However, if the pH can be driven lower — from 5.0 to 5.2 — some positive benefits accrue. Better hot break, better tasting hop profile and less color pickup are three benefits of lowered pH during the boil. The biggest drawback is that hop utilization is decreased slightly.

In order to drop the pH during the boil, some German brewers add a bit of calcium during the boil. I've found that about 1/4 tsp. of gypsum or calcium chloride works well for this. You can also use lactic or phosphoric acid.

The pH of beer falls to 4.0 to 4.4 after fermentation and aging. If beer pH gets too high, the resulting beer lacks crispness. However, if you achieve a decent post-boil pH, beer pH almost always takes care of itself.

CONCLUSION

This is not to say there aren't other factors that lead to better beer — there are. But, I believe the above list comprises the top 10 factors that most often make the difference between good and bad homebrew for most homebrewers. If I were to keep extending the list, subsequent items — such as mucking with your water chemistry, tweaking your mash variables, finding the perfect recipe, etc. — would affect the character of the beer, but wouldn't affect overall quality as much as the 10 above. Also, some procedures — such as cooling — are important, but do not usually pose a problem to homebrewers given their usual practices.

I'm sure many homebrewers will disagree with my ordering of the items presented here (and one of the great things about homebrewing is the impassioned debates it inspires). For example, most homebrewers probably know a fellow brewer who obsesses over mash parameters, but treats fermentation as almost an afterthought. At a minimum, if this article gets you to think about where you spend your time and effort in brewing (and why), then it will have served its purpose.

My whole relationship with *BYO* started shortly after I completed my graduate studies in Dr. Lewis' brewing program at UC Davis. At the time I was teaching and consulting with Dr. Lewis and Tom Shellhammer. Carl Landau, the founder of *BYO*, had moved to Davis and called the brewing lab looking for someone who may be interested in being the Technical Editor for his new magazine. My friend Scott Ungermann suggested that Carl contact me and that's how it all began.

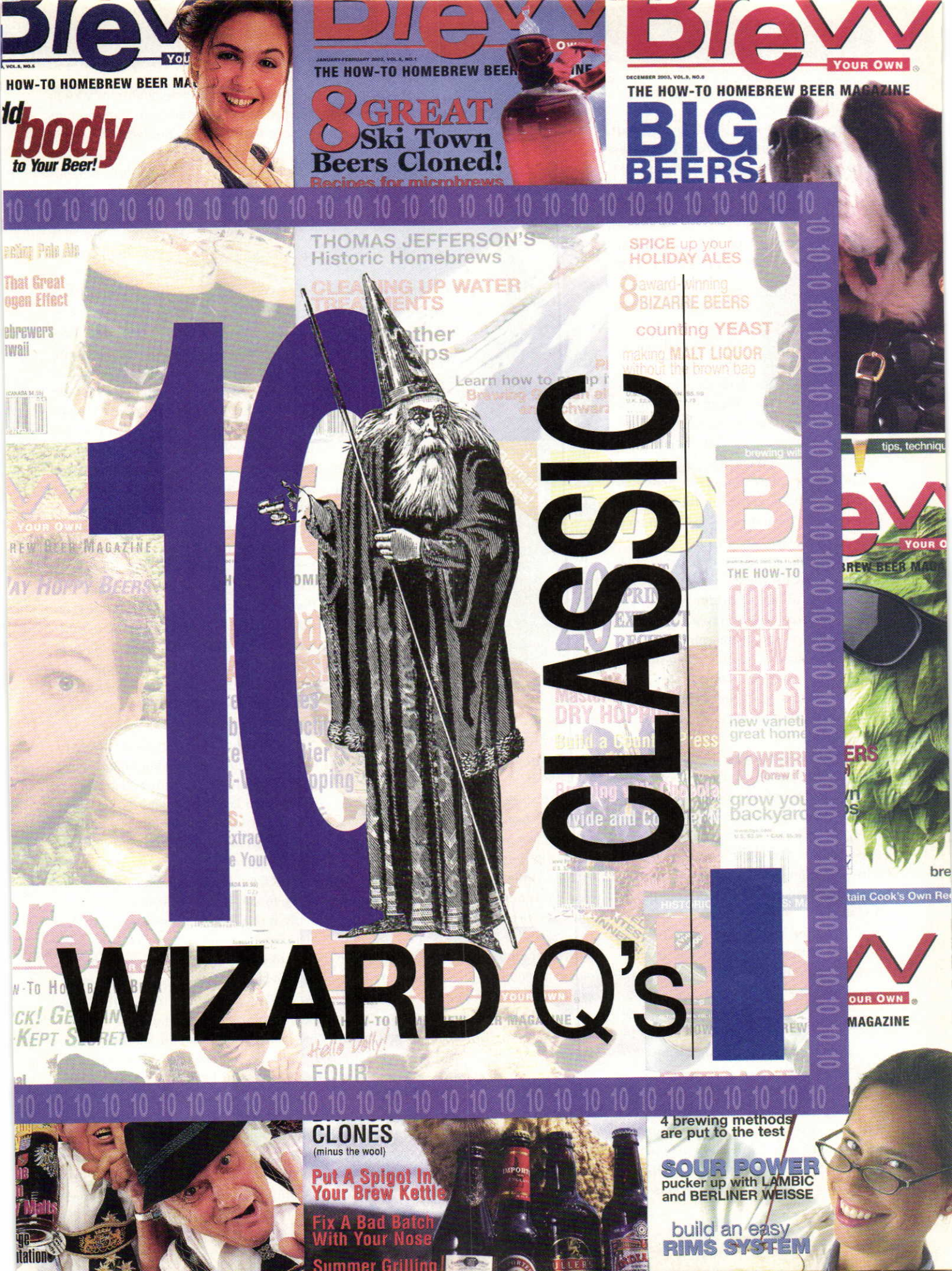
I don't remember how I got nominated to write *BYO*'s Q&A column, but somehow I was slated to write the Mr. Wizard column and began answering some questions we dreamed up in the office for the Premier issue in the spring of 1995. I was not particularly shy at the time, yet for some reason I wanted my new column to be anonymous. There were many years when very few people, including friends, knew about my secret life as a homebrew columnist. The longer I kept my identity a secret the more fun the secret was to keep.

Ashton Lewis is **Mr. Wizard**

I moved to Missouri in 1997 to work for Paul Mueller Company in a new showcase brewery and to help with brewing and food related projects. There were times that keeping up with my new job and covert column were difficult but I was able to stay motivated by the challenging and interesting questions thrown at me from all over the United States and various homebrew spots across the globe. The thing that I really like is that my educational background in brewing and food science and my profession in brewing and process engineering are really useful when writing my column. Many of the questions I answer require research and my writing routine has become a great mental exercise that I really enjoy.

Cheers to 10 years and thanks for all of your thoughtful questions!

– Ashton Lewis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PREMIER 1995

Yeast pirates

My buddies call themselves yeast pirates because they visit breweries and swipe yeast samples. Is this legal?

Ron Grimaldi
Denver, Colorado

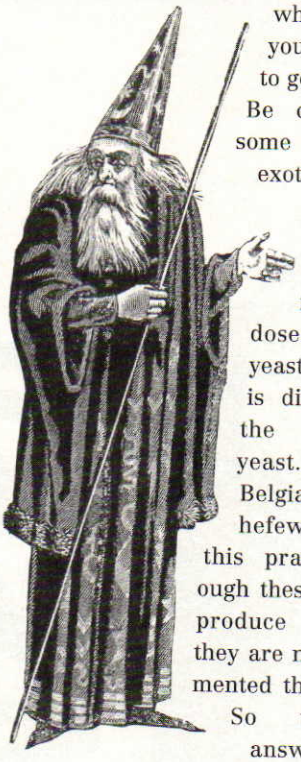
Mr. Wizard wants to go on record right away that he doesn't approve of the term "yeast pirate." As far as the practice goes, your friends are not committing any federal offenses. However, I have seen some brewery job applications that ask: "Have you pirated yeast?" Mr. Wizard's affirmative response to that question probably explains why he didn't get the job. So if you want to "pirate yeast" be cool about it; no need to irritate anyone.

Now that we know it is legal, how does one swipe yeast? My marauding kit consists of one cigarette lighter, one sterile mason jar, one plate of wort agar, and one metal microbiology loop (all micro stuff available from homebrew supply stores). The mason jar is used to store some beer containing the yeast of interest in case the plating on site goes awry.

As far as the heist, I calmly order a pint of unfiltered beer and inconspicuously break out my mobile yeast lab. I first flame the loop, dip it into my beer and then streak it out on the wort agar plate. The plate is then sealed with Parafilm (a wax tape) for transport. The sample in the mason jar is my backup.

An easier way to get yeast from a brewery without permission is to culture it from a bottle-conditioned brew. I recently read a conversation on-line regarding how to get yeast from Sierra Nevada Porter or Stout. The answer to the question had something to do with buying Wyeast 1056.

My immediate thought was to culture the yeast directly from the bottle. I mean if you want yeast from Sierra Nevada porter, why buy it when you can culture it from a bottle of porter! If you do this, be careful. If the brew has any bacteria in the bottle, your yeast propagation process will also increase the bacterial population—not exactly the idea. Some breweries, like Sierra Nevada, are known for clean yeast in the bottle. Ask around to get a feel for the quality of yeast in the bottles of whatever brew you are looking to get yeast from. Be careful with some of the more exotic bottle-conditioned beers—many are filtered and dosed with a yeast strain that is different than the fermenting yeast. Some Belgian ales and hefeweizens use this practice. Although these yeast may produce good beer, they are not what fermented the host beer. So the short answer is that culturing a brewery's yeast without their permission is legal. It's sort of like buying livestock; you don't need permission to breed two animals that you bought.



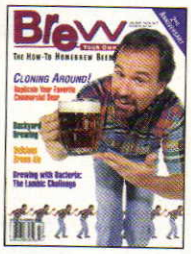
In the case of beer, when you buy unfiltered beer you get the yeast along with it. Just remember, however, that many brewers protect their yeast because of the special character it gives their products. I don't recommend going on brewery tours and opening tank valves or sticking your paw into open fermenters to swipe yeast while your gracious host is not looking. That kind of behavior is just plain rude and could cause contamination to the beer. It also tends to give us homebrewers a bad rap!

JULY 1997

Beer age

I keg all my beers but sometimes run out of refrigerator space. When this happens I leave my keg outside the refrigerator. My beer is not pasteurized, so how long can I safely store my kegs at room or refrigeration temperature before the flavor is affected?

Ray Nelson
Honolulu, Hawaii



They call me the Wizard, but a crystal ball I have not. The answer to your question has plagued brewers since beer was first conceived. Many famous scientists studied the spoilage of beer and wine, and Louis Pasteur developed the heat preservation technique now called pasteurization for beer, not milk. If brewers only knew how long their beer would last after packaging, distribution and packaged beer control would be so much easier.

The homebrewer and pub brewer do have it pretty simple, however, because the palate can tell when the beer no longer tastes as it should. So the simple answer to your question is that your beer's flavor will remain unaffected by storage until your palate is able to detect that it has changed! At this point you may want to have a party and drink the rest of the beer before it becomes bad.

Professional brewers who choose to bottle, can, or keg their beer cannot use this simple method because distribution prevents it. When beer leaves the brewery, the brewer loses control over his beer's fate. Some distributors try to torture the beer in hot warehouses, others move it from hot to cold and back to hot to try to see if the "cold-filtered" thing really worked, and others place it in tall stacks at the end of the grocery store aisle like little kids playing with building blocks. I'm sure if these distributors knew what they were doing to the beer, they wouldn't do it unless, of course, they are just plain mean and nasty!

This is where the brewer really wants a crystal ball. They measure dissolved oxygen in package, use predictive microbiological tests, conduct simulated aging studies, and look at historical data to attempt to predict how long their beer will last in the hands of the distributor. Some distributors and beer

retailers are very kind to beer and provide a cold, dark place for the beer to reside. In this sort of environment, beer can last for more than a year and sometimes several years before "going bad," whatever that really means. The same beer may last only a couple of days in a less hospitable environment, such as a truck with no cooling stranded in Death Valley in July.

Based on all of these methods and a bit of guessing, some brewers put "best before" dates on their beers and others use "born on" dates. These codes allow the consumer to judge freshness before making a purchase. If everything goes as planned, the distributor will remove any old product before the consumer ever buys it and the date can be used as a guide at home.

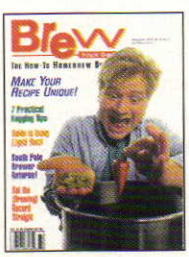
In your case you are the brewer, the distributor, the retailer, and the consumer. If the beer gets old and starts to taste bad I would return it to the retailer and complain like mad. The retailer will trade the old stuff for new stuff with the distributor, the distributor will exchange it for new product with the brewer, the brewer will destroy the old product and, just like a commercial brewer, brew more beer to deliver into the consumer's mug.

NOVEMBER 1998

Historical brews

I know American beers are lighter today than before Prohibition, but are there records of the recipes used before all these changes? I look at labels on some of the bottles in my collection and see that some breweries claim to be more than 100 years old. I just wonder how much better the beer might have been, say when Pabst was first started in 1844.

Pat McMackin
via e-mail



Beer history is usually a subject I avoid, because my view of beer history is not in line with the mainstream, romanticized views of brewing in the old days. But this is one of those questions that really is hard not to respond to, so here it goes.

For starters, Prohibition caused tremendous financial hardship for the domestic beer industry, but Prohibition didn't force brewers to brew light beers. There are many pre-Prohibition recipes floating about, and the differences between beer recipes of that era and beer recipes today are really not that great. American brewers of European descent were using starch adjuncts such as rice and maize (corn) decades before Prohibition. These adjuncts, among other things, lighten beer color and flavor. Brewers, a tremendously resourceful group, have used all sorts of starch sources over the several thousand years of beer brewing. The notion that rice and corn additives somehow make beers less beer-like has always puzzled me. After all, the loosest definition of beer is any alcoholic beverage whose carbohydrate is derived from cereal grains (as opposed to wine, whose carbohydrate comes from fruit sugars). In any case American brewers began using adjuncts long before Prohibition.

Many beer historians tie the lightening of American beer flavor, particularly hopping rates, to the rationing of foods during World War II. After the war ended the American palate was drastically changed. The bland trend was not reserved for beer alone. American food in general was bland, perhaps because Americans were accustomed to bland foods during war-time rationing.

Are American beers bland? Most microbrew drinkers would say yes. Ninety percent of domestic beer sales fall into the bland category, and Bud drinkers like their

Bud. Was Pabst bland in 1844? No one alive today can comment on its flavor, but most American lagers of that period did contain adjuncts and probably had less character than their European counterparts. How much better were the beers back then than they are today? Read on!

In 1844 commercial refrigeration did not exist, pure yeast culturing had not been developed, the most basic understanding of beer spoilage by bacteria had not even been conceived, the word biochemistry did not exist and there was absolutely no concept of how yeast biochemistry influenced beer flavor. In short, brewing science had not been born.

