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THE HOW-TO HOMEBREW BEER MAGAZINE

JANUARY-FEBRUARY 2012, VOL.18, NO.1

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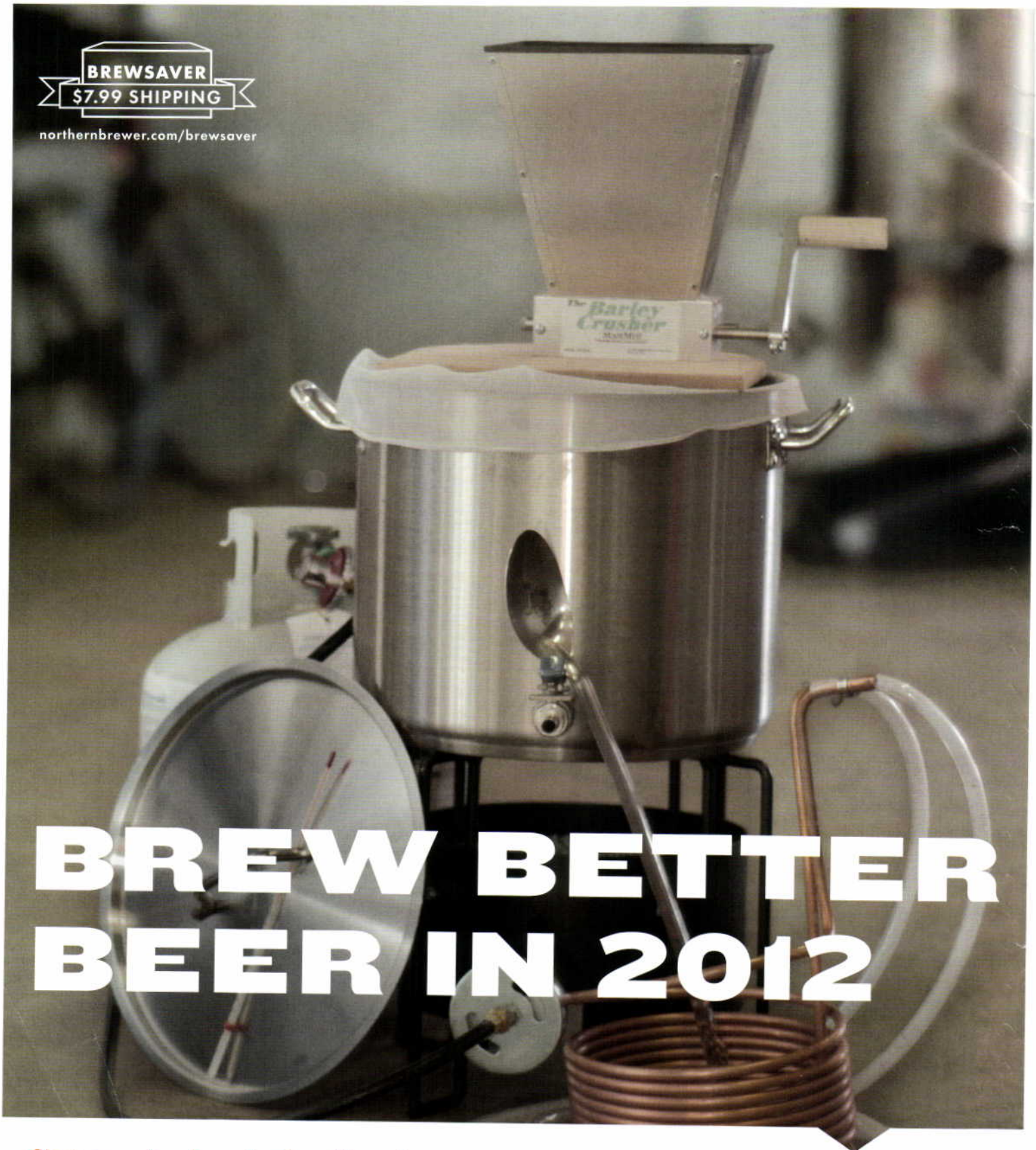

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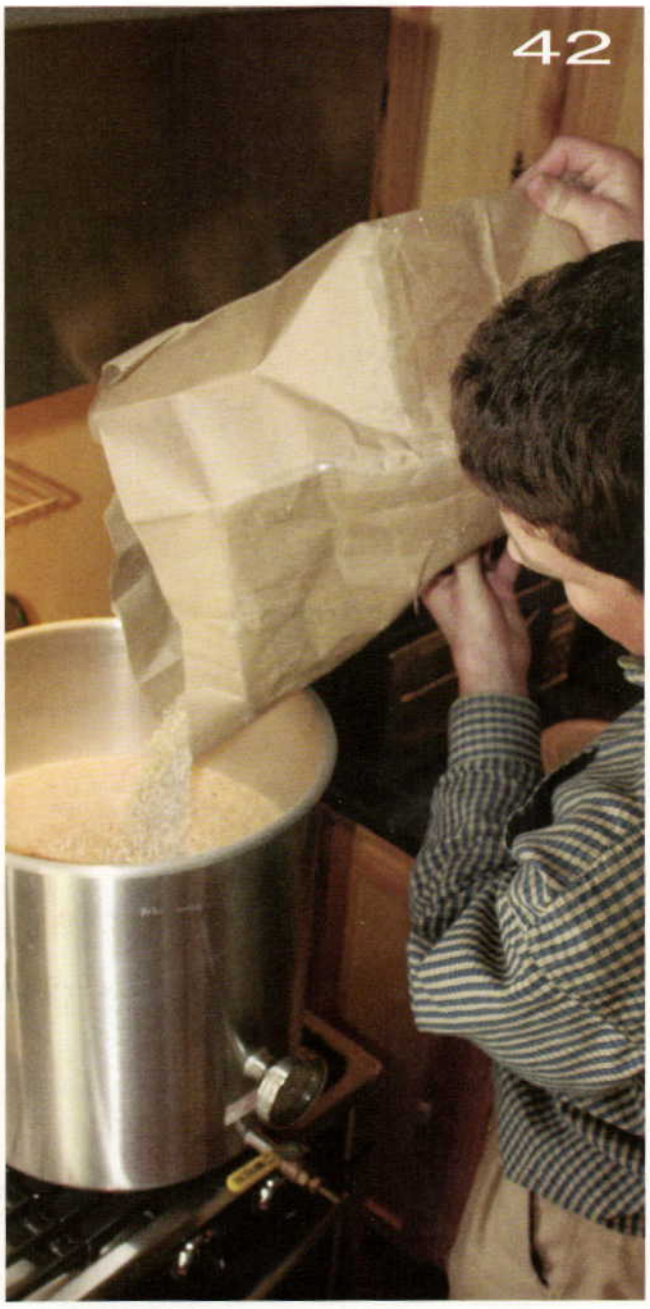

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BYO RECIPE STANDARDIZATION

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

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

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

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

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what's happening at BYO.COM

More Expert Advice

Looking for even more ways to brew better beer? Get more information for improving your homebrews with 20 tips from some well-known homebrew shop owners.

www.byo.com/component/resource/article/1777

Try Brewing with Chocolate

If you're considering making an aphrodisiac beer with chocolate like those on page 36, learn more about brewing with chocolate before you begin for sweeter results.

www.byo.com/component/resource/article/316

Watch and Learn

Watch *BYO*'s series of instructional homebrew videos to learn the basics. *Basic Brewing Radio*'s James Spencer walks you through the steps of racking, kegging, growing hops, making a yeast starter, and more!

www.byo.com/videos

Cover Photo: **Charles A. Parker**

Brew Your Own — THE HOW-TO HOMEBREW BEER MAGAZINE

EDITOR
Chris Colby

ART DIRECTOR
Coleen Jewett Heingartner

ASSOCIATE EDITOR
Betsy Parks

TECHNICAL EDITOR
Ashton Lewis

CONTRIBUTING WRITERS
Chris Bible, Christian Lavender, Marc Martin, Terry Foster, Glenn BurnSilver, Kristin Grant, Forrest Whitesides, Jamil Zainasheff

CONTRIBUTING ARTISTS
Shawn Turner, Jim Woodward, Chris Champine

CONTRIBUTING PHOTOGRAPHERS
Charles A. Parker, Les Jörgensen

◆

PUBLISHER
Brad Ring

ASSOCIATE PUBLISHER & ADVERTISING DIRECTOR
Kiev Rattee

ADVERTISING SALES COORDINATOR
Dave Green

EVENTS/MARKETING COORDINATOR
Alex Ramsvig

BOOKKEEPER
Faith Alberti

SUBSCRIPTION CUSTOMER SERVICE MANAGER
Linda Marlowe

NEWSSTAND DIRECTOR
Carl Kopf

SUBSCRIPTIONS ONLY
Brew Your Own P.O. Box 469121 • Escondido, CA 92046
Tel: (800) 900-7594 • M-F 8:30-5:00 PST
E-mail: byo@pcspublink.com • Fax: (760) 738-4805
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EDITORIAL & ADVERTISING OFFICE
Brew Your Own
5515 Main Street
Manchester Center, VT 05255
Tel: (802) 362-3981 Fax: (802) 362-2377
Email: BYO@byo.com

ADVERTISING CONTACT: Kiev Rattee (kiev@byo.com)
EDITORIAL CONTACT: Chris Colby (chris@byo.com)
FACEBOOK: www.facebook.com/BrewYourOwn
TWITTER: @BrewYourOwn

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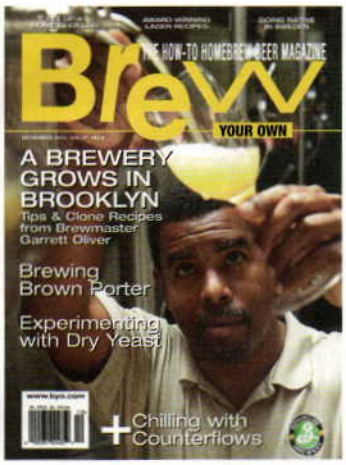


Alcohol estimate — does it rule or drool?

The Moose Drool clone recipe in the November 2011 issue lists the OG as 1.052 and the FG as 1.012. How is it that the ABV is 5.3%? Is there a temperature correction that is not mentioned?

Jim Weins
via email

Homebrewers typically estimate the alcohol content of their homebrews via a simple formula. For example, BYO *uses the common formula:*

*Alcohol (by volume) = (OG-FG) * 0.129*

where OG and FG are the original and final specific gravities of the beer, in "gravity points"

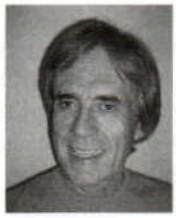
*So, for example, if the beer's OG was 1.052 and the FG was 1.012, the estimated alcohol by volume would be (52-12)*0.129 = 5.16. In other words, 5.2% ABV.*

As you noticed, 5.2 is not 5.3. The 5.3% ABV quoted in our recipe stats is the actual alcohol level in commercial Moose Drool. (It's listed on their website.) Actual fermentations do not always yield the amount of alcohol predicted by the above formula. Yeast health, pitching rate, aeration and other variables affect what percentage of the sugars the yeast consume gets converted to ethanol and what percentage goes down other metabolic pathways. So, a drop of 40 gravity points isn't always going to yield 5.2% alcohol.

Lots of commercial breweries list the OG, FG and ABV of their beers and ABV estimates from the OG and FG don't always match up with the actual ABV. (It's actually informative to see how divergent some of them are.)

Because the stats in BYO *recipes are meant to be accurate descriptors of the beer, we went with the actual alcohol content as measured by the brewery instead of an estimated alcohol content obtained from a generic formula. However, we felt it was a bit of a moot point — or would it be a moose point? — to worry about a difference in alcohol levels of 0.1%. Homebrewers don't actually measure the alcohol*

contributors



Bill Pierce started brewing in 1994 and was instantly hooked. His first beer was a brown ale. Bill has completed the Craft Brewers Certification program from the Siebel Institute in Chicago, Illinois and briefly worked as a brewpub brewer.

Bill is a BJCP judge and a longtime active member of the Home Brew Digest (hbd.org), an online brewing forum. In addition, he formerly wrote the "Advanced Brewing" column for *Brew Your Own*.

In the May-June 2010 issue of *BYO*, Bill took readers back in time to when the Ballantine Brewing Company was in full swing. In this issue, on page 26, he takes another page from brewing history and discusses the long rise and ignoble fall of former US brewing giant Falstaff.