In 1844 beer was fermented in wood or concrete fermenters left exposed to the atmosphere. These fermenters were very difficult to clean, and bacteria were certainly full-time residents in breweries of the period. Without an understanding of microbiology, ease of cleaning didn't matter because the brewers did not even know the true objective of cleaning.

In 1844 beer was packaged in wood casks and exposed to air during serving. Oxidation and the proliferation of aerobic bacteria that turn alcohol to vinegar must have been commonplace.

In 1844 breweries used tools that would be classified today as crude. Life in the brewery was hard. In 1844 the beer consumer could not imagine what he did not have, and the beer industry did very well. Breweries that consistently made highly ranked beer stood out from the crowd, but all breweries of that period certainly had their difficulties. Modern brewers and beer drinkers need not look to the past with rose-colored glasses but instead should be in awe of the advances made over the past 150 years by the brewing industry.

Brewers were among the most inquisitive and open-minded thinkers of the 19th century in the fields of chemistry, biology, and food-processing technology. Enzymes were identified and defined by brewing scientists; Louis Pasteur revolutionized the world with his Etudes sur le Vin and his Etudes sur la Biere in the mid-19th century (these studies later gave rise to milk pasteurization); Emil Christian Hansen developed pure culture techniques for yeast in the late 1800s; and S.P.L. Sørensen, a colleague of Hansen at the Carlsberg Laboratories in Copenhagen, suggested the pH scale in 1909. All of these achievements were applied to different industries and spawned new ideas in the field of science.

Today, brewing benefits from advances in raw-material quality, advances in the understanding of brewing science, and advances in brewing technology.

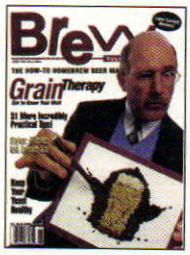
Almost every homebrewer today understands that beer is damaged by oxidation. This most basic kernel of knowledge was not known by the commercial brewing industry at the turn of the century. Today, oxygen pick-up is minimized by design in the brewhouse, in the design of beer transfer systems, filters, and packaging lines.

JUNE 1999

Hot side aeration

Regarding BYO's response (twice) to Dan Cole of Roanoke, Virginia, (Mail, August 1998, March 1999) about hot-side aeration (HSA). I think he has intelligently challenged you to answer a simple question with a real answer. You have twice told him that HSA is not a problem for homebrewers, but you have never given a researched or referenced answer as to why you believe this. A little explanation as to why the editor disagrees so strongly with Mr. Wizard as well as other feature writers would help settle this question.

Andy Lynch and
Bob Bratcher
Roanoke, Virginia



Before I jump head first into this colorful debate about hot-side aeration (HSA), I would like to explain where some of the comments in BYO mail and in some of the BYO articles stem. Most of the comments regarding this whole debate have come from commercial brewers who write for BYO.

To paraphrase, they have suggested to our readers not to worry about HSA too much because there are bigger problems to solve. Steve Parkes wrote that "the English homebrewer is more likely to be opening a can of extract . . . than worrying about excessive wort splashing causing hot-side aeration" ("Brewing Like the British," December 1998 *BYO*). Some readers might have thought Parkes was saying that splashing hot wort could cause HSA, but I think his point was that American homebrewers tend to worry about things more than the English.

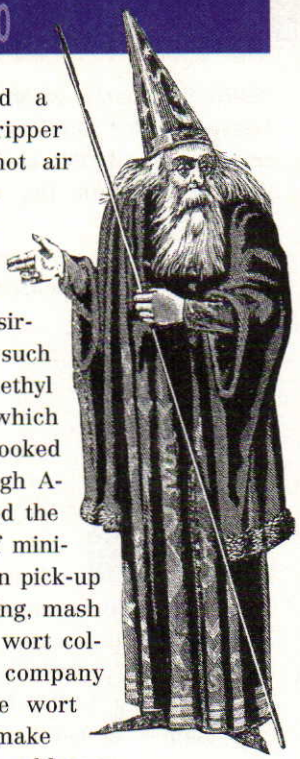
Dan Cole has asked for an experiment conducted by a third party to confirm or deny the existence of hot-side aeration. This would be a great experiment if the topic were new.

Fortunately for those interested in HSA, it is a well-researched topic and the research conducted over the years clearly shows that oxygen pick-up during mashing and mash transfer has an effect on beer flavor.

The topic of HSA can be divided into two areas: 1) aeration prior to wort boiling and 2) aeration after wort boiling. Malt enzymes, such as lipoxygenases and polyphenol-oxidases, that catalyze oxidation reactions are present in the mash and wort prior to wort boiling. In my opinion, this is where the HSA concern makes sense.

The second class of HSA is wort aeration after boiling. The only real consequence I have seen cited about aeration after the boil is an increase in wort color. Keep in mind that very hot wort, wort right after the boil, does not permit much oxygen into solution and under normal brewery conditions this won't cause much wort darkening.

Anheuser-Busch (A-B) uses a



device called a volatile stripper that forces hot air over thin films of wort after wort boiling to remove undesirable aromas such as DMS (dimethyl sulfide, which smells like cooked corn). Although A-B has adopted the philosophy of minimizing oxygen pick-up during mashing, mash transfer and wort collection, the company still uses the wort stripper to make very pale-colored beers.

Personally, I believe the body of scientific evidence surrounding HSA in relation to mash and wort oxidation prior to boiling is believable. Luckily, the problem is easy to control. Basically, don't splash too much during mash-in, transfer from the mash pot to the lauter tun and wort collection. This seems so simple that most people don't see the big dilemma. Today, mash mixers are designed with special agitator blades to minimize splashing during mash heating.

Lauter tuns are filled from the bottom to ensure a very quiet fill. Some experimental lauter tuns even operate under a slight overpressure from carbon dioxide. New brew kettles are filled from the bottom, and the worry about splashing has been designed out of the modern brewhouse. Even the beautiful and traditional wort grant has been replaced by wort collection piping systems that eliminate any exposure of wort to oxygen during transfer from the lauter tun to the brew kettle. After wort boiling, most breweries use whirlpool vessels to separate hops and trub from wort, and even these vessels are constructed to minimize splashing during filling.

As long as homebrewers exercise a little care, the likelihood of having HSA problems is very slim. The truth is that commercial brewers are concerned

about HSA and that companies that manufacture brewhouse equipment have responded to these concerns by changing their designs of the past.

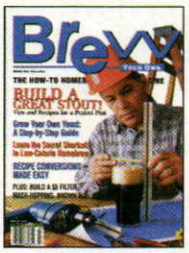
The confusing part for the homebrewer is that many writers who write for homebrew publications also work in the commercial-brewing arena, and commercial-brewing concerns frequently become homebrew concerns. Unfortunately, Mr. Cole felt like he was being brushed off by past comments stating that HSA is not much of a problem for the homebrewer. For what it is worth, I don't feel that HSA is a huge issue for most homebrewers. However, for those inquisitive homebrewers such as Mr. Cole, HSA is an interesting topic.

MARCH 2001

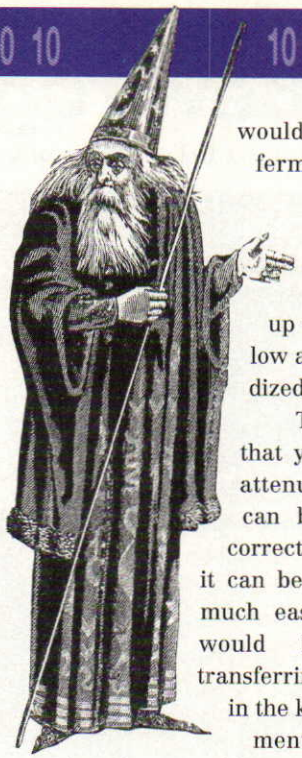
Stuck fermentation

Recently I made a batch of American lager that had a "stuck" fermentation. I suspect that I underpitched and possibly under-aerated the wort. The final gravity was in the neighborhood of 1.025. Being somewhat impatient, I went ahead and kegged it to see how it would turn out. As I had suspected, it turned out to be sweet rather than crisp, due to the unfermented sugar. Will boiling the beer for about 15 minutes to drive off the carbon dioxide, then re-aerating and re-pitching correct the problem?

Brian Janes
Sparks, Nevada



This doesn't sound like the best idea. For starters, boiling your beer for 15 minutes will evaporate most of the alcohol from it. The other negative effect of this plan is severe oxidation. This would occur because of oxygen pick-up when the beer is transferred from keg to kettle and then kicked into high gear when the beer is heated to boiling. So far we have produced oxidized, non-alcoholic, sweet beer. Mmmm! The next step of your plan is to re-aerate and add more yeast. This would work to ferment the residual sugars and you would end up with a very low alcohol, oxidized beer.



The notion that your underattenuated beer can be fixed is correct and I think it can be done in a much easier way. I would begin by transferring the beer in the keg to a fermenter, securing the top with an airlock and storing it at fermentation temperature for a few days. This allows most of the carbon dioxide to escape from the beer. The remaining carbon dioxide won't inhibit fermentation and should be low enough to prevent excessive foaming.

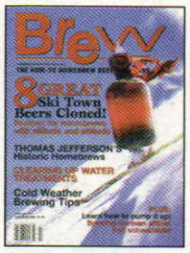
Next, make a small batch of wort from dry malt extract. I would use about one pound of dry malt extract, 5 quarts of water and 1 AAU of hops (0.1 ounce or 2.4 grams of 10 percent alpha hops, for example). Boil this for one hour and adjust the volume to one gallon. Then cool, aerate and add yeast. Ferment at room temperature until it begins rapidly fermenting (high-kraeusen stage). This should happen in 24 to 48 hours, depending on how much yeast you added. When high kraeusen rolls around, add this to the contents of your fermenter. Monitor the fermentation until complete, transfer to your secondary, then age and keg as you did before. My advice for the future is to be patient. In this case you could have kraeusened the beer before you jumped the gun and kegged a batch of half-fermented lager.

JANUARY–FEBRUARY 2002

Foam and proteins

I have been homebrewing for several years and still have a persistent problem with head retention. I brew all-extract batches with some specialty grains, but do not mash. I have heard that using carapils and going heavier on the hops can aid in head retention, but I still can't keep a head on the beer for the whole glass. Please help!

Steve Thunberg
Rolling Meadows, Illinois



Beer foam is pretty neat-looking stuff and is one of those topics that brewers can only discuss with other brewers. Start talking about the merits of good foam among non-brewers and people will think there is something fundamentally amiss! I have spent a lot of time looking at and thinking about beer foam — in fact, I did my masters thesis on beer foam — and have developed a simplified approach to brewing beer with great foam.

The key item involved in my approach involves malt selection. This means going all-grain. Unfortunately (for extract brewers), all-grain brewers really have a leg up on extract brewers when it comes to foam for a few reasons. First of all, foam is primarily a function of wort or beer protein content and type. Protein (or more correctly polypeptide) content decreases when wort is heat-treated, because proteins come out of solution (the wort) when heated. Extracts are heated and sometimes boiled when produced, and the brewer again boils the wort at home (unless you're making a no-boil beer). Another key factor affecting beer foam is the type of malt used. Extract brewers can select different specialty malts but have no control over the type of malt in the extract, which typically comprises more than 85 percent of the recipe. Plus, some extracts contain adjuncts, for example sugars, which dilute the protein content even more and have a negative affect on foam.

When selecting extracts look for all-malt, low-color types, since these will give you the best shot at good foam. I personally prefer dried malt extract (DME) over liquid extracts. This is because DME receives less heating in

the process. Some extracts will describe the wort it will produce. If you can find un-hopped, all-malt extracts that use the descriptors "light color" or "lightly modified malt," you will be in good shape.

I recently brewed a Pilsner using a new malt, produced by Briess, that's simply called Pilsner malt. The malt caught my attention because Briess has spent a lot of time and energy on developing an under-modified malt. Their advertising mainly described its low color and very light flavor. I was more interested in the type of foam it would produce. So I bought some of the Pilsner malt and some Czech Saaz hops and got busy!

The first thing I noticed about the malt was its color. This stuff is really pale and the color is a sign of little protein degradation during malting. Darker pale malts are usually well-modified because modification leads to protein breakdown. This leads to an increase in smaller protein bits (polypeptides) and each polypeptide has a reactive site that can participate in the Maillard reaction during kilning. The Maillard reaction is responsible for malt color and flavor. Therefore, color is loosely related to modification.

During wort collection it was clear that this was going to be a very pale wort. The next observation was indeed memorable! As the wort was heated, large flocs of protein began to form. This is typically seen after the boil, but I have never seen big protein flocs prior to boiling. Then when the wort finally came to a boil, this magnificent meringue-like foam emerged. Now that the wort has been fermented, the beer is lagering. It is currently carbonated, cold and aging. I have taken several samples and have never made a beer with such an incredible foam.

So here is my simplified approach to brewing beer with good foam: 1) begin with under-modified malt if you really want killer foam (use special malts as normal for color and flavor), 2) avoid using protein-free adjuncts like corn, rice and sugar, 3) never use any soapy cleaner or sanitizer without a very thorough rinse, 4) use really clean beer glasses.

There is one major problem with this approach. Most pale malts are not under-modified and there are some real benefits to using well-modified malt. There is a trade-off with everything. If I am correct about malt modification being a primary factor in foam stability, then foam stability will progressively decline as malt modification increases.

July–August 2002

Oak chips

If I wanted to use oak or beechwood chips in brewing a 5.5 gallon (21-L) batch of beer, how would I go about it? How many ounces would I use and how would they be handled in the mash or fermentation containers? How long would they be left there? I realize that they would have to be steamed for 15 minutes before using.

Paul A. Borowski
via email

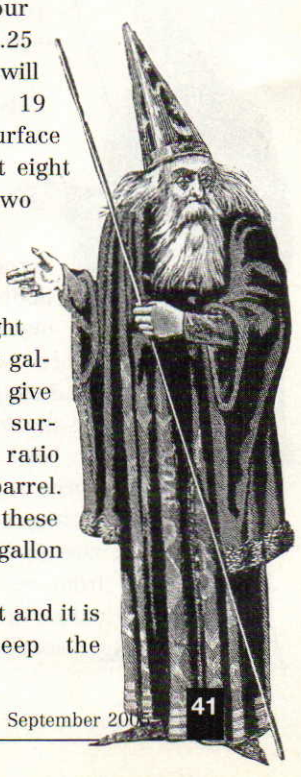
You have really asked two different questions here: How to add oak for flavor and how to add beechwood for aging. Beechwood does not not add flavor. Adding oak chips — which is done in the fermenter, not the mash tun — can add some interesting flavors to your homebrew and act as a surface area to accelerate aging.

Whether using oak for flavor or beechwood to help with aging, the weight of the wood chip is not the most important consideration. Rather, the surface area is the key factor to consider. The flavor from the chip is released into the beer only where the beer and the chip are in contact. You could have a bag of thin oak chips and a bag of thick oak chips that both weigh the same, but the thin chips would have a greater surface-area-to-weight ratio. So the thin chips would add more flavor than the same weight of thick chips.