Marc Martin lives in the Pacific Northwest, where he is the Primary Fermenter of the Washington homebrew club Plato Republic. In the July-August 2010 issue of *BYO*, Marc wrote about attending a symposium in which the style guidelines for a proposed new beer style, which proponents dubbed Cascadian Dark Ale, were drafted. Some *BYO* readers felt that the moniker was misleading, and perhaps even a snub to the recently deceased Greg Noonan, whose Vermont brewpub brewed a "black IPA" many years ago.

In this issue, Marc — wearing the hat of *BYO*'s Replicator — talks to Smuttynose Brewing and clones their beer called Noonan, a black IPA, on page 12.

Terry Foster was born in London, England and holds a PhD in chemistry from the University of London. He has written extensively about beer and brewing and now lives in the United States. he frequently helps out with the brewing at New Haven, Connecticut's brewpub, called BruRm@BAR.

As well as being *BYO*'s "Techniques" author, Terry has written several feature stories for *BYO*, most recently a profile of Scotland's Brew Dog Brewery in the January-February 2010 issue, a story on an Irish Viking ale in the May-June 2011 issue and a story on Welsh ale in the September 2011 issue.

In this issue, on page 57, Foster sets about recreating a famous historical beer — Guinness' West India Porter from 1801 (a precursor to their stout).

content of their beers (that takes some fairly expensive equipment), so nobody will ever know if their beer turns out to contain 5.2% alcohol, 5.3% alcohol, or some other level. (The same can be said for IBUs.) We just went with 5.3% percent because that's the actual amount in the commercial beer. In the end, for the homebrew clone, what's most important is if the beer turns out good.

Nugget Nectar needs notes

I've been reading your magazine for a long time and I've trusted many of your recipes with very good success. I was going to run the recipe for the Nugget Nectar Amber (October 2011) and did some calculations before hand. It appears that the ABV is off as well as the original gravity. I was checking it based upon using the all-grain version. I came out with an ABV of 5.3%, assuming a 70% total process efficiency. The final gravity was correct based upon the yeast suggested (75% attenuation) using the grain bill as suggested. What would the corrected recipe look like? I also compared this to the Hop Back Amber recipe and that recipe was correct in terms of original gravity and final gravity plus SRM.

Mark Bossart
via email

Marc Martin responds: "Good catch on this one. It is sharp readers like you that keep us on our toes. I went back through my notes from Andy Dixon and this led me to the mistake. I had sent in what I thought was the final copy of the article when, in fact, I had another copy with the one important addition you noticed was missing. Both the dark Munich malt and the Vienna malt need to be bumped up to a total of 2.5 lbs. (1.1 kg) each. Here is the corrected text for the all-grain option:

This is a single step infusion mash using an additional 7.75 lbs. (3.51 kg) Pilsner malt, 2.0 lbs. (0.91 kg) dark Munich malt and 2.0 lbs. (0.91 kg) Vienna malt to replace the liquid and dry malt extracts. Mix the crushed grains with 4.75 gallons (18 L) of 172 °F (78° C) water to stabilize at 152 °F (67 °C) for 60 minutes. Sparge slowly with 175 °F (79 °C) water. Collect approximately 6.5 gallons (25 L) of wort runoff to boil for 90 minutes. Reduce the 90 minute hop addition to 1.25 oz. (35 g) Nugget hop pellets (13% alpha acid) (16.25 AAU), to allow for the higher utilization factor of a full wort boil. The remainder of this recipe and procedures are the same as the extract recipe.

"For what it's worth, all BYO *recipes are based upon 65% grain utilization.*

"Regarding the question of yeast attenuation. This is based on the actual number achieved at their brewery with American ale yeast strains. If the proper number of cells are provided, good aeration is achieved and temperature control is maintained, 80 to 82% attenuation is normally achieved. Hence, 1.071 – 72 OG and 1.014 FG, a differential of 58 points. 58 / 72 = 80.5%

"As a quick aside let me give you one of the formulas know as a 'brewers divisor' – you can take the differential of your OG and FG and divide that number by 7.7 to achieve the estimated alcohol by volume (ABV). In this example 58 points / 7.7 = 7.53. This can be handy to do in a pub that posts OG and FG, but not alcohol content."

No sparge grain adjustments (I)

I am intrigued with Louw's article on no sparge brewing in the November 2011 issue.

I am new to the hobby, and tend to brew smaller volumes while I master the techniques. I don't know enough to figure out how to adjust the grain mixtures as he did.

Scott Harmon
via email

No sparge grain adjustments (II)

Dave Louw gives a formula for adding more water to the mash when performing a no sparge operation. He mentions an addition of more grain to the mash, but I can't tell how much.

Sean Pryor
via email

Formulating recipes for no sparge brewing is just like formulating regular beer recipes, except the extract efficiency is usually a little lower. In theory, if you grind the grain as finely as you normally would and stir the mash as frequently, your extract efficiency in a thin, no-sparge mash should be the same as usual. But in practice (frequently with unstirred mashes) homebrewers report somewhat lowered efficiency. So, to calculate your adjusted grain addition, you would need to brew one batch of no sparge beer to find your new extract efficiency. The amount of additional grain you add to future recipes would depend on the change in your extract efficiency. If your extract efficiency does drop, the easiest way to calculate the adjustment in grains would be to use brewing software. Type the original recipe into the software, then change the extract efficiency to your new level. Then add pale malt to the recipe until the OG climbs to its original value. BYO

homebrew nation

READER PROFILE

Brewer: Lenny Camperlango

Hometown/State: Kingston, New York

Years brewing: Four

Type of brewer: All-grain

Homebrew setup (volume, style, efficiency): I brew 5.5-gallon (21 L) batches using an outdoor turkey fryer and a 10-gallon (38-L) Rubbermaid cooler with a false bottom. I get about 80% efficiency and I brew outside. I also have a 2-tap keezer so I keg the majority of my beers, although I still bottle any beers that I want to age.

Currently fermenting: Golden Ale, Pumpkin Ale, Saison and Columbus IPA

What's on tap/in the fridge: Cilantro Lime Wheat Beer, New Zealand IPA, Kane (American Strong Ale), Belgian Tripel, Strawberry Melomel and Old Ben (old ale).

How I started brewing: I found my passion for quality beers when I worked at a beer store. People would come into the store every once in a while and request to buy empty Grolsch bottles to bottle their homebrews. This is where I first became interested and always kept it in the back of my mind. When I finally moved into my first apartment I decided, "Why not?" and ordered a homebrew kit and made my first extract amber ale. It tasted like cherry lollipop seltzer, but it was mine and I loved it. I became hooked and started adding steeping grains to my recipes with extract, and I brewed like this for about a year. Then I finally stepped up to partial mash and did two batches before I finally jumped into all-grain brewing. I started out doing stove top beer in a bag (BIAB) beers. I did those for a couple years and was quite happy with my results. I've just recently upgraded my set up and am now brewing outdoors which I absolutely love!

reader recipe

CILANTRO LIME WHEAT BEER
(5 gallons/19 L, all-grain)

OG = 1.066 FG = 1.017
IBU = 42 SRM = 97 ABV = 6.4%

Ingredients

4 lbs. (1.8 kg) American Pilsner malt
3 lbs. (1.4 kg) white wheat malt
5.4 AAU Cascade hops (1 oz./28 g at 5.4% alpha acids) (60 min.)
2.7 AAU Cascade hops (0.5 oz./14 g at 5.4% alpha acids) (20 min.)
2.7 AAU Cascade hops (0.5 oz./14 g at 5.4% alpha acids) (5 min.)
2.1 oz. (60 g) fresh chopped cilantro (5 min.)
0.3 oz. (8.5 g) fresh grated lime zest (5 min.)
2.8 oz. (79 g) lime juice (2 limes squeezed) (0 min.)
Safale US-05 yeast (rehydrated)

Step by step

Use a 90-minute mash: 3.5 gallons (13 L) of water at 148 °F (64 °C). Sparge with 3 gallons (11 L) of 168 °F (76 °C) water. The total boil time is 90 minutes. Cool wort to 60 °F (16 °C) and pitch the yeast. Ferment in primary for one month.

byo.com brew polls

Do you brew lagers?

No, but I would like to 46%
Yes, sometimes 29%
No, I'm not interested 17%
Yes, all the time 8%

social homebrews

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what's new?

Brewer's Edge Oxygen Injector

This new oxygen injector from Brewer's Edge makes it easy to add oxygen to your wort by using easy to purchase canned 1.4 and 2.1-ounce oxygen tanks sold by Bernsomatic and Worthington (available inexpensively in the welding/brazing section of most hardware stores). One tank will oxygenate 10 to 16 5-gallon (19-L) batches of wort.

Available at retailers who carry Brewer's Edge products or wholesale through Brewmaster, 800-288-8922.

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www.essenciana.com

calendar

January 14
Boneyard Brew-Off
Urbana, Illinois
The Urbana-area Boneyard Union of Zymurgical Zealots invite homebrewers to enter their 18th annual homebrew competition. The sole requirement for entering is that it must be a beer, mead or cider with a starting gravity over 1.070.
Entry Fee: $6 for the first entry; $5 additional entries
Deadline: January 9
Contact Email: Marco Boscolo, marco75boscolo@gmail.com
Web: www.buzzbrewclub.org/competition

February 4
GEBL IPA Bracket Challenge
Everett, Washington
The Greater Everett Brewer's League (GEBL) invites you to enter their head-to-head IPA competition, featuring four brackets (English IPA 14a, American IPA 14b Imperial IPA 14c and Experimental IPA 23a). The winner of each bracket will advance to a final best of show round. It is a BJCP/WAHA registered competition and provides points toward the Washington Homebrewer of the Year circuit.
Entry Fee: $6 for first entry; $4 additional entries
Entry Deadline: January 31
Contact Email: William Fredin, teamoly@yahoo.com
Web: www.gebl.org

February 17-18
Midwinter Homebrew Competition
Milwaukee, Wisconsin
The Beer Barons of Milwaukee will again sponsor their annual homebrew competition, which is a qualifier in the Midwest Homebrewer of the Year circuit. The top scoring English Session Beer (BJCP categories 8A, 8B, & 11A) will be brewed commercially by Milwaukee Brewing Co. and tapped during a special event honoring the entrant at the Milwaukee Ale House.
Deadline: February 5
Entry Fee: $7
Web: midwinterhbc.beerbarons.org

homebrew drool systems

Joe's Electric Brewery

Joe Lynch • Kansas City, Missouri

My all-electric homebrewery is a basic HERMS system and the whole setup including the heat/cooled conical cost about $4000 to build. The temperature is controlled using digital controllers. It took about six months to build. I had a professional electrician do all of the wiring. All electric is the way to go — use the propane for cooking your turkeys.

The mash tun and HLT are powered by a March pump using a 110-volt hot water heater element. The mash tun and HLT are insulated with hot water tank insulation found at any hardware store. I can keep the mash temperature within a 2-degree Fahrenheit differential. The brew kettle uses a 220-volt system from High Gravity.

I usually reach a hard boil in about 20 minutes. After the wort is boiled, it passes through a counter-flow chiller and then through an inline oxygen system where it is pumped into my temperature-controlled conical fermenter from MoreBeer!. I had originally built it in on a wood base using scrap wood from my home remodeling project. It just wouldn't stay clean so I changed over to the metal shelving. They were cheap and strong. My first test run was with just water, and I found a few leaks that were very easily fixed.

I have a filtered water system nearby and I do very little lifting. The system is placed on shelving from the hardware store. All connections are quick disconnects. The system is easy to breakdown for a complete cleaning. After each brewing session I run some PBW using hot water through, then back flush.

This setup is in my unfinished basement (man cave). I estimate that using this system, I have shaved about an hour off my all-grain brew day. As with any HERMS-type system, the mash efficient percentage is fantastic. I have also compared the kilowatt usage - this system costs just slightly more than propane but is easier to use.

beginner's block

THE BASICS OF BASE MALT

by betsy parks

Base malt makes up the majority of the bulk of any batch of beer, but base malt isn't a blank canvas that you use to build your beer. Learn more about the variations in base malt and you will be better able to build your own beers one day.

If you've ever brewed anything from Jamil Zainasheff's "Style Profile" column, you will have noticed variations in base malt recommendations: British pale ale malt for British ales like brown porter, Pilsner malt or malt extract for Maibock and domestic 2-row pale malt for American IPA. This is because every malt, including the base malt, varies in flavor, color and diastatic power, which can produce very different finished beers.

What's the difference?