I recently made some oak-aged hard cider and got an incredible aroma from the wood during the aging process. The barrels I used are about three feet in diameter, four feet long and contain 50 gallons (190 L) of liquid. To put this in beer-geek terms, the barrels have about 149 square inches of oak area per gallon of contents. This statistic is the barrel's surface-to-volume ratio. That's a good number to keep in mind, since most barrels used for aging wine are in this size range. As the capacity of a barrel increases, its surface-to-volume ratio decreases and the time required for the oak to flavor the contents of the barrel increases.

I chose an American oak, with a medium toast and a "normal" surface roughness. According to the barrel maker, this would give me nice vanilla notes from the toast level, an aroma consistent with American oak. The roughness of the interior would result in a faster release of oak flavors than a barrel with a more polished finish. Most of these same options are available when buying oak chips that are added to the aging vessel.

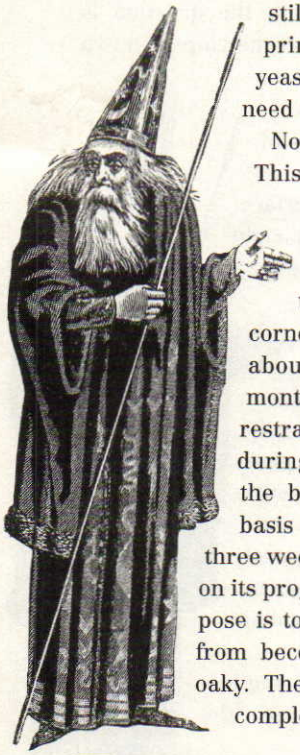
Right now it's summer, a good time to brew a big beer for the winter. Imagine a strong ale with assertive bitterness, low hop aroma and a full and clean malt backbone. This beer has just finished primary fermentation and the plan is to age it on oak to add further complexity to its flavor. A bag of oak chips with the desired toast has been purchased and the question is how much to add. If the chips are two inches wide, four inches long and 0.25 inches thick they will each provide 19 square inches of surface area (two sides at eight square inches, two edges at one square inch and two edges at 0.5 square inch). Eight of these chips per gallon of beer will give about the same surface-to-volume ratio (149) as an oak barrel. So set aside 43 of these chips for the 5.5-gallon (21-L) batch.



Chips will float and it is important to keep the

entire surface of the chip in contact with the beer during aging. A hop bag weighted with some stainless steel bolts (or some other inert weight) will do the trick. Sterilize the bag, chips and weight with either steam or hot water. I chose to fill my barrels with 195 °F (91 °C) water and let the barrels sit for several hours prior to use. Either method will work for sterilization. Some sanitizing solutions will damage the wood and perhaps flavor the beer. Burning sulfur is one method of sanitizing barrels used by winemakers, while using a dilute solution of KMS or Campden tablets is another. I like hot water because there is nothing added to the barrel other than water.

The next step is to place the chip bag into a vessel for the aging process. This poses a dilemma since the chip bag won't fit into a carboy and a plastic secondary allows oxygen into the beer. The ideal container is a 5-gallon (19-L) Cornelius keg. Place the chips in the keg and rack the beer from the primary into the keg for aging. Try to minimize the amount of yeast carried into the secondary as excessive yeast will impart autolyzed flavors from yeast death over the aging period. The beer can be primed at this time or you can wait until later. Priming at this stage will be easy since the yeast viability is still excellent. If primed later, more yeast will most likely need to be added.



Now it's time to wait. This is the most important step to oak aging. It is tempting to place the keg in a cool corner and to forget about it for several months. Vigilance and restraint are required during aging. Sample the beer on a regular basis — say once every three weeks — to keep tabs on its progression. The purpose is to prevent the beer from becoming excessively oaky. The oak should add complexity to the beer, but not dominate its flavor. Once the flavor reaches the intensity you desire, you can rack the beer into a second keg or bottle it.

Another variation is to not worry about the oak intensity during aging and to blend the oak-aged beer with a batch of non-oaked beer to produce the desired oak intensity. This is how I treated my cider, which became so oaky after three months in a new barrel that it was hard to smell or taste anything but oak!

You also mentioned beechwood in your question. Beechwood aging has absolutely nothing to do with wood flavor. The wood gives the yeast more surface area to cling to and helps the beer age. Diacetyl and acetaldehyde reduction during aging requires yeast and beer to interact, and that is precisely what the beechwood chips do for the brewer.

MAY–JUNE 2003

Can you overdo the O_2?

How long would I have to aerate with oxygen in order to incur negative effects on my yeast? I have read several articles that skirt the issue, but most cover commercial brewing and don't give homebrewers an idea of how much is too much. I have read the recommended length of time to aerate, but not the maximum times.

Perry Launius
Jackson, Mississippi

It sometimes seems like homebrewing has advanced from "Relax, don't worry, have a homebrew" to "Stress out so much that only a homebrew can calm you down." Unfortunately, there is no exact answer to this question. To leap-frog to my recommendation, I encourage homebrewers to worry more about under-aeration and not to spend too much time on concerns with over-aeration. The caveat is with propagation. Yeast can be stressed when oxygen is continuously or intermittently bubbled into a propagation container. I will give some insight that may help understand why there is no exact answer to your question and will present a list of facts about oxygen and yeast that may help.

For starters, not all brewing yeast strains have the same oxygen requirements for satisfactory fermentation. This observation is documented in Malting and Brewing Science, Volume II (Hough, Briggs, Stevens and Young), although many practical brewers know this to be true from anecdotal evidence. This book has a very nice graph showing peak yeast density as a function of wort oxygen content at the beginning of fermentation. The graph shows a dramatic increase in yeast density as oxygen levels increase from 0 mg/L (which equals 0 ppm) to 2 ppm and very little change from 2–8 ppm. Another graph shows the relationship between the duration of fermentation and wort oxygen content at the beginning of fermentation. This relationship is a bit more interesting since fermentation time decreases as oxygen content increases.

In the book Brewing (Lewis and Young), the point is made that alcohol content in beer declines as wort oxygen levels increase. This reduction can be greatly exaggerated in fermentations that are continuously aerated, such as yeast propagation. Cell density in a commercial propagator with aeration and stirring provisions can reach as high as 200 million cells/mL; this is about five times higher than the peak density seen in a typical beer fermentation where the fermenter is neither aerated nor stirred.

The explanation for this phenomenom is relatively simple — alcohol is not produced from glucose when yeast are consuming glucose to synthesize the building blocks for new yeast cells. Wort aeration also has a dramatic influence on beer flavor formation during fermentation because it affects yeast metabolism. For example, if wort oxygen is limited then ester production increases and, in turn, the production of fatty acids within the yeast cell is limited. Likewise, fatty acid production increases with wort oxygen level and ester production decreases.

Yeast propagation is really the

place in commercial breweries where over-aeration has been examined. Why? Because yeast propagators are equipped with sparging devices designed to deliver a lot of air to the propagation and increase cell growth. After all, the goal of propagation is growing yeast and not making beer. Both practical brewers and brewing scientists have observed that yeast can be damaged when excessive amounts of oxygen are delivered during propagation. The term used to describe this stress is "oxidative damage." While oxygen is required for a wide array of biochemical functions, it is also related to cellular aging. The free radical theory suggests that cellular aging results from damage caused by reactive oxygen species known as "free radicals" — sounds like a punk rock band!

Veronique Martin of Oxford Brookes University presented a poster at the 1999 European Brewing Congress (EBC) in Cannes entitled "The Oxidative Stress Response of Ale and Lager Yeast Strains." This poster showed stationary phase yeast (the phase after the increase in yeast density) to be less sensitive to oxidative stress than cells growing during the exponential growth phase. Furthermore, the negative affects of oxidative stress show up in subsequent fermentations that use yeast cropped from a stressed environment.

At the same EBC meeting, Chris Boulton from Bass gave a talk called "A Novel System for Propagation of Brewing Yeast." This method uses oxygen injection into the propagator. The purported advantage of this method was that yeast did not get exposed to oxidative stress during the sensitive growth phase of their life cycle. This is

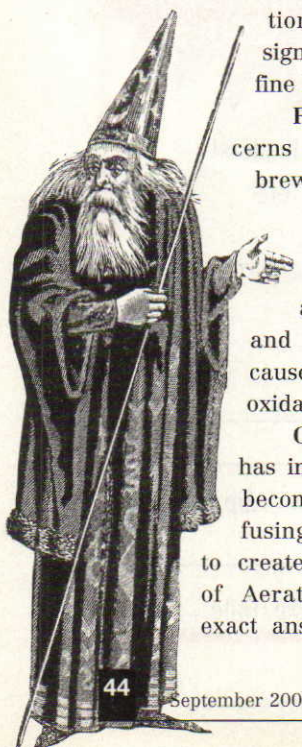
clearly a topic without an exact answer as research is ongoing. In fact, much of the research is believed to relate to aging in humans and other animals. I will close with a list of facts and my own opinion.

Fact: Wort oxygen levels very quickly drop after the lag phase of fermentation ends when aeration or oxygenation is performed only once. This is the typical method of aerating wort.

Fact: Wort has an oxygen content of about 8.5 ppm when saturated with air (79% nitrogen and 21% oxygen) and an oxygen content of about 43 ppm when saturated with oxygen.

Fact: 0.57 liters of oxygen at standard temperature and pressure weighs 813 mg. When dissolved in 5 gallons (19 L) liters of wort, this results in a concentration of 43 ppm. After the saturation point is reached, no more oxygen can be dissolved into wort. In other words, it doesn't take long to saturate wort with oxygen (or air when aeration is being performed).

Fact: Oxygen content in wort cannot be known without measuring it since wort temperature, gas bubble size and the contact time between the bubble and wort all have a profound effect on gas diffusion. Small bubbles diffuse much, much more quickly than big bubbles. Small bubbles also are less buoyant, rise slower through the wort and as such have a longer contact time. That's why aeration stones are designed to produce very fine bubbles.



Fact: The major concerns with commercial brewers and over-aeration are primarily focused on propagation where aggressive aeration and oxygenation can cause problems due to oxidative stress.

Opinion: This topic has incredible depth and becomes extremely confusing if one attempts to create a Unified Theory of Aeration. There is no exact answer to your exact question. Homebrewing is a hobby of exploration. I think the idea is to learn from what others have done and explore the art of brewing in a fun and creative manner. Along the way, the experienced brewer will come up with their own special techniques and interpretations to the tremendous number of ideas floating around the brewing (and homebrewing) world.

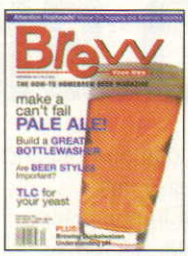
I personally use pure oxygen for a one-time saturation shot for yeast propagation. I have never had any problems with this method. When it comes to wort aeration for making beer, I use air and saturate with air. Again, this works well for me and, most importantly, my yeast!

SEPTEMBER 2003

Hardest homebrew

Please solve an argument between my homebrew buddies and myself. What, in your opinion, is the hardest kind of beer to brew at home and what is the easiest?

Erik Beal
Edina, Minnesota



I can't believe a couple of homebrew buddies would argue over such a thing. I suppose these discussions are just part of this great hobby! I view beer in a similar light as music.

Music combines different individual sounds into a total sensory experience. In music, the extremes of this total sound combination seem the most challenging to produce. On one end of the spectrum, compositions that sound excessively simple (don't you love oxymora?) are often difficult to play. The jazz standard "Four" by Eddie Vinson (often credited to Miles Davis) is an example of a really simple composition that requires an excellent group of musicians to play successfully.

The other musical extreme is huge orchestral compositions where disaster occurs if every note is not played at the right time and tune. Johann S. Bach composed pieces with amazing complexity that challenge both musicians and the instruments they play. Bach's intricate compositions were commonly used in his day to tune organs.

In the middle are tunes like Sir Mack Rice's "Mustang Sally." This catchy little ditty is one that almost every local blues band can crank out with confidence and few mistakes.

The Mustang Sallies of homebrew are beer styles like pale ale, American-style wheat, hefeweizen, stout, porter and brown ale. If you have good ingredients, an appropriate yeast strain and know the basics of brewing, you can brew these styles at home with ease and consistency. These are the types of beers that are great to offer friends and watch the expressions on their faces. It's like they are saying, "Wow! You brewed this at home?"

Notice that none of these beers are lagers. Since lagers are fermented and aged at temperatures that are much cooler than the average home, they require special equipment that put them into a more advanced homebrew category. The other commonality among these beers is that they have enough flavor intensity to cover up minor faults. Styles that have light, subtle or refined flavor complexity are much more difficult to brew than big beers with over-the-top flavor. This is a point of debate among many brewers because it suggests that the big commercial brewers are actually producing a difficult beer style. You can beat up the "budmillcoors" of the world for brewing beer with little flavor, but you really can't argue that they lack skill.

If you are having a hard time swallowing this (no pun intended!), try brewing an American-style lager and compare it to a commercial example. European styles like Pilsner and helles lager also fall into this category because they have few ingredients and a simple, yet elegant flavor profile. Faults in these beers stand out like a coffee stain on a white shirt.

The symphonies of beer include heavy hitters like barleywine, doppelbock, all sorts of Belgian ales and styles that are intentionally soured by bacteria. Although these beers have a lot going on in the flavor department,

they require balance to taste good. It's tempting to go nuts with these beers and to over-emphasize one component of the beer. For example, over-hopped barleywines, cloying doppelbocks, over-spiced Belgian ales and soured beers that taste like some microbiology experiment gone awry seem more common than exquisitely balanced versions of these same styles.

I am sure that I have not solved your argument, but I have presented my opinion to this "no-right-answer" style question. I can honestly say that my best beers usually fall into the Mustang Sally category, although I have brewed really tasty lighter beers and some equally delicious big beers. I tend to be my own worst critic and find more faults with beers that venture towards the lower and upper extremes of flavor . . . happy debating!

SEPTEMBER 2004

Mash methods

My neighbor and I have been doing single infusion mashes for about four years. We started doughing in at 104 °F (40 °C) and holding this temperature for 20 minutes. This has increased our efficiency. We have read that instead of doing a single infusion, it is better to do a step at 140 °F (60 °C) and a step at 158 °F (70 °C) for a total of one hour, with the understanding that the amount of time spent during the hour at 140 °F and 158 °F will change depending on the brew you're making. What's your take on this advice?

David Reaser & Ray Redcay
Bethlehem, Pennsylvania

The topic of mashing technology and mashing biochemistry is a topic of deep personal interest and is one that I have written much about over the years in this column. I advocate using certain brewing implements and brewing techniques when needed. Mashing is certainly an area where different options abound. A brewer can choose from infusion mash tuns, stirred mash mixers (heated pot and spoon for the homebrewer), double mash set-ups for either decoction or adjunct mashes and then a whole subset of options for the type of wort separation method. When it comes to the mash profile itself, the options are wide open since the mash profile is a combination of temperatures held for various times to accomplish the brewer's goal.