All malts start out essentially in the same way: as raw grains of barley that are processed by maltsters to convert the starch in the grains into fermentable sugars. After that, the grains are processed depending on their purpose: base malts, kilned malts, roasted malts as well as kilned and roasted malts, which involves roasting and kilning to produce the malts' individual flavors and colors. While they are not as dark as other malts, base malt colors do vary, often between 2 to 4 °Lovibond.

Like brewing water, differences in base malts can often be traced back to the conditions and ingredient availability where the beer style originated, or were created with a certain type of beer in mind. For example, pale British ale malt is often made with Maris Otter barley, which is a 2-row variety that is native to the UK and was bred in Cambridge to brew traditional cask conditioned ales. It is said to provide a slightly more biscuity, bready flavor than standard barleys.

Some of the most common base malts include: North American 2-row, British pale ale, domestic pale ale, wheat, rye and Pilsner. For more information about each of these, including color and suggested beer styles, visit *BYO*'s online malt charts at www.byo.com/resources/grains. In addition to these variations between types of malts, there can also be variation between similar malts depending on which maltster made it.

reader tip

Harold Martin • Snohomish, Washington

After my wort is chilled and I'm ready to pour it into the primary fermenter I like to run it through a strainer. This helps remove spent hops but trying to do this procedure by myself was tedious until I tried this:

I simply place the strainer on top of my fermenting bucket and then position the bucket's handle on top of the strainer's handle. Doing this keeps the strainer very steady while I pour the wort through it. It also helps to oxygenate the wort.

by marc martin

DEAR REPLICATOR, I LOVE *BYO* AND I READ EVERY ISSUE. I DID, HOWEVER, TAKE EXCEPTION TO YOUR JULY-AUGUST 2010 ARTICLE, "BIRTH OF A NEW STYLE," DISCUSSING "CASCADIAN" DARK ALE. SUCH A BEER, BLACKWATCH IPA, WAS AN ORIGINAL OFFERING FROM, NOW DEPARTED, GREG NOONAN AT THE VERMONT PUB AND BREWERY IN BURLINGTON, VERMONT. HAVE YOU TRIED THE SMUTTYNOSE BREWERY'S TRIBUTE BEER, "NOONAN"? I BEG YOU TO CONSIDER RUNNING A REPLICATOR ARTICLE ON THIS BEER.

MICHAEL BURDICK
BURLINGTON, VERMONT

I must admit, I could have done a better job of researching the true beginnings of this type of beer before finalizing the July-August 2010 article. I have since verified that the first version of a black IPA was brewed at Vermont Pub and Brewery. Hopefully this article will serve to honor Greg Noonan.

Smuttynose's owner, Peter Egelston and his sister, Janet opened the Northampton Brewery in Northampton, Massachusetts in 1986, and later the Portsmouth Brewery in Portsmouth, New Hampshire. In 1993 Peter attended an auction of the bankrupt Frank Jones Brewing Co. (also in Portsmouth) and agreed to purchase the entire brewery. This was to become the Smuttynose Brewery, which opened in January of 1994.

Smuttynose Brewmaster David Yarrington's homebrewing roots date back to his college days in the late 1980s. He worked at 20 Tank Brewery in San Francisco, California then helped open Tokyo Brewing Co. After that he moved back to the states and completed the Master Brewer program at UC-Davis in 2001. He soon joined Smuttynose and has been there ever since.

"Noonan," a black IPA, was created as part of Smuttynose's "Short Batch" series, which are their limited edition, experimental beers. They felt a good way to honor Greg's memory would be to create a beer very similar to Black Watch. The main challenge with this beer is to achieve the black color without imparting the acrid grain astringency. To subdue the heavy roast flavors, the dark Carafa® II malt is not mashed with the rest of the grains. Instead it is added to the top of the mash just prior to sparging. A combination of Magnum and Columbus hops contribute an elegant and refined bitterness that parallels the reduced astringency. The result is a light bodied, non-acrid, very dark beer with plenty of flavor and aroma.

Now, Michael, Greg's contribution to brewers everywhere lives on. BYO

SMUTTYNOSE BREWING COMPANY'S SHORT BATCH #12 "NOONAN" CLONE

(5 gallons/19 L, extract with grains)

OG = 1.061 FG = 1.013 IBU = 75 SRM = 42 ABV = 6.4%

Ingredients

6.6 lbs. (3 kg) Briess light, unhopped, liquid malt extract
1.5 lb. (0.68 kg) pale ale malt
12 oz. (0.34 kg) Belgian aromatic malt (25 °L)
10 oz. (0.28 kg) crystal malt (60 °L)
4 oz. (0.11 kg) black malt (600 °L)
1.0 lb. (0.45 kg) Carafa® II malt (450 °L) (** follow special instructions to right)
11.3 AAU Magnum hops (0.81 oz./ 23 g of 14% alpha acid) (75 min.)
7.5 AAU Columbus hops (0.5 oz /14 g of 15% alpha acid) (30 min.)
3.75 AAU Columbus hops (0.25 oz. /7 g of 15% alpha acid) (20 min.)
3.75 AAU Columbus hops (0.25 oz./7 g of 15% alpha acid) (10 min.)
7.5 AAU Columbus hops (0.5 oz./14 g of 15% alpha acid) (0 min.)
Glacier hops (1.0 oz./28 g of 5.5% alpha acid) (dry hop, 7 days)
Nugget hops (1.0 oz./28 g of 13% alpha acid) (dry hop, 7 days)
½ tsp. yeast nutrient (last 15 min.)
½ tsp. Irish moss (last 30 min)
White Labs WLP 001 (American Ale) or Wyeast 1056 (American Ale) yeast
.75 cup (150g) of corn sugar for priming (if bottling)

Step by Step

Steep the milled grain in 2 gallons (7.6 L) of water at 154 °F (68 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.8 L) of hot water. **In a separate saucepan combine 1 lb. (0.45 kg) milled Carafa® II malt with 1.5 quarts (1.42 L) water at 130 °F (54 °C) for 3 minutes. Remove grain and add this black liquid and the liquid malt extract to the wort and boil for 75 minutes. While boiling, add the hops, Irish moss and yeast nutrient as per the schedule. During the boil, use this time to thoroughly sanitize a fermenter. Now add the wort to 2 gallons (7.6 L) of cold water in a fermenter and top off with cold water up to 5 gallons (19 L). Cool the wort to 75 °F (24 °C). Pitch your yeast and aerate the wort heavily. Allow the beer to cool to 68 °F (20 °C). Hold at that temperature until fermentation is complete. Transfer to a carboy, avoiding any splashing to prevent aerating the beer and add the Nugget and Glacier dry hops. Allow the beer to condition for 1 week and then bottle or keg. Allow the beer to carbonate and age for two weeks. For all-grain instructions, visit www.byo.com/component/resource/article/2492

Cocoa Love

Brewing with chocolate

by Betsy Parks 

ON PAGE 36 OF THIS ISSUE, WE SHARE SOME RECIPES FOR BEERS WITH APHRODISIAC QUALITIES, MANY BREWED WITH SOME FORM OF CHOCOLATE. TAKE SOME ADVICE FROM THE BREWERS IN THIS ISSUE WHO ALL BREW A COMMERCIAL "CHOCOLATE" BEER.

We brew a beer called Hot Chocolate, which is basically a porter base: basic two-row and chocolate malt with chocolate, oatmeal and lactose. The oatmeal gives the beer a structure and silkiness, while the lactose gives it a creamy sweetness. It is "hot" thanks to cayenne pepper.

We use "free trade" powdered chocolate in the kettle to make Hot Chocolate. Totally ignoring the social aspects of it, from a culinary point of view the free trade chocolate is far superior to conventional varieties.

Powdered chocolate is messy, though. The biggest problem we've had with it is learning to not add the powder directly to the kettle as it turns into little balls. Instead we pull a small amount of hot wort out and mix it with the chocolate, then mix that back into the kettle. It's basically like making gravy — you mix the dry ingredients with a bit of the hot liquid so that you don't get a lumpy gravy. If you want to experiment with brewing with chocolate, you don't want to use chunk chocolate because of the fat, which can cause all kinds of problems, including issues with head retention. You want to keep the fat level as low as possible, which is why we use the powdered stuff.

At home you can also experiment with the timing of when you add chocolate to the beer. You can add it at different times in the kettle, add it past the boil, or use chocolate nibs in the secondary fermenter. You could also try adding chocolate liqueur in the secondary, which might get scrubbed in primary, but it might be fun to experiment after primary is over.

Randy Lee, Brewmaster at Valkyrie Brewing Company in Dallas, Wisconsin. Randy and his wife, Ann, opened Viking Brewery in 1994 — the first microbrewery in northwest Wisconsin. They recently sold the trademark Viking and renamed their brewery Valkyrie.

When we brew our Chocolate Ale, we use Venezuelan cocoa nibs after the primary fermentation, as you would do when dry hopping. We always went with nibs — we never experimented with raw or baking chocolate. We also went to the source by working with a chocolatier who sourced cocoa nibs that he thought had a nice flavor. We leave the beer on the nibs for about two weeks, after which the cocoa is almost completely in solution and the hulls are empty. The nibs still have some oil, however we don't see too much of an effect on the beer. When you add chocolate on the cold side, the oils are less of a concern.

The big issue we had with chocolate in our brewing process was how to add the nibs to the beer and then get them back out. We lost a lot of beer in the process, but in the end we put them in bags and hung them in the fermenter, much like dry hops.

One of the things that I decided not to do from the get go was using chocolate or roasted malt or barley, as I wanted to focus more on a bready character. I feel that this lets the chocolate flavor come out more — it's not subdued by what's called chocolate flavor from the malt. We use special wheat malt from Briess that has a nice, nutty, bready character that gives the beer an amber, rusty color. I feel that it really helps push the chocolate flavor out without going over into the roast flavors.

We use a lot of Belgian yeast, however, for our chocolate beer we went with a more neutral strain. I felt that the banana/clove flavors from the Belgian yeasts weren't a good match for the chocolate.

Steven Pauwels, Brewmaster at Boulevard Brewing Company in Kansas City, Missouri. Steven started out in the brewing industry at his hometown brewery, Eeklo's Brouwerij Krüger. He has held positions at the Domus brewpub in Louvain and at RIVA brewery in Dentergem (both in Belgium). He has been the Brewmaster at Boulevard for the past twelve years.

Steve Polewacyk, Owner of the Vermont Pub and Brewery in Burlington, Vermont. Steve opened VPB in 1988 with his partner, Greg Noonan. He started out as a homebrewer under Greg, and worked closely with him in the brewery and in administrations until Greg passed away in 2009.

In our experience throughout the years there have been a few beers where we've emulated chocolate flavor with malts, however, for our Double Chocolate Stout we partnered with a local chocolate company, Lake Champlain Chocolates, to source cocoa nibs.

We have made three versions of the chocolate stout: in the first experiment we made the beer with cocoa powder added to the boil, which was great through the primary fermentation, but each subsequent week we lost the chocolate in the secondary. The second experiment we used cocoa powder in the boil, as well as cocoa nibs in the secondary. That seemed to bring the chocolate flavor back.

One of the problems with chocolate, especially something like baking chocolate, is that the chalkiness can come out of a lot of products, which can give a mouthfeel that is grainy or gritty.

If you are brewing with chocolate at home and want to experiment, lactose is also a great feature in any chocolate beer, especially if the chocolate flavors are on the dark side, because it helps to sweeten it up. For example, we recently took a keg of milk stout and aged it on Madagascar cocoa nibs and then added more lactose — the lactose makes the chocolate flavor more predominant.

Also, beware if you're not familiar with an ingredient — especially with chocolate, and be careful of overroasted products. Inexperienced brewers tend to go overboard with new ingredients, but you should start small and then work your way up. It's easier to add than it is to take away. It is possible to take flavor away, but only if you have an extra batch of beer to blend back. There's a level of patience that some homebrewers perhaps don't have — they want to hit the beer right the first time. But go at it easier and wait for the second batch of your same beer to hit what you're looking for. We are the same way here — we brew experimental beers every week and sometimes we're going to hit it, sometimes not. BYO

Debunking Bitterness

Mystery fermentation, no chill brewing

by Ashton Lewis

Q I RECENTLY SAW AN IPA RECIPE FROM JAMIL ZAINASHEFF THAT LISTED THE IBUS AT 100. IS THIS IN THE REALISTICALLY ATTAINABLE RANGE ON A BASIC HOMEBREW SETUP (FULL VOLUME BOIL POT AND MASH TUN ONLY) WITH "NORMAL" HOPS/HOP PRODUCTS (WHOLE LEAF, PELLETS OR PLUGS)? I RECALL READING SOMEWHERE THAT 80–85 IBUS WAS THE MAX WITHOUT SPECIAL EQUIPMENT.