The brewer's goal is where I keep my attention glued. There are many new brewing technologies springing up in the world of commercial brewing that attract many brewers because the methods are new, and this attraction to technique often takes the focus off of the most critical element — namely the brewer's goal!

The brewer's goal in mashing is two-fold. The primary goal is to convert starch from the variety of starchy

ingredients into fermentable sugars so that yeast may gobble them up and transform wort into beer. This goal is crude and we can accomplish our primary goal and produce beers with a very high residual extract as well as those with virtually no remaining carbohydrates.

The secondary goal of mashing, and arguably a much more important one, is to take control of the transformation of starch. In order to control these reactions it is critical to understand the reactions themselves and this means boning up on mashing biochemistry — aka enzymes. I will avoid covering this topic in depth because I want to cover new ideas, but here's a quick rundown on enzymes in the mash.

Enzymes are most active when their "temperature optimum" and "pH optimum" are both met. If the mash temperature exceeds the optimum temperature of a specific enzyme, say beta-amylase, the enzyme irreversibly denatures and permanently loses activity. The various relevant enzymes active in malt have a range of temperature optima from 104 °F (40 °C) to 158 °F (70 °C).

The rate of enzymatic reactions is highest when the concentration of enzyme and substrate are high. This means that reaction rates drop off as time passes and there becomes a point of diminishing return where extending the mash time does not have any real affect on the mash. It also means that if the concentration of a certain enzyme group is very low in malt, for example proteolytic enzymes, there will not be much change in the wort attribute by the enzyme group. In other words, if they ain't at the party, they can't contribute to the fun!

Most all-grain brewers are fluent in the material above and many can recite the various temperatures and en-zymes active over these ranges as easily as their own birthdays. The real question is picking the appropriate tool for a particular brew. This requires defining the finished brew and choosing a strategy to get there.

At the most recent Craft Brewers Convention in San Diego, Dr. Michael Lewis and Dr. Charlie Bamforth (past and present brewing science gurus at U.C. Davis) gave a wonderful presentation where they challenged brewing practice and demanded us as brewers to defend why we do what we do.

To rephrase the thought, they challenged the audience to think about the brewer's goal and to critically evaluate their methods selected to strive towards this goal.

One of the many topics covered was mashing time and temperature. Many big brewers have gotten side tracked in the last year with their

inexplicable pursuit of low-carb beers. Anheuser-Busch, the company many believe to have accidentally created this monster, has recently gone after the South Beach Diet because this diet has incorrectly labeled beer as high in carbohydrates, specifically the disaccharide maltose. It seems that the author of this diet never studied microbiology and fails to recognize the fact that yeast consume maltose to transform wort to beer.

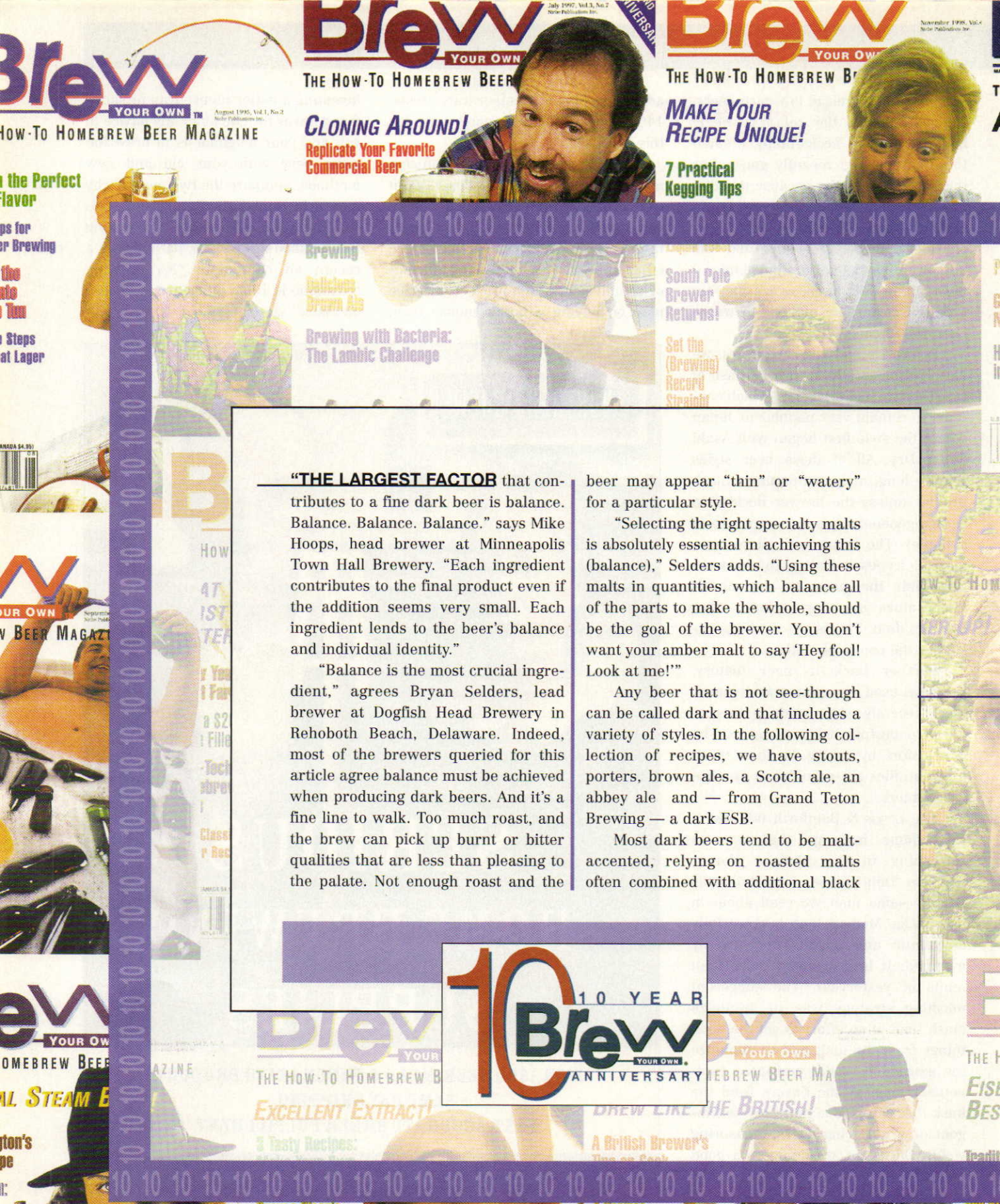
Before we had low-carb beers, we had light beers and for a brief flash of U.S. beer we had dry beers, which continue to remain very popular in Japan where the style first began with Asahi Super Dry. All of these beer styles require long, multi-temperature mash profiles unless the brewer decides to use exogenous enzymes (enzymes from a bottle). The result with these commercial trends is that many brewers have felt the need to use multi-temperature mashing because other brewers do it. This is not the best reason for the choice of method.

Further back in beer history, Germans used decoction mashing and, more recently, step mashing to produce wonderfully delicious lagers. The conclusion by many is that these mash profiles are required to produce great lagers.

The Lewis & Bamforth talk had a take home message that was so refreshing in the obvious Homer Simpson "Doh!" sense . . . malt today is not the same malt we read about in text books. Modern malt is powerfully enzymatic and usually very evenly modified. It is also much paler than malts of yesteryear. The suggested mashing strategy was to minimize mash time in an effort to get the good things from the malt and to minimize the extraction of the unwanted compounds, such as the flavors from the husk that can give a gold brew astringent or grainy characters. Measuring yield, which you are doing, is a good measure of success when it comes to mashing.

Another key variable to consider is fermentability. If your goal is a dry beer and you are not going as low as you like, you may need to add some lower temperature rests; 140 °F (60 °C) is a good rest for this purpose.

In your case, if a simple infusion mash is not providing the flexibility in wort profile required to brew the beers you desire, change it. If your beers taste great and your goal is to be more efficient be careful. Increasing efficiency usually comes at a price. That price may be buying a better mouse trap, inventing a better mouse trap or sacrificing flavor for efficiency. My advice to you and your neighbor is to brew the same beer with your old and new methods. Compare the two methods by measuring initial and final gravity, calculating your efficiencies and tasting the finished brews. To paraphrase a recent ad campaign, "No brewing technique is 100% efficient . . . choose on taste!"



"THE LARGEST FACTOR that contributes to a fine dark beer is balance. Balance. Balance. Balance." says Mike Hoops, head brewer at Minneapolis Town Hall Brewery. "Each ingredient contributes to the final product even if the addition seems very small. Each ingredient lends to the beer's balance and individual identity."

"Balance is the most crucial ingredient," agrees Bryan Selders, lead brewer at Dogfish Head Brewery in Rehoboth Beach, Delaware. Indeed, most of the brewers queried for this article agree balance must be achieved when producing dark beers. And it's a fine line to walk. Too much roast, and the brew can pick up burnt or bitter qualities that are less than pleasing to the palate. Not enough roast and the beer may appear "thin" or "watery" for a particular style.

"Selecting the right specialty malts is absolutely essential in achieving this (balance)," Selders adds. "Using these malts in quantities, which balance all of the parts to make the whole, should be the goal of the brewer. You don't want your amber malt to say 'Hey fool! Look at me!'"

Any beer that is not see-through can be called dark and that includes a variety of styles. In the following collection of recipes, we have stouts, porters, brown ales, a Scotch ale, an abbey ale and — from Grand Teton Brewing — a dark ESB.

Most dark beers tend to be malt-accented, relying on roasted malts often combined with additional black

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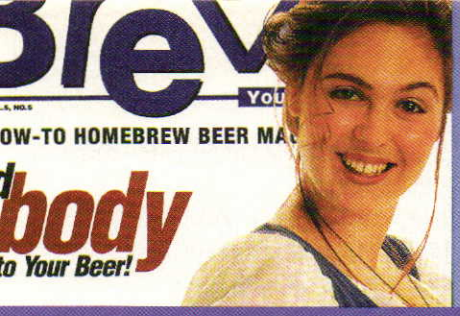
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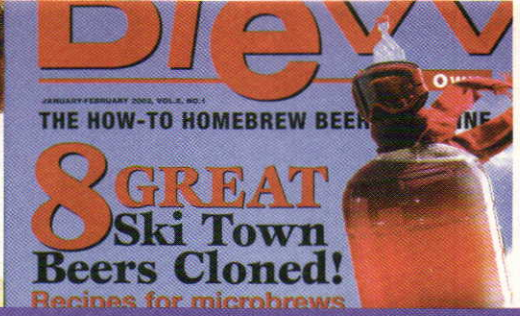
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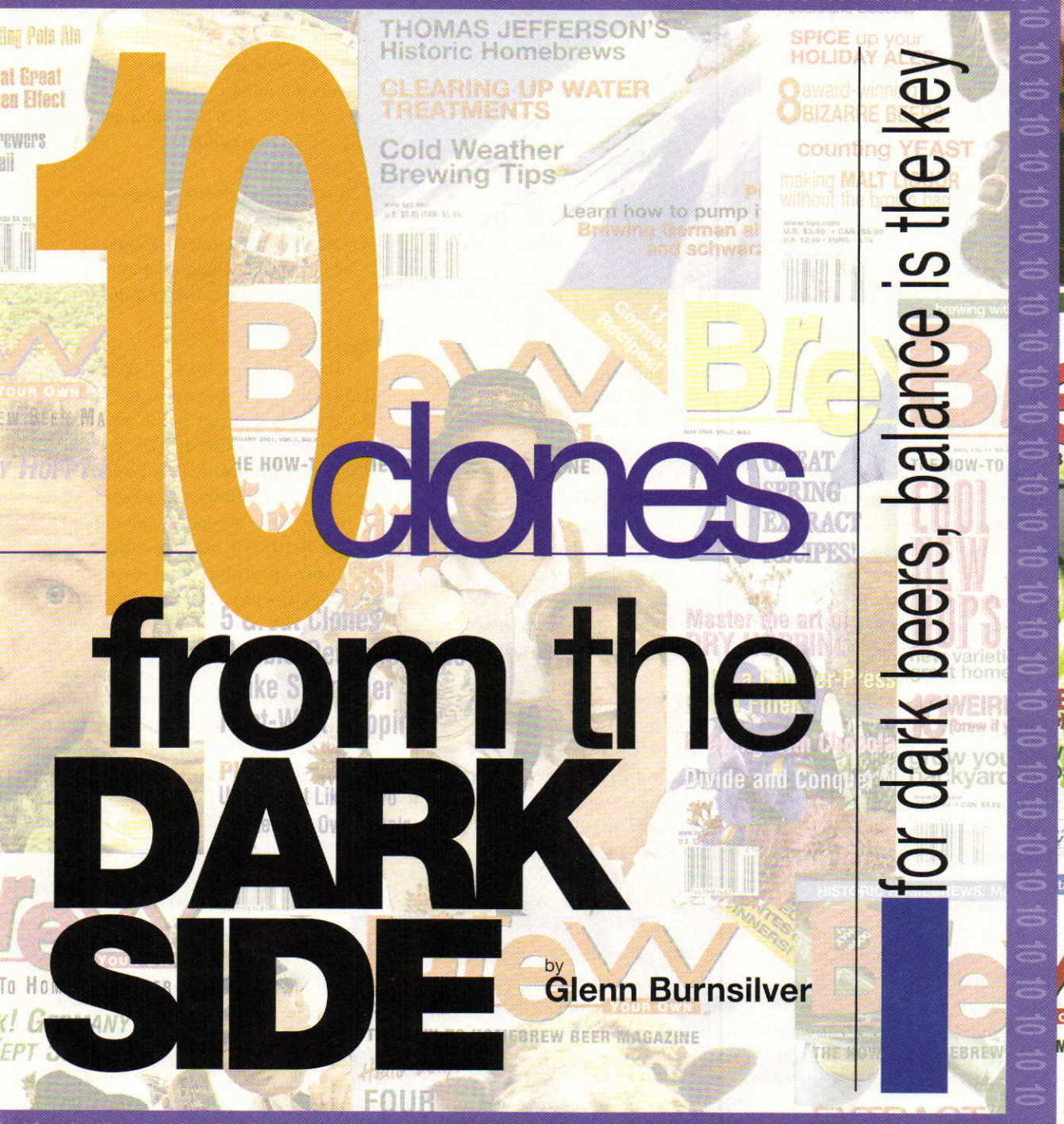
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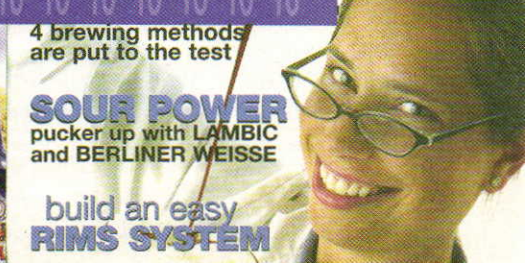
TREATMENTS
Cold Weather
Brewing Tips
SPICE up your
HOLIDAY
counting YEAST
10 clones
from the
DARK
SIDE
by
Glenn Burnsilver
for dark beers, balance is the key


tips, technique
YOUR OWN
MAGAZINE


CLONES
(minus the wool)
Put A Spigot In
Your Brew Kettle
Fix A Bad Batch
With Your Nose


4 brewing methods
are put to the test
SOUR POWER
pucker up with LAMBIC
and BERLINER WEISSE
build an easy
RIMS SYSTEM

patent malts or chocolate malts. Secondary flavors, such as coffee (in the case of Lagunitas Cappuccino Stout), oak chips and vanilla (in the case of Dominion Oak Barrel Stout), licorice and orange peel (in the case of Ommegang Abbey Ale) and smoke (in the case of Alaskan Smoked Porter) further add additional complexity to the already rich flavor profiles typical of dark brews.