MIKE KILLGORE
BEAVERTON, OREGON

A The limit of beer bitterness is really a function of the solubility of iso-alpha-acids in wort and their survival into finished beer. Most of the literature on this topic is of the practical sort where data showing the IBU level of various commercial beer is part of the discussion. Hypothetical discussions that focus on everything but real beer makes me a little grumpy. Brewing beer with 100 IBUs is certainly within the realm of reality based on beer that is brewed and commercially sold.

It is true that there is not a singular "Max IBU" value that is applicable to all beer because wort pH and wort gravity directly affect hop isomerization during the boil. Furthermore, what happens during fermentation, aging and filtration (for brewers who filter) influences hop utilization. If you are attempting to get the maximum bitterness level and are limited by iso-alpha-acid solubility in wort, then it logically follows that downstream iso-alpha-acid loss will reduce beer bitterness. Loss occurs when trub sticks to fermenter walls, foam is skimmed from fermenters, bitter acids adhere to yeast cells and when beer is filtered.

I am not sure what special equipment is required to brew high IBU beers. Wort loss can become a real issue, so this may be what you have read. Commercial brewers brewing some of these monsters often launch an über-bitter beer as a special and are not overly concerned about efficiency. But then the special sticks and their consumers want more. And then efficiency becomes a real concern because excessive wort loss is an expensive proposition when operating a brewery with the intent of making money. Very broad whirlpools are one solution to deal with high hop loads in the brewhouse if pellet hops are used. If cone hops are used things are a bit easier since the hops are typically removed with a hop separator before the whirlpool. So there are some practical concerns related to hop removal when brewing beers with big hop additions.

The bottom line with this question is that you are correct to be asking about limits, because they do exist when it comes to bitterness. I am a very skeptical consumer when it comes to putting much faith in certain claims, especially the claims of small packaging breweries, pub brewers and homebrewers. The reason for my skepticism is simple; claims without lab analyses equal estimates. And most small brewers do not have the laboratory equipment required to perform IBU analyses. Couple this with the sometimes tremendous testosterone flow present when brewers brag about the big size of their latest imperial this or that and the result is often exaggeration.

I am a simple brewer and simple beer consumer with a unified philosophy about brewing. Rule number one; it's all about perception. If what we do

"The limit of beer bitterness is really a function of the solubility of iso-alpha-acids in wort and their survival into finished beer."

help me mr. wizard

in the brewery cannot be perceived by the consumer or does not influence efficiency then why worry about it? Some brewers advertise that they lager for eight weeks, or whatever. That's cool, but does the beer taste better than beer aged for six weeks, five weeks or four weeks? If it does, then there is a compelling reason to age for eight, but if the only reason is to talk about it in marketing I am not the type of brewer who would agree with the decision. Rule number one has a few caveats. For starters, I am not referring to ingredients in beer that can cause bodily harm without being detected when drinking; these are still perceived, just not immediately. I am also not referring to cleaning and maintaining the brewery environment. My rule number one is really about brewing process decisions.

Rule number two; limit brewery speak when communicating with consumers. People do not consume laboratory results, they consume beer (in the context of this discussion). Laboratory numbers taken out of context really give very little information about flavor. We may assume that beer with a meager 50 IBUs is less bitter than another with 80 IBUs, but perceived bitterness has much to do with the beer itself. Alcohol content, residual extract and malt selection all influence bitterness and IBU values alone do not define perceived bitterness. Some brewers and beer writers share the opinion that beer consumers are often turned off by this "geek speak" because it has the effect of alienating people who may really like beer, yet know little or nothing about the process.

Q I BREWED A FOUNDER'S BREAKFAST STOUT CLONE FROM *BYO*, ADDED SOME EXTRA GRAIN AND MY OG WAS 1.090. IT WAS MY FIRST BEER WITH COFFEE, CHOCOLATE AND COCOA NIBS. I PITCHED HALF OF THE BATCH WITH SOME S-05 YEAST HARVESTED FROM A RECENT BATCH OF PORTER AND PITCHED THE OTHER HALF WITH FRESH S-04 AS AN EXPERIMENT. I BREWED THE STOUT ON SUNDAY, AND ON MONDAY WHEN I GOT HOME THERE WAS ONLY A BIT OF FOAM (IT WAS OILY LOOKING) ON TOP OF THE BEER BUT NO REAL KRÄUSEN AND THERE WERE NO BUBBLES COMING OUT UNLESS I SHOOK THE CARBOY. AFTER ABOUT THREE DAYS OF SHAKING, I COULDN'T GET ANY MORE BUBBLES TO COME OUT FROM SHAKING. THINKING I DID SOMETHING TO KILL MY YEAST, I ADDED EXTRA YEAST (S-05 TO BOTH). I KEPT WATCHING AND SAW NO SIGNS OF FERMENTATION. THINKING THAT MAYBE THE CHOCOLATE OR COFFEE DID SOMETHING TO PREVENT THE YEAST FROM FERMENTING, I GAVE UP ON THE BEER BUT DECIDED TO HOLD OFF ON DUMPING IT. SIX WEEKS AFTER BREWING THE GRAVITY READING WAS 1.030. HOW AND WHEN DID THIS FERMENT? DID AN INFECTION CONSUME THE SUGAR?

BOB HINES
CHAPMAN, KANSAS

A True mysteries are rarely encountered in a brewery when the facts related to a particular problem are at hand. The problem lies in obtaining the facts and this is particularly true when homebrewing. In a commercial brewing operation it is common for brewers to be in the brewery most of the time and in some of the larger breweries instrumentation and data collection is used to gather and track data related to production. Production staff and historical data are pretty handy when it comes to tracking down the ghosts that seem to haunt the brewery, but in cases like yours there is not much information to evaluate.

The beer you brewed had a fairly high original gravity and also contained a high proportion of specialty malts. Based on this information I would not predict a very low finishing gravity. Couple that with the single step infusion mash at 155 °F (68 °F) for one hour specified in the recipe and I suggest that 70% is a reasonable guess for

the apparent degree of fermentation (how much extract is consumed during fermentation as measured using a hydrometer). Thirty percent of 1.090 is 1.027 and your final gravity was 1.030. This tells me that your OG and FG numbers are believable. When I solve problems I first begin by questioning the validity of the information at hand — because that is what Wizards do!

The other fact at hand is that you added an ingredient that contains fat to your wort; baking chocolate contains cocoa butter. You also added ground coffee beans and coffee beans contain oils. Fats and oils are the same general class of components that are deposited on the rim of a beer glass if you happen to be noshing on greasy finger foods while enjoying a frothy pint . . . well, perhaps previously frothy pint. Fats and oils are well-known anti-foaming compounds because they have a higher affinity for the surface of liquids than do foam-positive compounds from beer. This means that proteins and hop compounds normally involved in beer foam are prevented from stabilizing foam bubbles when these strongly hydrophobic molecules are present. In simple terms you may have had carbon dioxide escaping from your fermenting batch of Breakfast Stout with little to no commotion at the surface of the carboy. Some brewers intentionally add anti-foams to fermenters to suppress foam during fermentation and increase the capacity of their fermentation vessels.

I can understand everything so far, but now I am faced with the piece of evidence that I cannot believe and that is the seeming lack of carbon dioxide gas. When beer ferments, nearly half of the sugar (by weight) is converted to carbon dioxide gas and nearly all of this gas leaves the fermenter. Your beer did ferment, therefore carbon dioxide gas left the fermenter. Until physicists at CERN in Geneva present data showing that $C_6H_{12}O_6$ does not release CO_2 when fermented by yeast I will continue believing in fermentation as we know it. I think what happened is that you had a faulty carbon dioxide gas detector . . . I mean a leak in your airlock. Hmmm, I wonder if that is how they clocked those neutrinos moving a few nano-seconds faster than photons of light in their accelerator?

A leaky airlock would explain why your airlock wasn't gurgling during fermentation and a slow fermentation would explain why shaking your carboy did not seem to generate much activity. Six weeks is a long time to ferment 60 gravity points and I think what happened is that you had a long and slow fermentation that never appeared to be doing much of anything. The only negative consequence of fermentations that drag out is the potential for contamination associated with slow pH reduction in the early hours of fermentation and off-flavors associated with under-pitching, often the cause of slow fermentation. Also, I don't think contamination explains your observations. All microbes that consume carbohydrates for energy give off gas.

Q I HAVE BEEN READING ABOUT A METHOD OF CHILLING CALLED "NO CHILL," WHERE THE BREWER SIMPLY POURS THE WORT AFTER FLAME OUT INTO A SUITABLE WATER CONTAINER, PURGES THE AIR AND SEALS IT AIRTIGHT. WHAT ARE YOUR THOUGHTS?

NICK ROLHEISER
EDMONTON, ALBERTA

A My first thought is that this method is certainly not new. Rapid chilling is a very recent development in the history of brewing. Prior to the advent of the plate heat exchanger, brewers had to wait for wort to cool prior to pitching. Most breweries eventually settled on coolships, which are large shallow pans resembling Olympic-sized kiddy pools, to cool wort prior to fermentation. Although cooling required only eight hours or so, wort contamination was a real issue with the coolship design. Then, in 1856, Jean Louis Baudelot invented a novel wort chiller and the brewing world was changed forever when his invention made rapid chilling a reality. The Baudelot chiller was copied and later modified into enclosed designs. Baudelot's basic design is still widely used in all sorts of different heating and cooling applications.

There are two real problems with slow wort chilling. One is the risk of microbiological contamination. The other problem associated with slow wort cooling is DMS formation after wort boiling. The precursor for DMS, S-methylmethionine, decomposes when heated and becomes DMS (DMS smells like cooked corn and most brewers consider it a defect in almost all beer types). Although much of this compound is transformed to DMS and removed with steam vapor during wort boiling, some does remain. This means that the wort DMS concentration increases after boiling and prior to cooling, and is especially noticeable if wort is in a sealed container that prevents the volatile DMS to escape.

The good news is that homebrewers do not have a very large volume of wort to chill and it is certainly possible to cool a carboy of wort in a reasonable time frame if the carboy is plunged into a cold water bath that is kept cold during cooling. Agitating the carboy will also dramatically increase the heat transfer rate during cooling. My personal preference is to cool wort using a wort chiller either in the kettle with an immersion chiller or en route to the fermenter with a plate or shell-in-tube chiller. I suppose if I were brewing on a desert island and only had the no-chill method I would make do, but neither one of us is stranded on an island. BYO

Weizenbock

Big German wheat beer

by Jamil Zainasheff 

One of my favorite "Dad" activities when my kids were little was taking them out for trick-or-treat on Halloween. I got such a thrill seeing how excited they were as we approached each house and their excitement at getting any sort of candy, good or bad. When they were really young we would just walk around our block. As they got older, we would go farther and farther afield and I would have to carry more and more candy, coats, hats, gloves, water bottles, flashlights — and sometimes even an exhausted child. It didn't take long for me to start hauling along our little red wagon. The wagon made it so much easier to drag along the expedition supplies, and I found out there was even room for a bottle of weizenbock, which made wagon pulling a little more enjoyable. Weizenbock is the perfect Halloween beer. The rich, malty character, the gently warming alcohol and the spicy and fruity notes make it seem like an adult candy, perfect for the cooler weather of fall.

Weizenbock has the same spicy/fruity character of a hefeweizen, but it also has a rich, bock-like malt character. Weizenbock is often hazy, ranging in color from dark amber to a dark, ruby brown, and topped with a large, dense, creamy off-white head. Like a good hefeweizen, the aroma includes moderate spicy notes and some banana-like esters, but it also has these dark fruit flavors and aromas. There should be notes of figs, plums, raisins and more. This fruit character blends in with the overall harmony of the beer, creating complex, rich, bready, bock-like melanoidins and a fruitcake-like character.

Like most weizen-style beers, weizenbock has a grainy, bready flavor underlying the beer. Slight, soft caramel notes and toasty, bread crust-like melanoidin character from Munich malt should be present in moderate levels. While it has a rich color, roasted flavors and aromas are limited to subtle dark toast or chocolate notes. Hop character is non-existent and hop bittering is subtle. The balance between bittering and sweetness is even or balanced slightly sweet. I think the BJCP style guide captures this style's overall impression well with, "A strong, malty, fruity, wheat-based ale combining the best flavors of a dunkelweizen and the rich strength and body of a bock." That malty richness balanced with the spicy/fruity character is what it is all about. The one thing I disagree with in the BJCP description is the "faintly tart character." I think tartness is a flaw in this style and more indicative of beer spoiled through long travel times and low levels of bacteria than it is a well made wheat beer.

A traditional weizenbock would be 50 to 70% wheat malt and the rest dark Munich malt. What I have found is that a blend of dark wheat, Munich and Pilsner malt, along with some caramel and roasted malt, seems to do well in competition. Although there are lots of quality malts out there, I always prefer to use continental malts in my German-style beers. I find the flavors of those malts consistent with the beers I drink when visiting Germany. I use a ratio of 4-2-1 (dark wheat, Pilsner, Munich) and a small amount (< 10%) specialty malts for my weizenbock. The use of specialty malts makes it easier to develop a rich color and flavor, but make sure what you are planning is balanced.

While you want to develop color without adding lots of roast malt flavors, a touch of dark toasted or even slightly chocolate notes is a nice touch. My preference is to use at least some dark caramel malt along with a small amount (1 to 2 %) of pale chocolate malt. If you use something darker than pale chocolate, make sure you do not over do it. Caramel malt can range from 5 to 10% of the grist. I like to make sure that at least some of the

Continued on page 22

WEIZENBOCK
by the numbers

OG:	1.064–1.090 (15.7–21.5 °P)
FG:	1.015–1.022 (3.8–5.6 °P)
SRM:	12–25
IBU:	15–30
ABV:	6.5–8.0%

Photo by Charles A. Parker/Images Plus

Weizenbock
(5 gallons/19 L, all-grain)

OG = 1.082 (19.7 °P)
FG = 1.021 (5.3 °P)
IBU = 23 SRM = 19 ABV = 8.1%

Ingredients

8.8 lb. (4 kg) Best Malz dark wheat malt (8 °L)
4.4 lb. (2 kg) Best Malz Pilsner malt (2 °L)
2.2 lb. (1 kg) Best Malz Munich malt (8 °L)
7.1 oz. (200 g) Franco-Belges caramel Munich malt (40 °L)
7.1 oz. (200 g) Castle Special B malt (120 °L)
3.5 oz. (200 g) Thomas Fawcett pale chocolate malt (200 °L)
5.36 AAU Hallertau pellet hops, (1.34 oz./38 g at 4% alpha acids) (60 min.)
Wyeast 3068 (Weihenstephan Weizen) or White Labs WLP300 (Hefeweizen Ale) yeast

Step by step

Mill the grains and dough-in targeting a mash of around 1.5 quarts of water to 1 pound of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gallons (24.4 L) and the gravity is 1.062 (15.3 °P).

The total wort boil time is 90 minutes, which helps reduce DMS in the finished beer and increases melanoidin formation. Add the bittering hops with 60 minutes remaining in the boil. I skip using kettle finings in this beer. Chill the wort rapidly to 62 °F (17 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. The proper pitch rate is three packages of liquid yeast or one package of liquid yeast in an appropriate starter.

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

Weizenbock
(5 gallons/19 L, extract with grains)

OG = 1.082 (19.7 °P)
FG = 1.021 (5.3 °P)
IBU = 23 SRM = 17 ABV = 8.1%

Ingredients

8.3 lb. (3.75 kg) Wheat liquid malt extract (4 °L)
2.2 lb. (1 kg) Munich liquid malt extract (8 °L)
7.1 oz. (200 g) Franco-Belges caramel Munich malt (40 °L)
7.1 oz. (200 g) Castle Special B malt (120 °L)
3.5 oz. (200 g) Thomas Fawcett pale chocolate malt (200 °L)
5.36 AAU Hallertau pellet hops, (1.34 oz./38 g at 4% alpha acids) (60 min.)
Wyeast 3068 (Weihenstephan Weizen) or White Labs WLP300 (Hefeweizen Ale) yeast

Step by step

I have used a number of wheat and Munich malt extracts with good results. Feel free to use whatever your shop recommends. If you can't get Munich extract, you can do a partial mash with Munich malt instead. If you can't get fresh liquid malt extract, it is better to use an appropriate amount of dry malt extract (DME) instead. I use Best Malz Pilsen, dark wheat, and Munich malt. The Caramel Munich 40 is from Franco-Belges, the Special B from Castle, and the pale chocolate from Thomas Fawcett. Feel free to substitute any high quality malt of a similar flavor and color from a different supplier. My hops are in pellet form and come from Hopunion.

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Avoid packing the grains too tightly in the bag, using more bags if needed. Steep the bag in about 0.5 gallon (~2 liters) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquor and malt extract to make a pre-boil volume of 5.9 gallons (22.3 liters) and a gravity of 1.069 (16.7 °P). Stir thoroughly to help dissolve the extract and bring to a boil.

The total wort boil time is 60 minutes. Add the bittering hops with 60 minutes remaining in the boil. I skip kettle finings for this beer. Chill the wort rapidly to 62 °F (17 °C), let the break material settle, rack to the fermenter, pitch the yeast and aerate thoroughly. The proper pitch rate is three packages of liquid yeast or one package of liquid yeast in an appropriate starter. Ferment at 62 °F (17 °C) until the beer attenuates fully. With healthy yeast, fermentation should be complete in a week, but don't rush it. The cooler than average ale fermentation temperature can extend the time it takes for complete attenuation. Rack to a keg and force carbonate or rack to a bottling bucket, add priming sugar, and bottle. Target a carbonation level of 2.5 to 3 volumes.

Weizenbock Commercial Examples

AleSmith Weizenbock
AleSmith Brewing Company
San Diego, California
www.alesmith.com

Eisenbahn Vigorosa
Cervejaria Sudbrack Ltda
Blumenau, Brazil
www.eisenbahn.com.br

Erdinger Weissbier Pikantus
Erdinger Weissbräu
Erding, Germany
www.erdinger.de

Glockenspiel Weizenbock
Great Lakes Brewing Company
Cleveland, Ohio
www.greatlakesbrewing.com

Moonglow Weizenbock
Victory Brewing Company
Downington, Pennsylvania
www.victorybeer.com

Plank Bavarian Dunkler Weizenbock
Brauerei Michael Plank
Laaber, Germany
www.brauerei-plank.de

Plank Bavarian Heller Weizenbock
Brauerei Michael Plank
Laaber, Germany
www.brauerei-plank.de

Ramstein Winter Wheat
High Point Brewing Company
Butler, New Jersey
www.ramsteinbeer.com

Schneider Aventinus
G. Schneider & Sohn
Kelheim, Germany
www.schneider-weisse.de

Schneider Aventinus Eisbock
G. Schneider & Sohn
Kelheim, Germany
www.schneider-weisse.de

"Although there are lots of quality malts out there, I prefer to use continental malts in my German-style beers. I find the flavors of those malts consistent with the beers I drink when visiting Germany."

> "Hop aroma or flavor is not part of this beer style, but I still like to use German hops for German beers. In this case Hallertau, Spalt, Tettnang, Perle, Magnum or Tradition are fine choices."

caramel malt is in the darker color range (>80 °L). The darker caramel malts adds color and helps enhance the dark fruit character that is critical to this beer.

The ideal extract for this style does not exist. The ideal extract would be at least 50% dark wheat malt and the rest Pilsner and Munich malt. Most wheat extracts are made with a lighter kilned wheat malt and most Munich extracts are approximately half Pilsner or two-row malt, which is more Pilsner malt than desired. If you are interested in giving all-grain a try, the brew in a bag method is an easy way to get started, as it is very similar to steeping grain in a bag. You can find lots of good information on this technique by searching for "brew in a bag method" on the Internet. If you would rather stick with extract, use any high quality wheat extract and Munich extract.

Historically, like most weizen-type beers, weizenbock would have been decoction mashed. While a decoction mash might induce more Maillard reactions, the rich malt flavors provided by today's Munich and Pilsner malts is more than adequate and a single infusion or step mash works well. Weizenbock has a medium-full to full body. Target a mash temperature range of 150 to 156 °F (66 to 69 °C). If you are making a lower gravity beer, use the higher end of this temperature range to leave the beer with a bit more body. If you are making a bigger beer, use the lower end of the range to avoid too full of a body, which can become syrupy when extreme. Keep in mind wheat malt is huskless, so if your equipment is prone to stuck mashes, you might want to add a volume of rice hulls equal to the volume of wheat malt.

Hop aroma or flavor is not part of this beer style, but I still like to use German hops for German beers. In this case Hallertau, Spalt, Tettnang, Perle, Magnum or Tradition are fine choices. Liberty or Mount Hood can be acceptable substitutes if you cannot source one of the others. Balance the beer with enough hop bitterness to firm up the beer, but not enough to

overcome the malt sweetness of the beer. The balance should be even or maybe slightly sweet, but not more. Target a bitterness-to-starting gravity ratio (IBU divided by OG) between 0.2 and 0.4.

While the traditional weizen fermentation esters and phenols should be obvious in weizenbock, keep in mind that the fermentation character

> "My favorite yeasts for all weizen-type beers is White Labs WLP300 Hefeweizen Ale and Wyeast 3068 Weihenstephan Weizen. You can try other weizen-type yeasts and might prefer one over the other, so feel free to experiment."

— the clove and banana — should blend well with the rest of the beer character. While some brewers like to pitch a reduced cell count to increase weizen fermentation characteristics, I'm not a big fan of that technique. Instead, pitching rates should be the same as other ales. My favorite yeasts for all weizen-type beers is White Labs WLP300 Hefeweizen Ale and Wyeast 3068 Weihenstephan Weizen. You can try other weizen-type yeasts and might prefer one over the other, so feel free to experiment. A restrained fermentation temperature of 62 °F (17 °C) creates a beautiful balance of fermentation flavors and helps keep some unpleasant flavors in check. It is very important to follow the recommended fermentation temperature for this beer. BYO

BYO "Style Profile" columnist Jamil Zainasheff is an award-winning Northern California homebrewer, author, and host of "The Jamil Show" and "Brew Strong" shows on The Brewing Network. *A "stylish" guy, Jamil has brewed every style of beer described in the Beer Judge Certification Program (BJCP) Style Guidelines. He writes "Style Profile" in every issue of* Brew Your Own.

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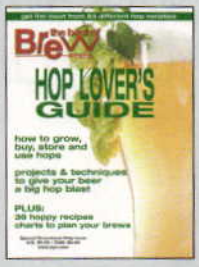

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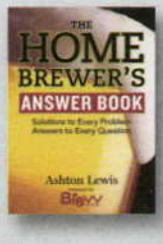

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remembering the choicest product of the brewers' art

Although St. Louis is now associated with Anheuser-Busch, A-B was neither the first nor the largest brewery there until the second half of the 20th Century. In fact, 100 years ago the most popular beer from that famous brewing city was Falstaff.

The roots of the Falstaff Brewing Corporation, which existed in one form or another for 167 years — from 1838 to 2005 — go back to German immigrant Johann Adam Lemp. Lemp was born in Gruningen in 1793. At the age of 43 he left for Cincinnati, another city associated with German immigration, and then moved to St. Louis two years later in 1838. His first business there was a grocery store. Along with other food items, he made and sold his own vinegar and beer in the new lager style that was beginning to achieve popularity in his native land. Almost all American beers at the time were top-fermented ales, and Lemp's lager became a favorite of other immigrants who wanted to keep up with trends in the old country.

Story by **Bill Pierce**

Beer, Not Groceries

Soon enough, the brewing eclipsed the grocery operations and in 1840 Lemp founded the Western Brewery, located on what is now the south leg of St. Louis's most prominent landmark, the Gateway Arch. Underneath the brewery, near the Mississippi River, were natural caves, which provided a cool location for lagering and storing the beer. Adam Lemp's son William came to America with his family as a very young boy. He attended St. Louis University and worked at the Western Brewery until he left in 1860 to form a partnership with another brewer. However, in 1862 the elder Lemp died suddenly, and his son returned to take over the reins of the family business. At that time, there were 40 breweries in St. Louis.