One characteristic all dark beers share is the robust goodness of roasted grains that yield a hearty, warming and satisfying feel full of "massive flavors," as Boulder's Avery Brewing head brewer Adam Avery is fond of saying. There is added depth and character to dark beers that only roasted malts can provide.

"I think the accentuated bready, roasty and caramelized aromas have a universal appeal in all aspects of gastronomy and culinary arts. Nothing grabs attention like fresh baked bread, meat roasts, or homemade caramels," says Randy Thiel, brewmaster at Brewery Ommegang in Cooperstown, New York. "These flavors and aromas have a natural segue into beers."

The recipes are presented here in both all-grain and extract versions. All-grain brewers can follow their normal procedures, with the option of stirring the dark grains into the top layer of the mash to aid in lautering.

Extract brewers should follow the procedures as closely as possible to get the most from the recipes. Many of the extract recipes include base grains among the grains to be steeped, making the steep a partial mash. So, follow the recommendations for temperature and amount of water to prevent starch haze in your beer. (You might not be able to see it in a dark beer, but it renders your brew more susceptible to contamination.) Likewise, the amount of rinse water specified will get enough color in your wort without extracting astringent tannins from the grains.

Both all-grain and extract brewers are advised to make a 2–3 quart (~2–3 L) yeast starter. To do this, boil 6–9 oz. (170–260 g) of dried malt extract in the volumes above to produce a starter around SG 1.035.

Ommegang Abbey Ale clone

(5 gallons/19 L, all-grain)

OG = 1.074 FG = 1.013
IBU = 22 SRM = 27 ABV = 7.8%

"The crystal and special roasted malts merge well together to yield soft caramel and raisin notes. These flavors will evolve gracefully as the beer ages." — Randy Thiel

Ingredients

5 lbs. 9.6 oz. (2.54 kg) Pilsner malt
2.25 lbs. (1.02 kg) aromatic malt
1 lb. 6.4 oz. (0.64 kg) crystal malt (20 °L)
2.25 lbs. (1.02 kg) Briess Special Roast malt (50 °L)
2.66 lbs (1.21 kg) corn sugar
6.25 AAU Styrian Goldings hops (60 mins) (1.25 oz./35 g of 5% alpha acids)
0.33 oz. Styrian Goldings hops (0 mins)
0.25 oz. (7 g) Curacao orange peel
0.5 oz. (14 g) licorice root
Wyeast 1214 (Belgian Ale) yeast or cultured Ommegang yeast
1.2 cups corn sugar (for priming)

Step by Step

Step mash with a 10-min. rest at 113 °F (45 °C), a 10-min. rest at 144 °F (62 °C), a 15-min. rest at 154 °F (68 °C), a 15-min. rest at 162 °F (72 °C) and a 5-min. rest at 169 °F (76 °C). Boil for 90 minutes, adding corn sugar at the beginning of the boil. Add orange peel and licorice for final 15 minutes of the boil. Ferment 76–84 °F (24–29 °C). (Yes, that hot.) Condition for 2 weeks at 28 °F (-2 °C). Keg and adjust to 3.0 volumes CO_2. Or bottle in heavy bottles with corn sugar with a target of 3.5 volumes of CO_2.

Ommegang Abbey Ale clone

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

OG = 1.074 FG = 1.013
IBU = 22 SRM = 27 ABV = 7.8%

Ingredients

3.33 lbs (1.51 kg) Weyermann Bavarian Pilsner liquid malt extract (late addition)
1 lb. 2 oz. (0.51 kg) Pilsner malt
2.25 lbs. (1.02 kg) aromatic malt
1 lb. 6.4 oz. (0.64 kg) crystal malt (20 °L)
2.25 lbs. (1.02 kg) Briess Special Roast malt (50 °L)
2.66 lbs (1.21 kg) corn sugar
6.25 AAU Styrian Goldings hops (60 mins) (1.25 oz./35 g of 5% alpha acids)
0.33 oz. Styrian Goldings hops (0 mins)
0.25 oz. (7 g) Curacao orange peel
0.5 oz. (14 g) licorice root
Wyeast 1214 (Belgian Ale) yeast or cultured Ommegang yeast
1.2 cups corn sugar (for priming)

Step by Step

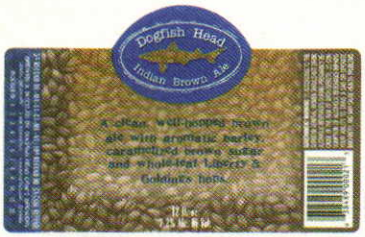
Heat 10.5 qts. (9.9 L) of steeping water in your brewpot to 124 °F (51 °C). In a separate pot, heat 7.9 qts. (7.4 L) of rinse water to 170 °F (77 °C). Place crushed grains in a large steeping bag and submerge bag in your brewpot. Heat steeping water quickly to 144 °F (62 °C), stirring occasionally, then turn down heat and slowly raise temperature to 169 °F (76 °C). It should take about 30 minutes to go from 144 °F (62 °C) to 169 °F (76 °C). Remove the grain bag and place in a colander over your brewpot. Rinse grains slowly and evenly with hot rinse water. Heat this "grain tea" — approximately 17.4 qts. (16.4 L) — to a boil. Boil for 60 minutes, adding corn sugar at beginning of boil and hops at time indicated. Add liquid malt extract, orange peel and licorice with 15 minutes left in the boil. (NOTE: there is no malt extract to add at the beginning of the boil.) Cool wort and transfer to fermenter. Add water to make 5 gallons (19 L), aerate and pitch yeast. See the all-grain recipe for fermentation and other remaining instructions.

Thanks to Randy Thiel, Brewmaster at Ommegang, for his homebrew recipe.

Dogfish Head India Brown Ale clone

(5 gallons/19 L, all-grain)

OG = 1.070 FG = 1.016
IBU = 50 SRM = 32 ABV = 6.9%



Ingredients

10.75 lbs. (4.88 kg) Pilsner malt
15.2 oz. (0.43 kg) flaked maize
10.9 oz. (0.31 kg) amber malt
10.8 oz. (0.31 kg) crystal malt (60 °L)
6.5 oz. (0.18 kg) coffee malt
2.2 oz. (0.06 kg) roasted barley
6 oz. (0.17 kg) brown sugar
11.5 AAU Warrior hops (60 mins)
(0.72 oz./20 g of 16% alpha acids)
6 AAU Golding hops (10 mins)
(1.2 oz./34 g of 5% alpha acids)
6 AAU Liberty hops (0 mins)
(1.33 oz./38 g of 4.5% alpha acids)
8 oz. (453 g) Goldings hops (dry hop)
8 oz. (453 g) Liberty hops (dry hop)
White Labs WLP005 (British Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Caramelize sugar in kettle prior to runoff. Mash at 152 °F (67 °C) in 3.75 gallons (14 L) of water. Boil 90 minutes. Ferment at 70 °F (21 °C).

Dogfish Head India Brown Ale clone

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

OG = 1.070 FG = 1.016
IBU = 50 SRM = 32 ABV = 6.9%

Ingredients

1.25 lbs. (0.57 kg) Muntons Light dried malt extract
5.25 lbs (2.3 kg) Muntons Light liquid malt extract (late addition)
1.0 lb. (0.45 kg) Pilsner malt
15.2 oz. (0.43 kg) brewers corn syrup
10.9 oz. (0.31 kg) amber malt
10.8 oz. (0.31 kg) crystal malt (60 °L)
6.5 oz. (0.18 kg) coffee malt
2.2 oz. (0.06 kg) roasted barley
6 oz. (0.17 kg) brown sugar
11.5 AAU Warrior hops (60 mins)
(0.72 oz./20 g of 16% alpha acids)
6 AAU Golding hops (10 mins)
(1.2 oz./34 g of 5% alpha acids)
6 AAU Liberty hops (0 mins)
(1.33 oz./38 g of 4.5% alpha acids)
8 oz. (453 g) Goldings hops (dry hop)
8 oz. (453 g) Liberty hops (dry hop)
White Labs WLP005 (British Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

In your brewpot, add just enough water to the brown sugar to dissolve it. Heat to a boil and caramelize sugar (without scorching it). Then, add 4.3 qts. (4.1 L) of water to your brewpot and heat to 163 °F (73 °C). Place crushed grains in a steeping bag and steep grains at around 152 °F (67 °C) for 45 minutes. During the steep, heat 3.2 qts. (3.1 L) of rinse water to 170 °F (77 °C) in a separate pot. After steep, rinse grains, add water to make at least 2.5 gallons (9.5 L) of "grain tea" (wort) and bring to a boil. Add dried malt extract and corn syrup and boil for 60 minutes, adding hops at times indicated in recipe. Add liquid malt extract with 15 minutes left in boil. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L) with water and aerate. Pitch yeast and ferment at 70 °F (21 °C).

Thanks to Bryan Selders, Lead Brewer at Dogfish Head, for providing the information used to produce this clone.

Avery New World Porter clone

(5 gallon/19 L, all-grain)

OG = 1.067 FG = 1.017
IBU = 44 SRM = 63 ABV = 6.5%

Ingredients

9 lbs. 7.5 oz. (4.3 kg) 2-row pale malt
2.33 lbs. (1.06 kg) Munich malt (10 °L)
1 lb. 2.66 oz. (0.53 kg) crystal malt (120 °L)
9.33 oz. (0.26 kg) CaraPils malt
9.33 oz. (0.26 kg) chocolate malt
7 oz. (0.20 kg) black patent malt
4.24 AAU Columbus hops (60 mins)
(0.33 oz./9.2 g of 13% alpha acids)
3.24 AAU Columbus hops (30 mins)
(0.25 oz./7.1 g of 13% alpha acids)
12.5 AAU Columbus hops (0 mins)
(0.96 oz./27 g of 13% alpha acids)
8.2 AAU Fuggles hops (0 mins)
(1.64 oz./46 g of 5% alpha acids)
1.2 oz. (34 g) Fuggles hops (dry hop)
Wyeast 1028 (London Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash 156 °F (69 °C). Boil 90 minutes. Whirlpool for 15 minutes before cooling. Ferment at 70 °F (21 °C).

Avery New World Porter clone

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

OG = 1.067 FG = 1.017
IBU = 44 SRM = 63 ABV = 6.5%

Ingredients

2.0 lbs. (0.91 kg) Briess Light dried malt extract
4.88 lbs (2.21 kg) Briess Light liquid malt extract (late addition)
1.33 lbs. (0.60 kg) Munich malt (10 °L)
1 lb. 2.66 oz. (0.53 kg) crystal malt (120 °L)
9.33 oz. (0.26 kg) CaraPils malt
9.33 oz. (0.26 kg) chocolate malt
7.0 oz. (0.20 kg) black patent malt
4.24 AAU Columbus hops (60 mins)
(0.33 oz./9.2 g of 13% alpha acids)
3.24 AAU Columbus hops (30 mins)
(0.25 oz./7.1 g of 13% alpha acids)
12.5 AAU Columbus hops (0 mins)
(0.96 oz./27 g of 13% alpha acids)
8.2 AAU Fuggles hops (0 mins)
(1.64 oz./46 g of 5% alpha acids)
1.2 oz. (34 g) Fuggles hops (dry hop)
Wyeast 1028 (London Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

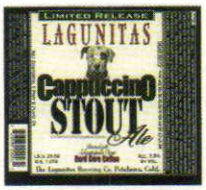
In your brewpot, heat 5.8 qts. (5.5 L) of water to 167 °F (75 °C). Place crushed grains in a large steeping bag and steep at 156 °F (69 °C) for 45 minutes. Check temperature every 10 minutes; if steeping temperature drops below 156 °F (69 °C), heat to 161 °F (72 °C). In a separate pot, heat 4.4 qts. (4.1 L) of rinse water to 170 °F (77 °C). Rinse grains and bring "grain tea" (wort) to a boil. Boil for 60 minutes, adding hops at times indicated. Add liquid malt extract with 15 minutes left in the boil. Cool wort, transfer to fermenter, top up to 5 gallons (19 L) and aerate wort. Pitch yeast from starter and ferment at 70 °F (21 °C).

Thanks to Adam Avery for the information used to formulate this clone.

Lagunitas Cappuccino Stout clone

(5 gallon/19 L, all-grain)

OG = 1.070 FG = 1.014
IBU = 52 SRM = 35 ABV = 7.2%



Ingredients

10 lbs. 1 oz. (4.6 kg) 2-row pale malt
1 lb. 12.5 oz (0.81 kg) wheat malt
1 lb. 4.75 oz. (0.59 kg) crystal malt (60 °L)
9.5 oz. (0.27 kg) chocolate malt
9.5 oz. (0.27 kg) corn sugar
3 oz. (0.09 kg) coffee
7.4 AAU Horizon hops (60 mins) (0.67 oz./19 g of 11% alpha acids)
0.72 AAU Willamette hops (30 mins) (0.14 oz./4.1 g of 5% alpha acids)
2.15 AAU Cascade hops (30 mins) (0.36 oz./10 g of 6% alpha acids)
4.9 AAU Willamette hops (0 mins) (0.98 oz./28 g of 5% alpha acids)
5.9 AAU Cascade hops (0 mins) (0.98 oz./28 g of 6% alpha acids)
0.07 oz.(1.9 g) Willamette hops (dry hop)
0.08 oz.(2.4 g) Cascade hops (dry hop)
Wyeast 1056 (American Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash at 155 °F (68 °C). Boil 60 minutes, adding corn sugar at beginning of boil. Ferment 70 °F (21 °C). Brew coffee and add in secondary.