William Lemp did well, and by 1864 he had renamed the business to Lemp's Western Brewery and built a new facility at a location in south St. Louis that had access to larger caves, cooled in the summer with ice harvested from the river during the winter. Several years later he moved into a sizeable home near the site and connected it to the brewery via an underground tunnel. By the 1870s Lemp's was the largest brewery in St. Louis and the eighth largest in the US, with an annual production of 500,000 barrels. They were able to afford what were then significant tech-

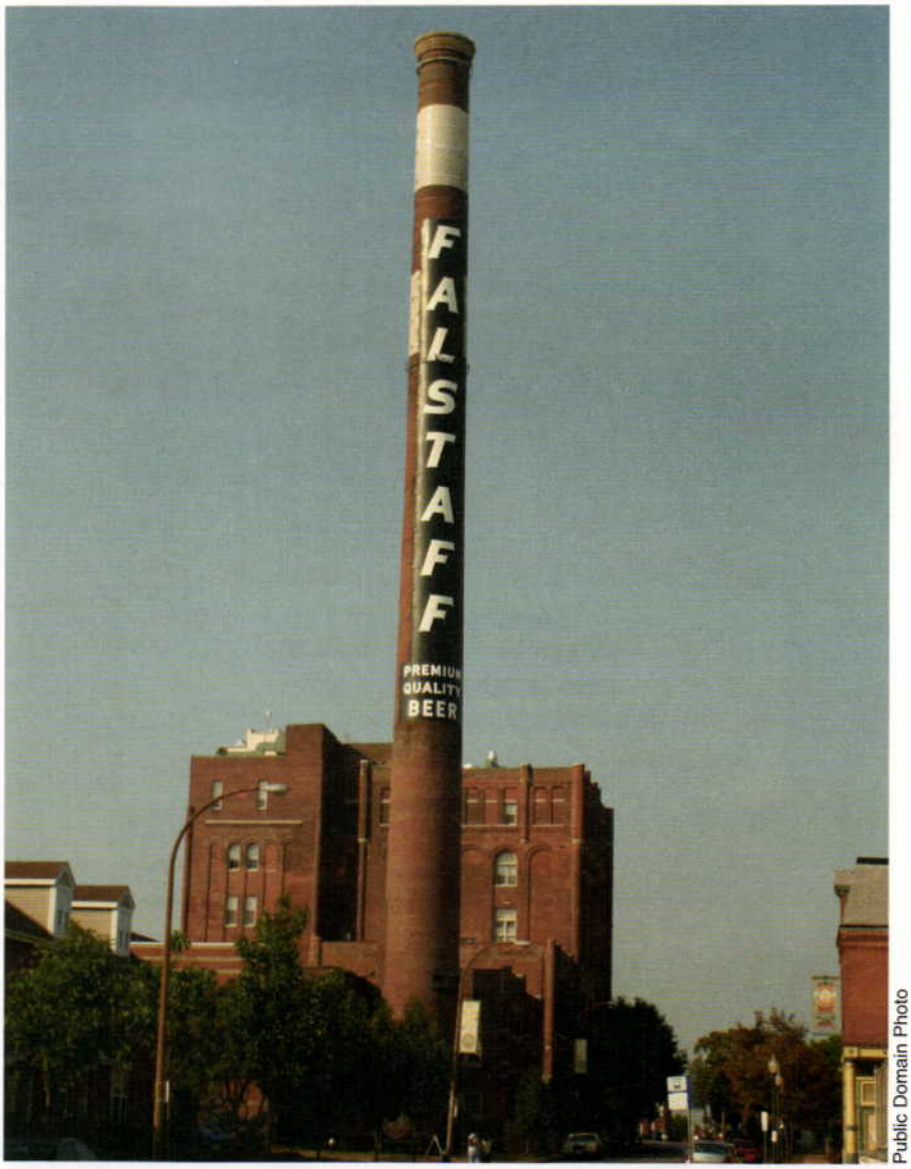

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Photo by Matt Kastner

Top: All Falstaff brewery locations are now shuttered, but in its heyday, Falstaff was the third largest brewery in the United States, behind Schlitz and Anheuser-Busch.

Bottom: Falstaff aggressively expanded and bought out other breweries, until it fell on hard times. The historic brand was acquired and allowed to languish. The last Falstaff was brewed in 2005.

nical innovations — in 1878 the first refrigeration machine in any American brewery and soon thereafter refrigerated railroad cars to transport the beer and distribute it over a wider area. Lemp's beers were even exported to Europe in ships newly fitted with refrigeration. They also were one of the first large brewers to operate their own bottling plant.

Fiction and Fact

Lemp introduced the Falstaff brand in the 1850s. Although the family was German, the beer was named after a fictional character made famous in the plays of William Shakespeare.

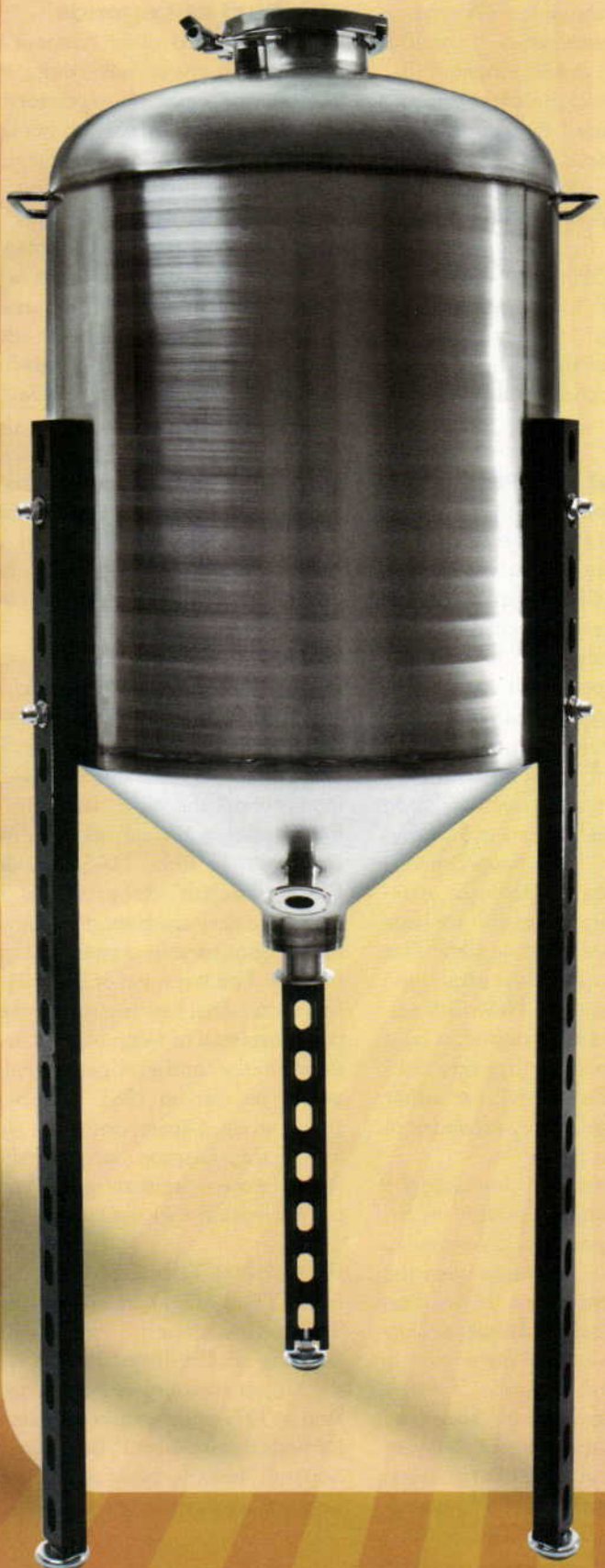
Sir John Falstaff was depicted as a portly and boastful English knight known for his love of good food, drink and conversation as well as being a patron of the arts. A longtime slogan used in Falstaff advertising was "The choicest product of the brewers' art," and the shield that appeared in the logo first trademarked in 1896 is said to be based on an artist's palette.

Three of William's four sons followed him into the business. His favored successor was his youngest, Frederick, who unfortunately had health problems and died at age 28 in 1901. Despondent over the loss and suffering from depression, William Lemp took his own life with a gunshot to the head in February 1904 at the age of 68. Eldest son William Jr. (Billy), assumed the presidency of the company, but he had his own problems. His wife Lillian was known for her lavish lifestyle and in 1908 sued him for divorce; the trial lasted 11 days and received sensational coverage in the national newspapers.

The Lemp family troubles were compounded by the growing temperance movement. The company was ill-prepared for the passage of the 18th Amendment in 1919 and had made no real plans for diversification. A nonalcoholic "near beer" introduced at the last minute did not sell well. By 1921 almost all employees had been let go. The brewery sat nearly empty and the business was short of cash.

Rescue came in the form of a rival St. Louis brewing family. Anton

BREW POWER



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Your Father's Mustache (Classic American Pilsner)
by Jeff Renner
(5 gallons/19 L, all-grain)
OG = 1.051 FG = 1.013
IBU = 35 SRM = 4 ABV = 5%

Ingredients
9.0 lbs. (4.1 kg) 6-row pale malt
2.25 lbs. (1.0 kg) brewer's grits
7 AAU Cluster hops (60 mins) (1.0 oz./28 g of 7.0% alpha acids)
5 AAU Styrian Goldings hops (15 mins) (1.0 oz./28 g of 5.0% alpha acids)
White Labs WLP833 (German Bock Lager) or Wyeast 2487 (Hella-Bock) yeast

Step by Step
Cereal mash corn grits. Mash in main mash to 140 °F (60 °C). Transfer cereal mash to main mash and adjust temperature to 152 °F (67 °C). Boil for 70 minutes. Ferment at 52 °F (11 °C).

Your Father's Mustache
(5 gallons/19 L, extract with grains)
OG = 1.051 FG = 1.013
IBU = 35 SRM = 4 ABV = 5%

Ingredients
1 lb. 9 oz. (0.7 kg) 6-row malt
6.5 oz. (180 g) flaked maize
3 lb. 11 oz. (1.67 kg) Briess Light dried malt extract
15 oz. (425 g) corn sugar
7 AAU Cluster hops (60 mins) (1.0 oz./28 g of 7.0% AA)
1.0 oz. (28 g) Styrian Goldings hops (15 mins)
White Labs WLP833 (German Bock Lager) or Wyeast 2487 (Hella-Bock) yeast

Step by Step
Steep grains in 2.8 qts. (2.6 L) of water at 150 °F (66 °C). Add extract, sugar and water to make 3.5 gallons (13 L). Boil 60 minutes. Ferment at 52 °F (11 °C).

Griesedieck was another German immigrant who had arrived in 1866 and invested in a number of St. Louis brewing-related businesses which by 1907 had become part of the International Breweries Company. (The name survives today in the IBC root beer brand.) A component of IBC was the Griesedieck Brothers Brewing Company, operated by Anton's four sons and a nephew. One of the sons, Joseph (Papa Joe) Griesedieck, stepped in and purchased the Falstaff brand from the Lemp family for the bargain sum of $25,000, reorganizing as the Falstaff Corporation (later Falstaff Brewing). He survived for the next 12 years by making soft drinks, and by curing, cooking and canning ham and bacon.

The Order of the Day
Upon Prohibition's repeal in 1933, brewing very quickly began again, with newly rehired employees working 48 hours straight to rush the product to thirsty customers who gathered on the brewery grounds and had to be restrained by police. It was clear America's love for beer had not diminished, and expansion was the order of the day. Falstaff responded with a series of acquisitions. They purchased the former Stiefel brewery in St. Louis and in 1935 the Fred Krug Brewing Company of Omaha, Nebraska, making them the first brewery to have operations in more than one state. This was followed shortly by the acquisition of National Brewing in New Orleans. Falstaff's practice of imposing its own production methods and quality control became the model for other national breweries as they expanded to multiple locations.

By 1948 Falstaff had purchased the competing Columbia Brewery in St. Louis and annual production exceeded 2,000,000 barrels. They also were the first brewing company to be listed on the New York Stock Exchange, a rarity when most breweries were closely held by their founding families. Further 1950's acquisitions included breweries in San Jose, California; Ft. Wayne, Indiana; Galveston and El Paso, Texas; and the remaining Griesedieck Brothers brewery in St. Louis. It was one of the most technically advanced breweries at the time and became the flagship of Falstaff operations.

The Stuff of Legends
Falstaff followed other national beer brands with major advertising campaigns and athletic sponsorships. Popular former Cardinals pitcher Dizzy Dean began broadcasting St. Louis Cardinals and Browns games on radio for Falstaff in 1941, and this was expanded to television. The infamous "midget strike zone" incident where Browns owner Bill Veeck inserted three-foot-six-inch (1.1-m) dwarf Eddie Gaedel as a pinch-hitter occurred during "Falstaff Day" at Sportsman's Park in 1951. Veeck would later purchase the Chicago White Sox. Eventually he brought another former St. Louis announcer, Harry Caray, who had originally promoted rival Griesedieck beers but now made famous the line "Holy cow! Have another Falstaff, folks!"