Lagunitas Cappuccino Stout clone

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

OG = 1.070 FG = 1.014
IBU = 52 SRM = 35 ABV = 7.2%

Ingredients

1.0 lbs. (0.45 kg) Briess Light dried malt extract
5.33 lbs (2.4 kg) Alexanders Pale liquid malt extract (late addition)
1.0 lb. (0.45 kg) 2-row pale malt
1 lb. 12.5 oz (0.81 kg) wheat malt
1 lb. 4.75 oz. (0.59 kg) crystal malt (60 °L)
9.5 oz. (0.27 kg) chocolate malt
9.5 oz. (0.27 kg) corn sugar
3 oz. (0.09 kg) coffee
7.4 AAU Horizon hops (60 mins) (0.67 oz./19 g of 11% alpha acids)
0.72 AAU Willamette hops (30 mins) (0.14 oz./4.1 g of 5% alpha acids)
2.15 AAU Cascade hops (30 mins) (0.36 oz./10 g of 6% alpha acids)
4.9 AAU Willamette hops (0 mins) (0.98 oz./28 g of 5% alpha acids)
5.9 AAU Cascade hops (0 mins) (0.98 oz./28 g of 6% alpha acids)
0.07 oz.(1.9 g) Willamette hops (dry hop)
0.08 oz.(2.4 g) Cascade hops (dry hop)
Wyeast 1056 (American Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Heat 7.0 qts. (6.6 L) of water to 166 °F (74 °C). Place crushed grains in a steeping bag and steep at 155 °F (68 °C) for 45 minutes. (Check temperature every 10 minutes and heat steeping water to 160 °F (71 °C) when it falls below 155 °F (68 °C).) In a separate pot, heat 5.25 qts. (5.0 L) rinse water to 170 °F (77 °C). Rinse grains and bring "grain tea" (wort) — around 11.6 qts. (10.9 L) total — to a boil. Add dried malt extract and corn sugar and boil for 60 minutes, adding hops at times indicated in recipe and add liquid malt extract with 15 minutes left in boil. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L) and aerate. Pitch yeast and ferment 70 °F (21 °C). Brew coffee and add in secondary.

Thanks to Tony Magee from Lagunitas for the recipe for Cappuccino Stout.

Minneapolis Town Hall's Hope and King Scotch Ale clone

(5 gallon/19 L, all-grain)

OG = 1.063 FG = 1.018
IBU = 22 SRM = 32 ABV = 5.8%

Ingredients

11 lbs. 4 oz. (5.10 kg) Simpsons Golden Promise malt
6 oz. (0.17 kg) flaked barley
4 oz. (0.11 kg) Munich malt (10 °L)
10.33 oz. (0.29 kg) crystal malt (60 °L)
4 oz. (0.11 kg) US chocolate malt
2 oz. (0.06 kg) UK roasted barley (500 °L)
5 AAU Centennial hops (90 mins) (0.5 oz./14 g of 10% alpha acids)
0.5 oz. (14 g) Kent Golding hops (0 mins)
White Labs WLP005 (British Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash at 153 °F (67 °C). Boil for 90 minutes. Ferment at 67 °F (19 °C).

Minneapolis Town Hall's Hope and King Scotch Ale clone

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

OG = 1.063 FG = 1.018
IBU = 22 SRM = 32 ABV = 5.8%

Ingredients

0.75 lbs. (0.34 kg) Northwestern Gold dried malt extract
4.88 lbs (2.21 kg) Northwestern Gold liquid malt extract (late addition)
3.5 lbs. (1.6 kg) Simpsons Golden Promise malt
6 oz. (0.17 kg) flaked barley
4 oz. (0.11 kg) Munich malt (10 °L)
10.33 oz. (0.29 kg) crystal malt (60 °L)
4 oz. (0.11 kg) US chocolate malt
2 oz. (0.06 kg) UK roasted barley (500 °L)
5.5 AAU Centennial hops (60 mins) (0.55 oz./16 g of 10% alpha acids)
0.5 oz. (14 g) Kent Golding hops (0 mins)
White Labs WLP005 (British Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

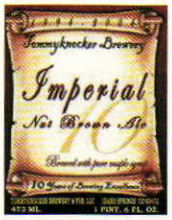
Heat 7.7 qts. (7.7 L) of water to 164 °F (73 °C), place crushed grains in steeping bag and steep for 45 minutes at around 153 °F (67 °C). In a separate pot, heat 5.8 qts. (5.5 L) of rinse water to 170 °F (77 °C). Rinse grains and bring the "grain tea" (wort) to a boil. (You will have about 12.7 qts. (12 L) total.) Add Centennial hops and dried malt extract and boil for 60 minutes. Add liquid malt extract with 15 minutes left and the Goldings hops at the end of the boil. Cool wort, transfer to fermenter and top up with water to 5 gallons (19 L). Aerate wort and pitch yeast. Ferment at 67 °F (19 °C).

Thanks to Minneapolis Town Hall's brewer Mike Hoops for the information used to formulate this clone.

Tommyknocker Imperial Nut Brown clone

(5 gallon/19 L, all-grain)

OG = 1.080 FG = 1.019 IBU = 50
SRM = 32 ABV = 7.9%



Ingredients

12 lbs. 13 oz. (5.81 kg) 2-row pale malt
1 lb. 9.5 oz. (0.72 kg) Munich malt
1 lb. 2 oz. (0.51 kg) crystal malt (40 °L)
7.5 oz. (0.21 kg) chocolate malt
10.5 oz. (0.30 kg) maple syrup
15 AAU Willamette hops (60 mins) (3 oz./85 g of 5% alpha acids)
Wyeast 1056 (American Ale) yeast or White Labs WLP001 (California Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash at 154 °F (68 °C). Boil for 2 hours, adding maple syrup at knock-out. Ferment at 72 °F (22 °F).

Tommyknocker Imperial Nut Brown clone

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

OG = 1.080 FG = 1.019
IBU = 50 SRM = 32 ABV = 7.9%

Ingredients

2.4 lbs. (1.1 kg) Muntons Light dried malt extract
6.0 lbs (2.7 kg) Coopers Light liquid malt extract (late addition)
1 lb. 9.5 oz. (0.72 kg) Munich malt
1 lb. 2 oz. (0.51 kg) crystal malt (40 °L)
7.5 oz. (0.21 kg) chocolate malt
10.5 oz. (0.30 kg) maple syrup
15 AAU Willamette hops (60 mins) (3 oz./85 g of 5% alpha acids)
Wyeast 1056 (American Ale) yeast or White Labs WLP001 (California Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

In your brewpot, heat 4.8 qts. (4.5 L) of water to 165 °F (74 °C). Place crushed grain in a steeping bag and steep at 154 °F (68 °C) for 45 minutes. In a separate pot, heat 3.6 qts. (3.4 L) of rinse water to 170 °F (77 °C). Rinse grains and add water to "grain tea" (wort) make at least 2.5 gallons (9.5 L). Boil for 60 minutes, adding hops and dried malt extract at beginning of the boil. Add liquid malt extract with 15 minutes left and maple syrup at the end of the boil. Cool wort, transfer to fermenter and add water to make 5 gallons (19 L). Aerate wort and pitch yeast. Ferment at 72 °F (22 °F).

Thanks to Eric Rode, Lead Brewer at Tommyknocker for the information used to formulate this clone.

Grand Teton Brewing's Bitch Creek ESB clone

(5 gallon/19 L, all-grain)

OG = 1.061 FG = 1.014
IBU = 54 SRM = 23 ABV = 6.1%

Ingredients

8 lbs. 5 oz. (3.77 kg) 2-row pale malt
14.5 oz. (0.41 kg) CaraAroma® malt
1 lb. 5 oz. (0.60 kg) crystal malt (60 °L)
2 lbs. 1.25 oz. (0.94 kg) Weyermann melanoidin malt
6.25 oz. (0.18 kg) CaraAmber® malt
1.47 AAU Galena hops (45 mins) (0.12 oz./3.5 g of 12% alpha acids)
1.47 AAU Chinook hops (45 mins) (0.12 oz./3.5 g of 12% alpha acids)
1.47 AAU Centennial hops (45 mins) (1.5 oz./4.2 g of 10% alpha acids)
1.76 AAU Galena hops (30 mins) (0.15 oz./4.2 g of 12% alpha acids)
1.76 AAU Chinook hops (30 mins) (0.15 oz./4.2 g of 12% alpha acids)
2.47 AAU Centennial hops (30 mins) (0.25 oz./7.0 g of 10% alpha acids)
2.67 AAU Galena hops (15 mins) (0.22 oz./6.3 g of 12% alpha acids)
2.67 AAU Chinook hops (15 mins) (0.22 oz./6.3 g of 12% alpha acids)
3.21 AAU Centennial hops (15 mins) (0.32 oz./9.1 g of 10% alpha acids)
10.75 AAU Centennial (5 mins) (1.1 oz./30 g of 10% alpha acids)
0.53 oz. (15 g) Centennial (0 mins)
0.58 oz. (16 g) Centennial dry hops
Wyeast 1056 (American Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash at 156 °F (69 °C). Boil 90 minutes. Ferment at 60 °F (16 °C).

Grand Teton Brewing's Bitch Creek ESB clone

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

OG = 1.061 FG = 1.014
IBU = 54 SRM = 23 ABV = 6.1%

Ingredients

0.75 lbs. (0.34 kg) Muntons Light dried malt extract
4.5 lbs (2.0 kg) John Bull Light liquid malt extract (late addition)
8 oz. (0.23 kg) 2-row pale malt
14.5 oz. (0.41 kg) CaraAroma® malt
1 lb. 5 oz. (0.60 kg) crystal malt (60 °L)
2 lbs. 1.25 oz. (0.94 kg) Weyermann melanoidin malt
6.25 oz. (0.18 kg) CaraAmber® malt
1.47 AAU Galena hops (45 mins) (0.12 oz./3.5 g of 12% alpha acids)
1.47 AAU Chinook hops (45 mins) (0.12 oz./3.5 g of 12% alpha acids)
1.47 AAU Centennial hops (45 mins) (1.5 oz./4.2 g of 10% alpha acids)
1.76 AAU Galena hops (30 mins) (0.15 oz./4.2 g of 12% alpha acids)
1.76 AAU Chinook hops (30 mins) (0.15 oz./4.2 g of 12% alpha acids)
2.47 AAU Centennial hops (30 mins) (0.25 oz./7.0 g of 10% alpha acids)
2.67 AAU Galena hops (15 mins) (0.22 oz./6.3 g of 12% alpha acids)
2.67 AAU Chinook hops (15 mins) (0.22 oz./6.3 g of 12% alpha acids)
3.21 AAU Centennial hops (15 mins) (0.32 oz./9.1 g of 10% alpha acids)
10.75 AAU Centennial (5 mins) (1.1 oz./30 g of 10% alpha acids)
0.53 oz. (15 g) Centennial (0 mins)
0.58 oz. (16 g) Centennial dry hops
Wyeast 1056 (American Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

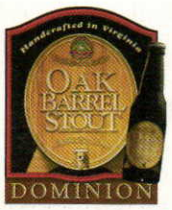
Heat 7.7 qts. (7.4 L) of water to 167 °F (75 °C) and steep grains at 156 °F (69 °C) for 45 minutes. Check temp every 10 minutes; if below 156 °F (69 °C), heat to 161 °F (72 °C). In a separate pot, heat 5.8 qts. (5.5 L) of water to 170 °F (77 °C) to rinse the grains. After grains are rinsed, bring the "grain tea" (wort) to boil. Add dried malt extract and boil for 60 minutes, adding hops as indicated. Add liquid malt extract with 15 minutes left in boil. Cool wort and transfer to fermenter. Add water to make 5 gallons (19 L) of wort. Aerate and pitch yeast. Ferment at 60 °F (16 °C).

Thanks to Brewer Rob Mullin from Grand Teton Brewing for the information used to formulate this clone.

Dominion Oak Barrel Stout clone

(5 gallon/19 L, all-grain)

OG = 1.056 FG = 1.017
IBU = 52 SRM = 61 ABV = 5.1%



Ingredients

8 lbs. 1 oz. (3.66 kg) 2-row pale malt
6.5 oz. (0.19 kg) CaraPils malt
15 oz. (0.43 kg) Munich malt
10 oz. (0.28 kg) crystal malt (40 °L)

6 oz. (0.17 kg) rauchmalz
6.5 oz. (0.19 kg) wheat malt
10 oz. (0.28 kg) chocolate malt
12 oz. (0.34 kg) roasted barley (500 °L)
13 AAU Perle hops (60 mins) (1.9 oz./53 g of 7% alpha acids)
8 AAU Willamette hops (5 mins) (1.6 oz./45 g of 5% alpha acids)
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) yeast
1 1/2 vanilla beans
2.5 oz. (71 g) oak cubes
0.75 cups corn sugar (for priming)

Step by Step

Mash at 154 °F (68 °C). Boil for 90 minutes. Ferment at 66 °F (19 °C). Add vanilla beans (sliced down center) and oak cubes in secondary.

Dominion Oak Barrel Stout clone

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

OG = 1.056 FG = 1.017
IBU = 52 SRM = 61 ABV = 5.1%

Ingredients

0.66 lbs. (0.30 kg) Briess Light dried malt extract
4.13 lbs (1.87 kg) Alexanders Pale liquid malt extract (late addition)
1.0 lb. (0.45 kg) 2-row pale malt
6.5 oz. (0.19 kg) CaraPils malt
15 oz. (0.43 kg) Munich malt
10 oz. (0.28 kg) crystal malt (40 °L)
6 oz. (0.17 kg) rauchmalz
6.5 oz. (0.19 kg) wheat malt
10 oz. (0.28 kg) chocolate malt
12 oz. (0.34 kg) roasted barley (500 °L)
13 AAU Perle hops (60 mins) (1.9 oz./53 g of 7% alpha acids)
8 AAU Willamette hops (5 mins) (1.6 oz./45 g of 5% alpha acids)
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) yeast
1 1/2 vanilla beans
2.5 oz. (71 g) oak cubes
0.75 cups corn sugar (for priming)

Step by Step

In your brewpot, heat 7.66 qts. (7.2 L) of water to 165 °F (74 °C). Place crushed grains in a steeping bag and steep 154 °F (68 °C) for 45 minutes. Check temperature every 10 minutes and heat steeping water to 159 °F (71 °C) if it falls below 154 °F (68 °C). Heat 5.75 qts. (5.4 L) of rinse water to 170 °Ï (77 °C) in a separate pot. Rinse grains and heat "grain tea" (wort) — of which you'll have about 12.6 qts. (12.0 L) — to a boil. Add dried malt extract and hops and boil for 60 minutes. Add liquid malt extract with 15 minutes remaining. Cool wort, transfer to fermenter and top up to 5 gallons (19 L). Aerate wort and pitch yeast. Ferment at 66 °F (19 °C). Add vanilla beans (sliced down center) and oak cubes in secondary.

(Most winemaking shops sell oak cubes; a medium toasted French oak would work well.)

Thanks to Old Dominion for the information used to formulate this clone.

Capital Brown Ale clone

(5 gallon/19 L, all-grain)

OG = 1.048 FG = 1.012
IBU = 20 SRM = 17 ABV = 5.8%

Ingredients

8.65 lbs. (3.92 kg) Maris Otter pale ale malt
1.0 lb. (0.45 kg) Simpsons Cara malt
4.5 oz. (0.13 kg) crystal malt (90 °L)
1.5 oz. (43 g) black patent malt
5.4 AAU Fuggless hops (60 mins) (1.1 oz./31 g of 5% alpha acids)
Wyeast 1028 (London Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Mash at 154 °F (68 °C). Boil for 90 minutes. Ferment at 70 °F (21 °C).