Falstaff was the first brewer to sponsor major entertainers, including the 1950 tour of country music star Hank Williams, who is said to have consumed Falstaff (along with various medications) the night before he was found dead in his car on New Year's Day 1953. In 1966, NASCAR driver Glenn "Fireball" Roberts died as a result of a fiery crash shortly after signing a sponsorship agreement with Falstaff. The last meal of beat generation writer Jack Kerouac is supposed to have consisted of a can of tuna, a bottle of whiskey and a six-pack of Falstaff before he died in 1967. British rock super group Cream, including guitar legend Eric Clapton, wrote and performed a one-minute musical commercial for Falstaff that same year.

Reaching Too Far
In 1965 Falstaff expanded once again. They purchased Narragansett Brewing of Cranston, Rhode Island, the largest brewery in New England. And in 1972 they acquired the brands formerly brewed by P. Ballantine and Sons of Newark, New Jersey, whose sales had declined after peaking in the

1950s. Total corporate production reached a maximum of just over 7 million barrels in 1966, making Falstaff the nation's third largest brewer, behind Schlitz and resurgent St. Louis rival Anheuser-Busch.

The Narragansett and Ballantine acquisitions proved to be difficult ones. The East Coast beer market was highly competitive, especially in terms of price. Additionally, the State of Rhode Island and the US Justice Department sued Falstaff on antitrust grounds, and another suit brought by former Ballantine shareholders claimed the negotiations for the brand were conducted unfairly and royalties improperly accounted and paid. These were eventually settled in Falstaff's favor, but defending them was expensive and time-consuming. The antitrust case was decided by the US Supreme Court in 1973. Meanwhile, sales, profit and production all declined for the first time in many years, to 6 million barrels by the early 1970s.

Enter Mr. Paul

At the time the American brewing industry was undergoing a period of major change and consolidation, ironically a trend that had begun by Falstaff itself more than 35 years earlier. One of the biggest players in those changes was Paul Kalmanovitz, a legendary and controversial figure. Born in Poland in 1905, he first immigrated to Egypt, and then joined the merchant marine, jumping ship in New York in 1926, where he did odd jobs and acquired US citizenship via marriage to another immigrant. Ten years later the Kalmanovitzes arrived in Los Angeles and opened a gas station; Paul also briefly worked as a driver for Hollywood film mogul Louis B. Mayer. Later they invested in real estate and operated nightclubs. In 1950 Kalmanovitz purchased the struggling Maier Brewing Company and its Brew 102 brand, which he managed to turn around. In 1958, Falstaff, eyeing the Southern California market, had tried to buy Maier. A Falstaff executive told Kalmanovitz, "You better sell or we will bury you." The threat was ignored. By the 1970s Kalmanovitz had taken over popular California rival Lucky Lager Brewing Company. Falstaff was seeking to shed some of its inefficient operations, and sold a recently acquired former Schlitz brewery in San Francisco to Kalmanovitz's General Brewing Corporation, which continued to brew Falstaff under contract. However, this was not enough to stanch the flow of red ink at Falstaff, and in 1975 they were in danger of being unable to meet their considerable payroll. Kalmanovitz, who already was a large shareholder, stepped in with a $25 million cash offer in exchange for majority control.

Such was his reputation as a fierce cost-cutter that employees at Falstaff's St. Louis headquarters flew the American and corporate flags upside down and at half-staff. The action may not have been unwarrant-

ed; Forbes magazine later reported that "Kalmanovitz went through Falstaff like Grant through Richmond . . . he took no prisoners." In less than a year the offices in St. Louis were consolidated with General Brewing in San Francisco, and by 1977 all Falstaff operations ceased there after a 139-year history in the city of its birth. Kalmanovitz and his executives continued their campaign of acquiring — and closing — struggling breweries. Over the next 22 years, even though Paul Kalmanovitz himself died in 1987, these included many of the former icons of American brewing, among them National Bohemian, Pearl, Olympia, Pabst and finally Stroh's. Of the large brewers, only Anheuser-Busch, Miller and Coors remained unscathed. Prior to the craft brewery revival, the number of breweries in the US had reached a low of 80 in 1983.

"Mr. Paul," as he was known, had an aversion to labor unions and taxes. He endured and survived numerous strikes and lockouts as a result of his takeovers. Upon his death, he left an elaborate will that attempted to avoid estate taxes by transferring the brewing interests to a nonprofit charitable trust. While the trust made numerous gifts to universities and medical research, it was also charged by the Internal Revenue Service with operating a profit-making business in violation of the tax code. After a long series of appeals and extensions that lasted for more than a decade, in 2010 the trust finally sold the Pabst Brewing Company, under which it had consolidated all its brewing operations, to a group of private investors.

Not With a Bang, But a Whimper

The decline of Falstaff after the Kalmanovitz buyout was neither short nor pretty. Very little was spent on advertising and promotion, and the brand withered. Breweries continued to be closed and demolished; in at least two cases the brewing equipment was dismantled and shipped to China. Sales of Falstaff had already fallen to 900,000 barrels in 1984; a decade later it was 270,000, and only 20,000 barrels were produced in 2001. The Ft. Wayne brewery, the last one that remained from the Falstaff era, was closed in 1990. Brewing was transferred to Pabst facilities in Milwaukee and the former Pearl brewery in San Antonio. After both of those breweries closed, Falstaff was brewed briefly under contract by Miller, variously in Fort Worth, Milwaukee, and Trenton, Ohio.

Finally, in 2002 the Falstaff contract moved to City Brewing of La Crosse, Wisconsin, which had been purchased and reopened by managers of the former G. Heileman brewery there. However, the patient had virtually no life left after its long, lingering illness. When annual sales declined to an all-time low of 1,468 barrels (the production of a medium-size brewpub) in 2004, the Falstaff brand was put to sleep once and for all in April 2005. Almost no one remained to note the passing, apart from those of us who mourn and remember when "the choicest product of the brewers' art" was indeed a proud and vital part of the tradition of American brewing.

Recipe Time

The taste of Falstaff from the 1960s onward is approximated by many of the "value priced" beers available at retail locations in your neighborhood. There is little reason to brew them yourself. However, a different beer entirely is the Classic American Pilsner style that attempts to recreate what was very likely brewed by American breweries, including Falstaff, prior to Prohibition in 1919.

Present-day commercial versions of this style are rare, but one of its champions is homebrewer Jeff Renner of Ann Arbor, Michigan, whose recipe for Classic American Pilsner uses 6-row American base malt, which is high in protein (including enzymes), and corn as a low-protein adjunct. It is more highly hopped than today's mainstream American lagers, but results in smooth flavor — and drinkability — the beer your great grandfather experienced. (See recipe on page 30.)

Because it duplicates the original style, Renner's recipe uses brewer's corn grits, which are still in common use by large breweries but not easily available from homebrew suppliers. Substitutions that produce good results include degermed corn meal and polenta. You will need to do a cereal mash or "double mash" because the corn starches will not be gelatinized at normal mash temperatures, as occurs with barley. To achieve gelatinization of the starches, corn needs to be boiled. (The same goes for rice as well, another common adjunct in American-style Pilsners.)

A cereal mash consists of adding 20–30 percent by weight of 6-row malt to the corn (this helps to keep the mash from sticking) and hot water to a thickness of about 1.5 quarts per pound (3.1 L/kg) of dry ingredients and a temperature of 152–154 °F (67–68 °C). Use a pot with a thick bottom to avoid burning. Hold for 20 minutes, and then increase the heat, stirring until it comes to a boil and occasionally thereafter. Boil for at least 30 minutes for corn meal, 45–60 minutes for corn grits or polenta. Add hot water if it becomes too thick or sticks. Meanwhile, you will have mashed in the rest of the grist for the recipe and held it at a temperature of about 140 °F (60 °C). Add the boiled cereal mash back to the main mash in order to achieve a temperature of 149–158 °F (65–70 °C). The lower end of that range results in a drier beer, the higher end more body and residual sweetness. Be prepared to adjust the temperature by adding hot or cold water as appropriate. Maintain that temperature for 40–45 minutes to achieve complete conversion of the gelatinized starches.

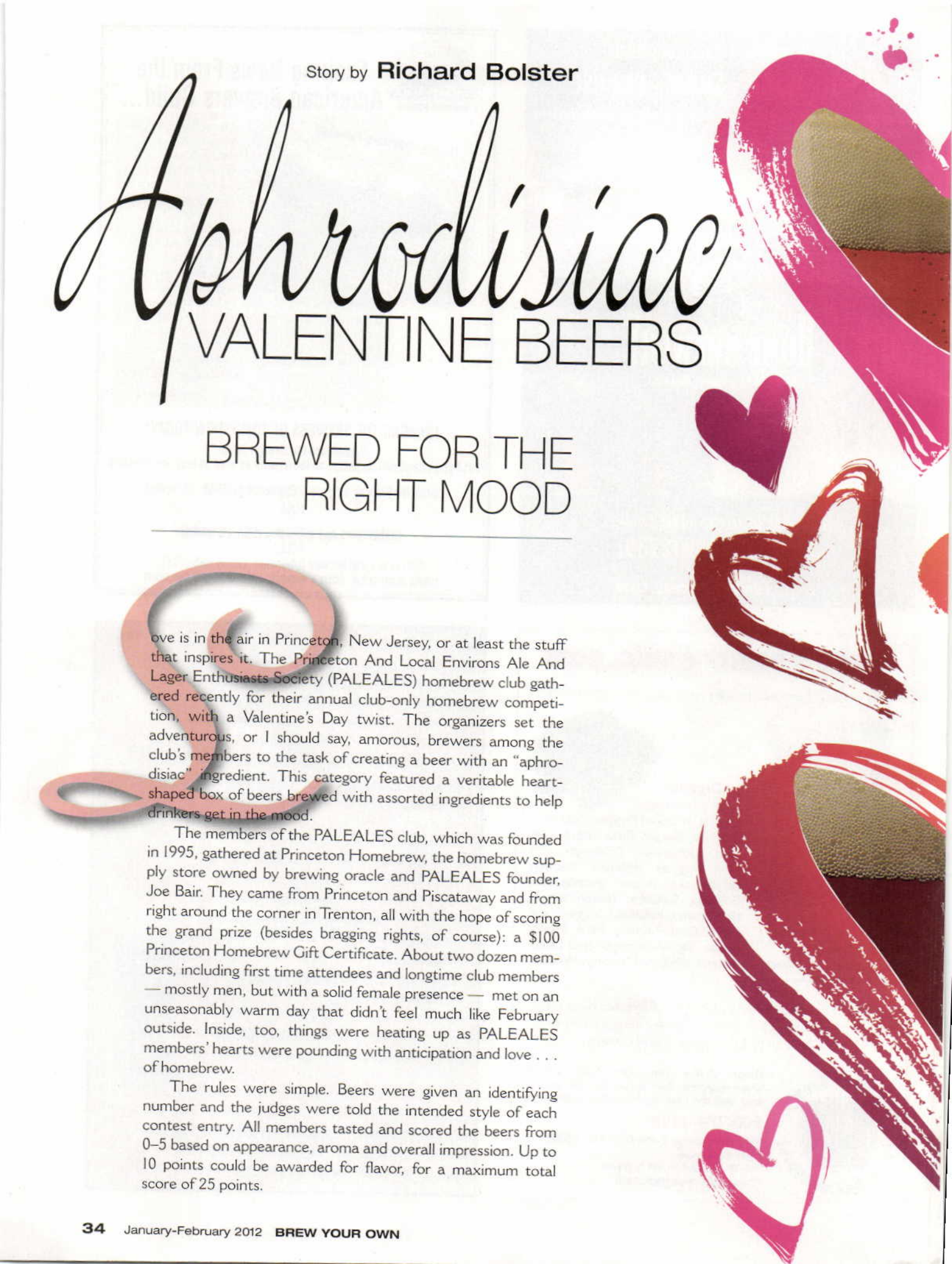
Should you not want to go to the effort of a cereal mash, you can use flaked maize (corn). The process of manufacturing the flakes gelatinizes the starches so that a standard single infusion or step mash will suffice. The resulting beer will be similar, but you will have missed an opportunity to connect with brewers of a century or more ago. BYO