Capital Brown Ale clone

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

OG = 1.048 FG = 1.012
IBU = 20 SRM = 17 ABV = 5.8%

Ingredients

1.0 lbs. (0.45 kg) Muntons Light dried malt extract
3.66 lbs. (1.66 kg) Muntons Light liquid malt extract (late addition)
2.0 lbs. (0.91 kg) Maris Otter pale ale malt
1.0 lb. (0.45 kg) Simpsons Cara malt
4.5 oz. (0.13 kg) crystal malt (90 °L)
1.5 oz. (43 g) black patent malt
5.4 AAU Fuggles hops (60 mins) (1.1 oz./31 g of 5% alpha acids)
Wyeast 1028 (London Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Heat 5.0 qts. (4.8 L) of water to 165 °F (74 °C). Steep crushed grains at 154 °F (68 °C) for 45 minutes. Heat 3.8 qts. (3.6 L) of rinse water to 170 (77 °C). Rinse grains, add dried malt extract and enough water to make at least 2.5 gallons (9.5 L). Boil for 60 minutes, adding hops at the beginning of the boil. Add liquid malt extract with 15 minutes left in boil. Cool wort and transfer to fermenter. Top up to 5 gallons (19 L) and aerate. Pitch yeast and ferment beer at 70 °F (21 °C).

Thanks to Kirby Nelson of Capital Brewing for the information used to formulate this clone.

Alaskan Smoked Porter clone

(5 gallon/19 L, all-grain)

OG = 1.065 FG = 1.015
IBU = 45 SRM = 58 ABV = 6.5%

Ingredients

8.25 lbs. (3.74 kg) 2-row pale malt
4.0 lbs. (1.81 kg) Munich malt
12 oz. (0.34 kg) crystal malt (45 °L)
11 oz. (0.31 kg) chocolate malt
7 oz. (0.20 kg) black patent malt
10.75 AAU Chinook hops (60 mins) (0.90 oz./25 g of 12% alpha acids)
3.75 AAU Willamette hops (15 mins) (0.75 oz./21 g of 5% alpha acids)
Wyeast 1968 (London ESB) or White Labs WLP002 (English Ale) yeast
0.75 cups corn sugar (for priming)

Step by Step

Smoke 1.0 lb. (0.45 kg) of the Munich malt with alder wood. Mash at 154 °F (68 °C). Boil for 90 minutes. Ferment at 68 °F (20 °C).

Extract with grains option:

Replace pale and Munich malt with 2.25 lbs. (1.0 kg) dried malt extract, 4.75 lbs. (1.25 kg) liquid malt extract and 1.25 lbs. (0.56 kg) Munich malt. Smoke 1 lb. (0.45 kg) of the Munich malt. Heat 4.7 qts. (4.4 L) of water to 165 °F (74 °C). Steep crushed grains at 154 °F (68 °C) for 45 minutes. Rinse with 3.5 qts. (3.3 L) of water at 170 °F (77 °C). Add dried malt extract and water to make 2.5 gallons (9.5 L) of wort. Boil for 60 minutes, adding hops at times indicated and liquid malt extract with 15 minutes remaining. Cool wort, transfer to fermenter and add water to make 5 gallons (19 L). Aerate wort, pitch yeast and ferment at 68 °F (20 °C).

Thanks to Kristi Monroe and Curtis Holmes from Alaskan Brewing for their assistance in making this clone.

Grab It

Culturing yeast from bottle-conditioned beer

by Chris Colby

A wide variety of brewers yeasts are available to homebrewers these days. But sometimes the particular strain you want isn't commercially available. However, it might be possible to culture it from a bottle-conditioned beer.

Most commercial beers are filtered, and some are flash pasteurized, before bottling and do not contain yeast. However, some brewers bottle-condition some of their beers. Often, the brewer will advertise this fact on the label of those products. If not, the tell-tale layer of sediment on the bottom of the bottle indicates a bottle conditioned beer.

Keep in mind, however, that some brewers use a different strain of yeast for bottle conditioning than they do for primary fermentation. The yeast on the bottom of most Bavarian hefeweizens, for example, is a standard lager strain. Franziskaner, for example, is bottled with a bottling strain, not a hefeweizen strain. One exception to this rule is Schneider Weisse, which evidence suggests is bottled with its fermentation strain. British bottle-conditioned beers, more often than not, are conditioned with their fermentation strain. To give one example, Fuller's 1845 reputedly is conditioned with its fermentation strain.

Also, you should know that some brewers use more than one strain of yeast during fermentation. If you culture yeast from a bottle, there is no guarantee that you will raise all the relevant strains. And if you do, they will most likely not be in the proportions the brewer uses. Some sources claim Saison Dupont is fermented with three strains, but — with some work — all three can be cultured from a bottle of the beer.

Other beers that are well-known to have yeast that can be cultured and brewed with are Sierra Nevada Pale Ale, Chimay, some Rogue beers and some of the beers from Kalamazoo Brewing (Bell's). Also, see the recipe on page 50 for Ommegang Abbey Ale, which can be brewed with yeast cultured from a bottle.

The success or failure of your attempt will mostly depend on the condition of the yeast you try to culture. If you get fresh beer that has been stored cold and is not extremely alcoholic, you have a good shot at recovering some yeast from the bottle. Yeast that have been stressed — from heat, age or high alcohol levels — are much harder to culture.

The concentration of these elements should be low enough not to put any stress on the yeast.

The yeasts most homebrewers want to culture come from British, German or Belgian beers. Unfortunately, the boat trip these beers endure — and the high alcohol content some of them exhibit — make culturing yeast from them difficult. You're better off trying to culture yeast from your local or regional micro. (Of course, if you visit Europe and can get some fresh bottle-conditioned beers, load up that suitcase for the flight home!)

If you find a bottle-conditioned beer that you think is a good candidate and you wish to culture yeast from it, here's how to do it.

Sanitation

Keeping all the equipment you use clean and sanitized (or preferably sterile) is the most important key to culturing bottled yeast. The number of viable yeast cells in a bottle may be very low and any contaminating microorganism that lands in your culture may grow faster than your yeast and render your culture useless. Take your cleaning and sanitation more seriously than you would for a regular batch of beer.

When culturing yeast from a bottle, the main idea is to get the yeast — which may initially be in poor health — viable and then grow it up to usable numbers.

The first step is to feed the yeast some wort to "wake it up." The easiest way to do this is to add a small amount of wort to the bottle.

Preparing the wort

The wort you add should provide carbohydrates, oxygen and other nutrients to the possibly fragile yeast cells. The concentration of these elements should be low enough not to put any stress on the yeast. Therefore, make your initial wort at a specific gravity of 1.015–1.020. Aerate or oxygenate it well and add a pinch of yeast nutrients. Use "complete" yeast nutrients, not DAP (diammonium phosphate), which is sold at many wine-making shops as yeast nutrient.

You will only need a small volume (usually 2–3 mL) of this wort — just enough to barely cover the bottom of the bottle. If you are culturing yeast from a 750 mL bottle, as many Belgian beers are packaged in, the amount of wort you use should be proportionally larger, around 6 mL.

At each step along the way, you want to feed the yeast a manageable amount of wort. When stepping up

healthy yeast cultures, the usual rule is to pitch the yeast culture to a wort 5–10 times the volume of the culture. In the early stages of culturing yeast from a bottle, sticking to 5X step-ups is a good idea. This both gives the yeast a manageable amount of wort to consume and limits the amount a stray contaminant can grow. In the bottle, aim to add roughly the same volume of wort as the sediment occupies.

Wort Meets Yeast

Before opening the bottle, wipe the neck and cap off, preferably with a 70% ethanol solution or drug store isopropanol. Pour off the beer, leaving the yeast sediment undisturbed. Use a butane lighter to flame the top of the bottle. You can also use a gas kitchen stove as a flame source. Let the alcohol evaporate before flaming the bottle and keep the alcohol capped while flame is present. Wave the bottle through the flame slowly a couple times; you don't need to torch the glass until it's hot. This should kill any microorganisms that were hiding up under the lip of the cap.

Set the bottle down and let it warm to room temperature, with the top covered with sanitized aluminum foil to prevent contamination.

Pour the feeder wort down the side of the bottle onto the yeast. If the bottle has a punt or other indentation, swirl the wort gently to rinse any yeast from the "island" into the "moat" of wort around it. Do not add enough wort to cover the "island." Flame the top of the bottle and either affix a (sanitized) fermentation lock or cover it with sanitized aluminum foil.

Depending on how much yeast is viable, the amount of time it takes to "wake them up" varies. Likewise, you may not always see visible signs of fermentation at the first stages of yeast culturing. The best thing to do is let the bottle incubate at relatively warm temperatures — 70–90 °F (21–32 °C) — for 1–3 days, looking for foaming or a slight clouding of the wort. (Many times the top of a refrigerator will be warmer than room temperature and is a good spot for incubating cultures.)

Incidentally, don't expose the yeast culture to strong light sources either to keep it warm or to look for signs of fermentation. You don't need to keep your culture in absolute darkness, but keep it out of sunlight or other bright light.

The First Step Up

Once you see signs of fermentation, or three days have passed, transfer the fermenting wort to a small culture of fresh wort, around 15 mL. A great container for this is a 15 mL sterile culture tube, available at scientific supply shops. These come individually packed and sterilized and have a cap that can be placed loosely on the tube, allowing gas to escape during fermentation.

You can take a small cardboard box and cut a round hole in it to serve as a tube holder. This is especially handy if you are handling many tubes.

For your 15 mL culture, you may want to add a tiny pinch of lysozyme — just one or two crystals — to your wort. Lysozyme is an enzyme that kills lactic acid bacteria and is available at most home winemaking shops. Although it only kills certain strains of bacteria, this affords a bit of extra protection against contaminants that may have been present in the bottle.

To transfer the wort to your 15 mL (about half a fluid ounce) culture, remove the fermentation lock or foil from the bottle, flame the tip, let the glass cool for a second and pour the yeast sample from the bottle to the 15 mL culture tube. Cap immediately and again incubate the 15 mL tube at 70–90 °F (21–32 °C).

In 1–3 days, you should see some sign of fermentation. This may be foam on the top of the wort, cloudiness in the wort or just a layer of yeast at the bottom of the tube. If you see this, you are basically home free. You have cultured yeast from your bottle. (As we'll see later on in the article, this may or may not mean that it makes good beer. But, you're on your way.)

If your 15 mL (0.5 fl. oz.) culture ferments, the yeast should be healthy enough be able to withstand a 10X step-up. To get to pitching quantities for a 5-gallon (19 L) batch, you will need two more step-ups — one to around 150 mL (5 fl. oz.) and a second to around 1,500 mL (51 fl. oz.)

The Second Step Up

For your 150 mL (5 fl. oz.) culture, you can use wort with a specific gravity of 1.030–1.035. Aerate well, and maybe add a tiny pinch of yeast nutrients, but don't bother with the lysozyme at subsequent stages unless the culture smells sour.

Incubate the culture at 70–80 °F (21–27 °C) for 2–5 days, or until fermentation is complete. (The decrease in the upper temperature limit is simply because I like to raise my yeast in the final step-ups at conditions somewhat closer to my actual fermentation conditions.)

Assessing the Yeast

This is a great stage to decide whether the yeast culture you've raised will be suitable for making beer. Pitched with a 15 mL (0.5 fl. oz.) culture, a 150 mL (5 fl. oz.) culture should ferment like a little batch of beer. You should see the kraeusen rise and fall as the yeast works. And, when they're done, the resulting liquid in the culture should taste like beer.

To find out if this is the case, decant a decent amount of the liquid into a sanitized container and refrigerate overnight. A 50 mL culture tube works great for this, but a baby food jar — or any other small, sealable container — will work just fine. Fill the container to the rim, seal and store cold. Refrigeration will settle most of the remaining yeast out of the liquid and allow you to taste the starter beer without a yeast bite interfering with

your sampling. If the starter beer tastes good, then step the beer up to 1,500 mL (51 fl. oz.) and brew with it. If it doesn't, chalk it up to experience and try again.

The Final Step-Up

For the final step-up prior to pitching, I add one small twist on the procedure. I let the 150 mL (5 fl. oz.) culture ferment completely and then I only pitch the yeast sediment. In the previous steps, I pitch the whole culture. The reason for pitching only the sediment is to discard any mutant cells (if present) that are not flocculant.

Once the 1,500 mL (51 fl. oz.) yeast starter shows activity, it is ready to pitch. Alternately, you can let it ferment out, and perform a second taste before using the yeast on a whole batch of precious homebrew.

Other Approaches

Some homebrewers reputedly use a much simpler procedure to raise bottle-conditioned yeast — they just fill an empty bottle-conditioned beer with wort and pitch it to their beer a few days later. If you can get that to work for you, great but I think my approach would have a much better success rate. Admittedly, it's much more work, but you don't overwhelm the small amount of yeast in the bottle with more wort than it can ferment.

Speaking of much more work, another approach some homebrewers have taken is to plate yeast from a bottle out on a petri dish filled with nutrient agar. Then, they will pick individual colonies from the plate and grow up multiple samples of the yeast. Each is evaluated for flavor and performance before using it. If you have the time (and lab skills to do this), this is another option.

What About Lambics?

You can culture bacteria and wild yeast from beers as well as brewers yeast. Lambics are a popular target for homebrewers to grab cultures from. Bottle-conditioned lambics, like those from Cantillon, have a wide variety of microorganisms potentially present. By using the procedures I describe — minus the lysozyme, of course — you will most likely obtain a mixed culture of microbes.

Keep in mind that some of these microbes have growth conditions that are dissimilar from brewers yeast. Growing up *Brettanomyces* (a wild yeast), *Lactobaccilus* or *Pediococcus* takes more time than raising brewers yeast does. As a result, many home lambic brewers simply maintain a standing mixed culture of "bugs" they have harvested from various bottles. I use the Wyeast Lambic Blend (Wyeast 3278) for primary lambic fermentation, then I supplement it with my mixed culture. I think this adds a bit of complexity to my lambics.

Chris Colby lacks culture, but is still the editor of BYO.

Total Sanitizing Station

Our *Projects* columnist upgrades his favorite innovation

Story and photos by **Thom Cannell**

"What's the coolest project you've built in your eight years contributing to *Brew Your Own*?," my editor inquired. The answer was easy — a bottle washer I built in 2003 is my favorite device. Cleaning and sanitizing is the most important process in brewing. As a BJCP-certified judge, it is sad to scribble "beneath the disgusting taste and aroma caused by contamination, there's depth of malt and a nice hop balance. Improve your sanitation." I have no way of knowing if the problem was a single dirty bottle or a whole batch by dirty hoses and lines, or vilely contaminated fermenters. My mission is to show you how to create an all-purpose cleaning and sanitizing station that will simplify this essential process. And may I (or you) never suffer through another bad bottle of homebrew due to contamination!

The original bottle washer was built to wash and sanitize any size bottle. I soon discovered it could be used to clean fermenters, hose lines and keg lines. I use it every brew session and in between. Best of all, if you've already built one, modification is easy and should cost less than $20. While a corny keg is beer-cool, you could use any sturdy cylindrical or square container with 1–4 gallon capacity. In case you don't have the old story, we'll start over.

Step-by-step – Corny version

Begin by marking your keg at the halfway point. This will give you a potential volume of at least 1 gallon (3.8 L) of cleaning solution. Lay the keg on its side and rotate it against a fixed marker. This will be your cutting guide so be sure it is accurate and circles the keg levelly.

Now it's time to cut the keg. I used a small grinder equipped with a cutoff wheel, but a hacksaw or jig saw with a fine (24 tpi) bimetal blade or grit-coated blade would also work. Once the keg is cut, grind and file the edges so that they are level and smooth. This is thin steel, and it retains razor-sharp edges. For safety's sake, do not neglect this step!

Holes — the in and out

There are several ways to make bulkhead fittings for your container, steel or plastic. One involves welding a stainless steel nipple or union into the corny. We chose a universal method of making a bulkhead fitting for both the intake and output.

Two compression fittings with national pipe taper (NPT) are required. One ⅜" x ⅜" (10 mm) MPT (male NPT) and a ⅜" x ⅜" (10 mm) FPT (female NPT) barbed fitting create a bulkhead fitting.

To prevent leakage you'll need "O" rings of proper size. Ordinary garden hose washers work well and last longer than conventional O-rings. Plus you may need a thick washer. This is because NPT fittings are not meant to fit like nuts and bolts, as needed here.

Pipe taper fittings join by interference or wedging and do not fit shoulder-to-shoulder. (Straight fittings exist and will tighten up like a nut and bolt. They're harder to find and more expensive.) The easiest solution is to use one hose washer inside and another outside. Another alternative is to make a washer out of scrap Plexiglas.

Drill ⅜" holes (16 mm) for the inlet and outlet above the chine (i.e. the joint between bottom and cylinder.) I measured 1" (25 mm) above the chine and used a prick punch to mark the location, then drilled a ⅛" (3 mm) pilot hole before drilling the larger hole. Where you put the holes around the cylinder is up to you — I chose 90°.

Drill ½" holes and enlarge with files or a rotary grinder (or a step drill if you have it).

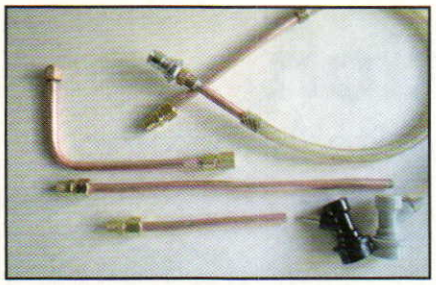
Intake and output construction

Liquid is stored in the bottom of the container and then pumped into a spray wand. Both the intake and spray wand were bent out of scrap ⅜" (10 mm) tubing using a tubing bender. You might like to use the stainless steel keg spear; I chose copper, it is easier to bend.

Two brass fittings (one compression and one female barbed) comprise each bulkhead fitting. Bend a right angle that is about 1 ½" (40 mm) by 3" (75 mm). Later we will trim this pickup tube to size.

Although this "Bottle Washer Deluxe" made for our September 2003 issue was admirable, we've decided to make it even more useful.

Then bend a right angle with one leg equal to your container's radius and the other about 12" (300 mm) long for the spray wand. The pickup tube should extend from the side of the container downward to within ½" (13 mm) of the bottom. The spray wand should be centered. This means you will have to cut the smaller leg of the spray wand a bit long, assemble the fitting, and measure for a final cut(s).



These are all the components you'll need to prepare for our new cleaning system: tapers, compression fittings and tubing.

Pump hookup

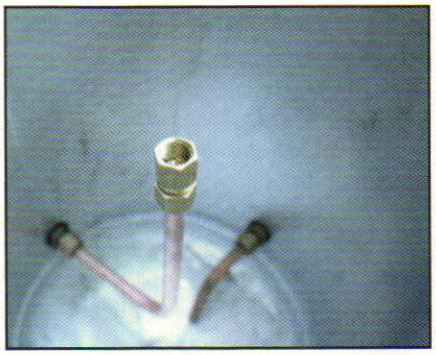
The first step to making the pump hookup, is to join the barbed fittings that are exiting the keg to the correct inlet, or output of your pump. My choice was clear vinyl tubing as it was sturdy enough and easy to clean and sanitize. The connection to the pump will depend on the pump itself. Drill powered pumps cost less than $10 (U.S.), use garden hose fittings and do not require an on/off valve.

Making the difference — old to new

Once the basics are complete, or you're ready to modify an existing spray cleaner, you'll need the following:

- ⅜" x ⅜" Female Pipe Taper thread (FPT) compression fitting
- multiple ⅜" x ⅜" MPT compression fittings

After removing the original spray tube from the keg, attach a ⅜" FPT compression fitting to the inside of your keg.



- several feet of ⅜" copper tube and some ⅜" internal diameter (i.d.) vinyl beer tube.
- You may also need some gas-in and beer-out keg body connectors if you're adapting to clean kegs and cobra taps.

The thought is this: connect height-appropriate sprayers for bottles, small and large fermenters, and connectors for hose cleaning, tap cleaning and any other use you can imagine.

Step one: Remove the original spray tube from the keg. Attach a ⅜" FPT compression fitting. You may have to reduce the height of the spray tube.

Step Two: Make a bottle holder. Cut ½" plywood to 5" x 13", find the center and cut a hole 2" (50 mm) in diameter. If you have a router, round the edges and the channels on the bottom (to keep this plank centered). If you have no router, file the edges and use pins or wooden blocks to prevent the plank from shifting.

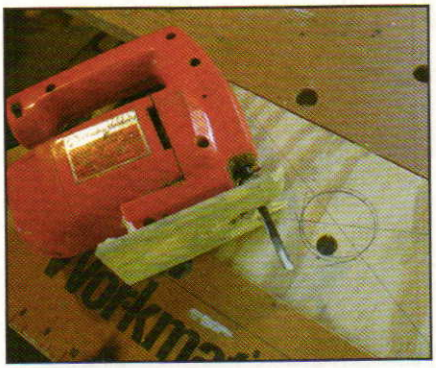
Step Three: Make the bottle sprayer. Attach a ⅜" MPT compression fitting to one end of an approximately 4" (100 mm) length of copper tube. This will be your bottle washer spray tube. Depending on pump pressure you may need to form a spray tip, or you may adapt a commercial spray tip from a home store.

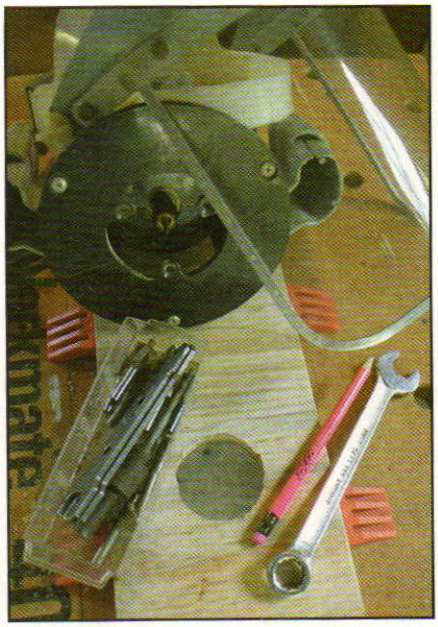
Step Four: Make a fermenter washer. Follow steps two and three, except make the center hole approximately 4–6" in diameter (depending on fermenter design) and increase the length of the spray wand to within 4" (200 mm) of the "top" of the upside down fermenter. Be creative when making spray tubes, you want the top surface to be totally covered and a uniform sheet of cleaner to cascade down the sides of whatever container you are cleaning — bottle or fermenter.

Step Five: Make some "other" gadgets. One gadget you can make fairly simply is a hose cleaner. This is simply a length of pipe attached to the spray head or a ⅜" barbed fitting that can be screwed in depending on the i.d. of the hoses you use.

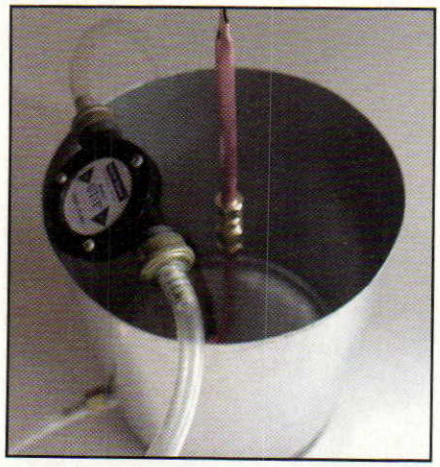
I like to clean my tap lines frequently. A dose of cleaner followed by sanitizer helps prevent backwards contamination in my kegs. Attaching a bent pipe to a hose that is connected to a beer-out keg body connector requires another bit of copper tube and an MPT compression fitting (see "Hose Cleaner" in March–April 2003's issue

When making your bottle holder, cut a piece of plywood 5" x 13" and cut or drill a hole 2" in diameter in the center.





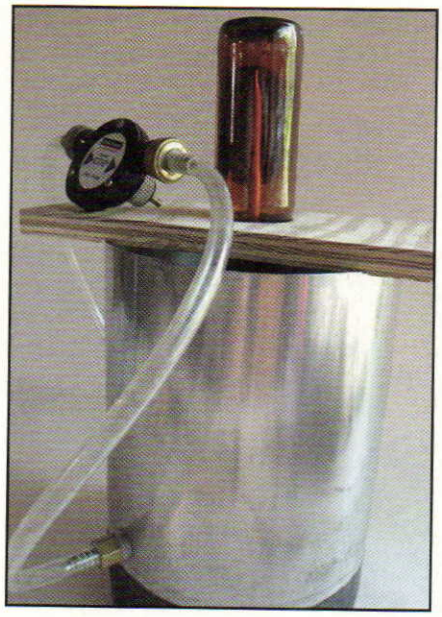
Once you have cut the 2" hole into the center of your bottle holder, use a router or file to round the edges.



Utilize a drill-powered pump in order to power your bottle sprayer and your fermenter cleaner.

of BYO). After you have these things, drill out the body connector to accommodate the ⅜" pipe and silver solder the body connector and tube together. Each additional device costs approximately $2.50, the price of an MPT compression fitting, tube, hose plus whatever thingamabob you hook to the other end. There's nothing like a final cleaning and rinsing of every bottle, fermenter, connector or tube before putting it to use. The mechanical action of pumping fluid promises a better cleaning and sanitizing operation and that will give you greater piece of mind and better beer. Best of all, the whole thing should cost less than $50, even if you have to buy a corny keg.

Here's the new-and-improved bottle washer and multi-use cleaning system that will surely make sanitation easier.



For more on cleaning and sanitation projects see:

Build a Bottle washer:
Projects (September 2003)
Hose Cleaner:
Projects (March–April 2003)
Clean-in-Place Device:
Projects (October 2002)
Draftline Cleaner:
Projects (December 2004)

Thom Cannell writes the "Projects" department for each issue of BYO.

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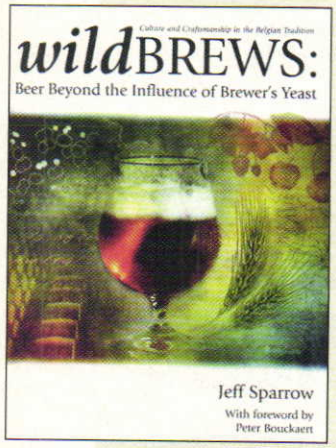

Brewers Publications releases *Wild Brews*

Authored by Jeff Sparrow, "Wild Brews" explores the world of lambics, Flanders red and American brews in a similar style. The book includes techniques in wood-barrel aging, blending and the use of fruit in wild fermentations. Having covered this ground, Sparrow offers homebrewers and professionals information on spontaneous and mixed fermentations including ingredients, organisms, barrels and blending. For more information, visit www.brewersassociation.org/books/wild_brews.html.

American Hop Plugs

Nigel Itson, owner of American Hop Plugs is an avid homebrewer and is always on the look out for ways to brew a better batch of beer. Knowing that plugs were almost exclusively made in Europe (even American hops), he got the idea to press hops into plugs in the United States. The rationale was that hops grown and pressed here in the USA would be fresher than the ones shipped to Europe and then shipped back. American Hop Plugs is a wholesale company and will be supplying these plugs to many homebrew supply stores. For more information, visit the Website at www.AmericanHopPlugs.com.

(top): The QuickConnectors constructed of stainless steel.
(bottom): The BeerGun bottle filler makes bottling more convenient.

Two new products from Blichmann Engineering

Blichmann's new QuickConnector fittings require no tools and are constructed of stainless steel. Use the new connectors to attach to any male 1/2" NPT fitting in your brewery. They are easy to sanitize and built to last a lifetime. Sold in two-set packs, the connectors are available in 3/8" and 1/2" ID hose sizes. The BeerGun Stainless Bottle Filler uses patent-pending "Quiescent Flow Technology" to provide a low foam fill without the complication and sanitation issues of a counter-pressure filler. One hand and about 20 seconds will purge a bottle with CO2 and fill it to the desired level. For more information visit Blichmann Engineering online at www.blichmannengineering.com.

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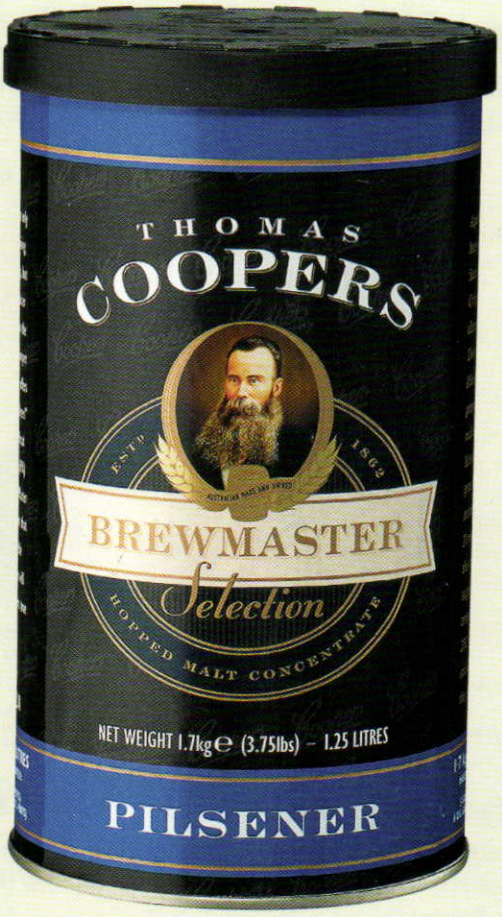

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