Bill Pierce is a frequent contibutor to Brew Your Own *magazine.*

Story by **Richard Bolster**

Aphrodisiac VALENTINE BEERS

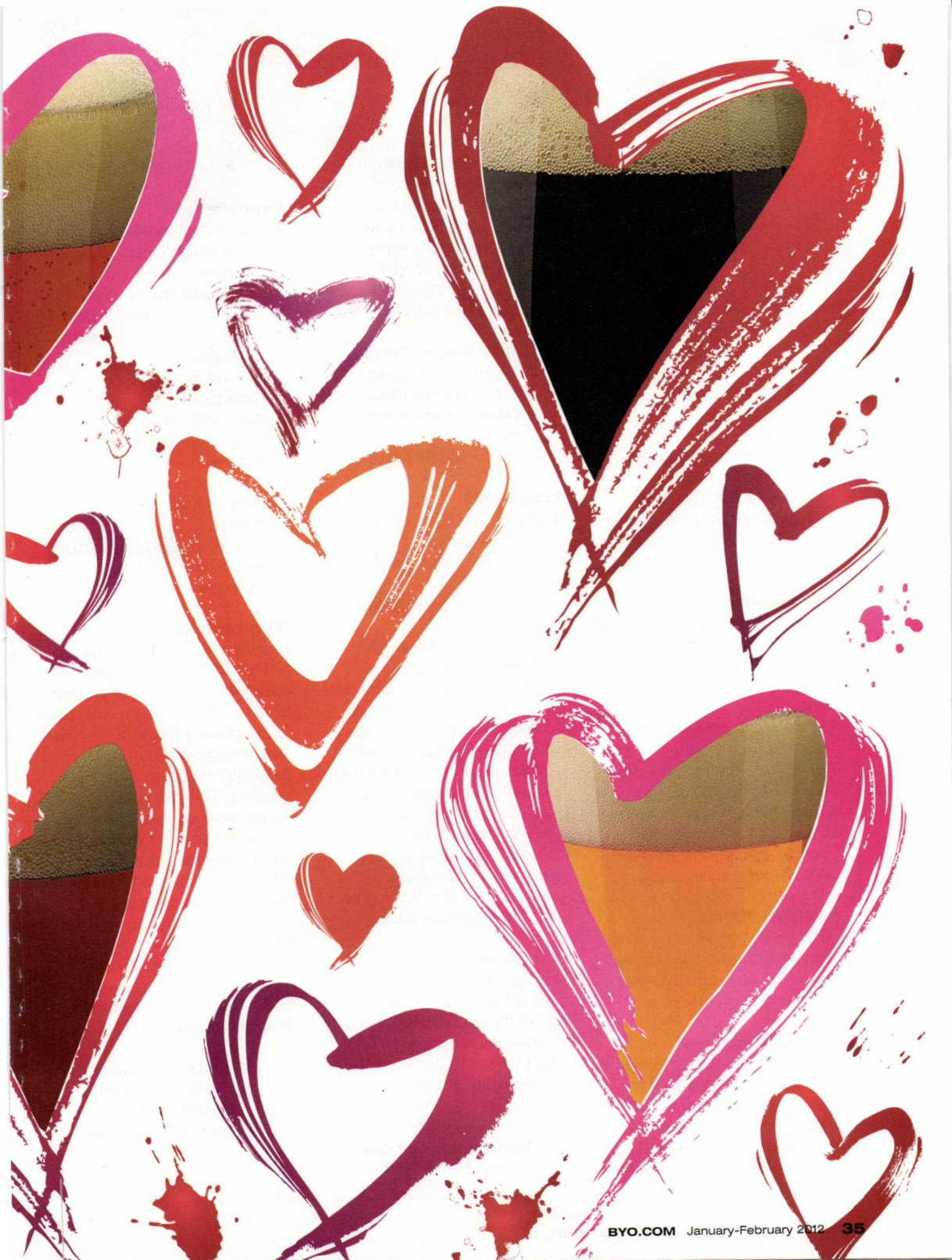
BREWED FOR THE RIGHT MOOD



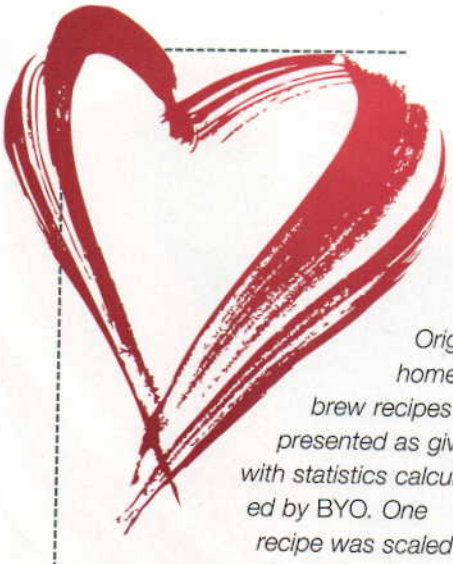
Love is in the air in Princeton, New Jersey, or at least the stuff that inspires it. The Princeton And Local Environs Ale And Lager Enthusiasts Society (PALEALES) homebrew club gathered recently for their annual club-only homebrew competition, with a Valentine's Day twist. The organizers set the adventurous, or I should say, amorous, brewers among the club's members to the task of creating a beer with an "aphrodisiac" ingredient. This category featured a veritable heart-shaped box of beers brewed with assorted ingredients to help drinkers get in the mood.

The members of the PALEALES club, which was founded in 1995, gathered at Princeton Homebrew, the homebrew supply store owned by brewing oracle and PALEALES founder, Joe Bair. They came from Princeton and Piscataway and from right around the corner in Trenton, all with the hope of scoring the grand prize (besides bragging rights, of course): a $100 Princeton Homebrew Gift Certificate. About two dozen members, including first time attendees and longtime club members — mostly men, but with a solid female presence — met on an unseasonably warm day that didn't feel much like February outside. Inside, too, things were heating up as PALEALES members' hearts were pounding with anticipation and love . . . of homebrew.

The rules were simple. Beers were given an identifying number and the judges were told the intended style of each contest entry. All members tasted and scored the beers from 0–5 based on appearance, aroma and overall impression. Up to 10 points could be awarded for flavor, for a maximum total score of 25 points.



Aphrodisiac Beer Recipes



Original homebrew recipes are presented as given, with statistics calculated by BYO. One recipe was scaled from 10 gallons to 5 gallons. Conversions to all-grain or extract version by BYO.

Jolly Roger Double Mocha Porter
by Dave Rawlins
(5 gallons/19 L, all-grain)
OG = 1.062 FG = 1.016
IBU = 45 ABV = 6.0%

Ingredients
11 lbs. (5.0 kg) Maris Otter pale malt
0.25 lbs. (0.11 kg) crystal malt (120 °L)
0.25 lbs. (0.11 kg) crystal malt (150 °L)
0.25 lbs. (0.11 kg) Weyermann Carafa® Type II malt
0.25 lbs. (0.11 kg) 2-row black malt
0.5 lbs. (0.23 kg) kiln coffee malt
0.5 lbs. (0.23 kg) chocolate malt
8.5 AAU Summit hops (45 mins) (0.5 oz./14 g of 17% alpha acids)
5 AAU Willamette hops (20 mins) (1.0 oz./28 g of 5% alpha acids)
5 AAU Willamette hops (5 mins) (1.0 oz./28 g of 5% alpha acids)
75% Wyeast 1764 (Rogue Pacman) and 25% White Labs WLP028 (Edinburg Ale) yeast

Step by Step
Mash in at 152 °F (67 °C). Hold at 152 °F (67 °C) for 60 minutes. If possible heat mash to 168 °F (76 °C) and hold for 10 minutes for mash out. Sparge with 168 °F (76 °C) water and collect 7.5 gallons (28 L) of wort or collect runoff until Plato drops to 2.0 (1.008 SG) and add water to the 7.5-gallon (28-L) mark. Boil for 60 minutes, adding hops as indicated. Cool to 65–68 °F (18–20 °C) and pitch yeast. Ferment at 65–68 °F (18–20 °C) for 1 week. Transfer to secondary fermenter for 2 weeks. Crash cool at 36 °F (2.2 °C) for 1 to 2 weeks then keg or bottle. Carbonate to 2.3 to 2.5 volumes.

Jolly Roger Double Mocha Porter
(5 gallons/19 L, extract with grains)
OG = 1.062 FG = 1.016
IBU = 45 ABV = 6.0%

Ingredients
8.0 lbs. (3.6 kg) Muntons Light liquid malt extract
0.25 lbs. (0.11 kg) crystal malt (120 °L)
0.25 lbs. (0.11 kg) crystal malt (150 °L)
0.25 lbs. (0.11 kg) Weyermann Carafa® Type II malt
0.25 lbs. (0.11 kg) 2-row black malt
0.5 lbs. (0.23 kg) kiln coffee malt
0.5 lbs. (0.23 kg) chocolate malt
8.5 AAU Summit hops (45 mins) (0.5 oz./14 g of 17% alpha acids)
5 AAU Willamette hops (20 mins) (1.0 oz./28 g of 5% alpha acids)
5 AAU Willamette hops (5 mins) (1.0 oz./28 g of 5% alpha acids)
75% Wyeast 1764 (Rogue Pacman) and 25% White Labs WLP028 (Edinburg Ale) yeast

Step by Step
Steep grains at 152 °F (67 °C). Stir in half of the malt extract and boil wort for 60 minutes, adding hops as indicated. Stir in remaining malt extract in final 15 minutes of the boil. Ferment at 65–68 °F (18–20 °C).

Gato Negro
by Dawn Coluccio and Kate Saik
(5 gallons/19 L, extract with grains)
OG = 1.054 FG = 1.013
IBU = 21 ABV = 5.2%

Ingredients
6.0 lbs. (2.7 kg) dark malt extract
1.0 lb. (0.45 kg) domestic special pale malt
1.0 lb. (0.45 kg) medium crystal malt
0.50 lb. (0.23 kg) roasted barley
0.25 lb. (0.11 kg) chocolate malt
0.50 lb. (0.23 kg) oatmeal
1.75 cup unsweetened cocoa powder
2 whole vanilla beans
5 AAU UK Kent Golding hops (45 mins) (1.0 oz./28 g of 5% alpha acids)
8.5 AAU UK Northdown hops (5 mins) (1 oz./28 g of 8.5% alpha acids)
White Labs WLP002 (English Ale) yeast

Step by Step
Heat 1.0 gallon (3.8 L) of water to 170 °F (77 °C). Add grain bag and steep for 30 minutes. Sparge grains at 168 °F (76 °C) bringing volume up to 2.0 gallons (7.6 L). Return to boil. Turn off heat and add malt extract. Boil for 60 minutes adding hops as indicated. Turn off heat. Split and scrape vanilla beans and add. Add cocoa powder. Stir thoroughly. Bring the total volume up to 5 gallons (19 L). Cool to 70 °F (21 °C) and pitch yeast. Ferment at 60–75 °F (16–24 °C). Rack to secondary when gravity is 1.016 or lower. Ferment until action has ceased and beer has clarified. Prime, bottle and age at room temperature for at least two weeks before chilling.

Strawberry Choco
by Mike Moreken
(5 gallons/19 L, extract with grains)
OG = 1.051 FG = 1.013
IBU = 23 ABV = 5.3%

Ingredients

1.0 lb. (0.45 kg) crystal malt (60 °L)
0.20 lb. (91 g) CaraPils® malt
1.0 lb. (0.45 kg) pale malt
3.2 lb. (1.5 kg) golden liquid malt extract (45 min)
3.0 lb. (1.4 kg) amber liquid malt extract (45 min)
6.1 AAU Nugget hops (60 mins) (0.5 oz./14 g of 12.2% alpha acids)
1 whirlfloc tablet (15 mins)
Nottingham dried yeast
3.0 lb. (1.4 kg) Sweet Cherry Puree Vintner's Harvest (secondary)
0.33 cup baker's chocolate (secondary)
2.0 oz. (57 g) strawberry extract (bottling)
0.5 lb. (0.23 kg) lactose (bottling)
¾ cup brown sugar (for priming)

Step by Step

Bring about 2.5 gallons (9.5 L) to roughly 155 °F (68 °C). Soak grain for 30 minutes. Remove grain. Bring to a boil. Remove pot from heat and stir in extract. Return to boil for 60 minutes. Add hops and whirlfloc as indicated. Add cool sterilized water to make 5 gallons (19 L). Aerate and pitch yeast at 72 °F (22 °C).

Ferment for one week then rack to secondary. Add cherry puree and chocolate to secondary. Move to cooler area for two weeks at 70 °F (21 °C), if possible. At bottling, add strawberry flavor and lactose, stir gently. Prime, bottle and condition at room temperature for four weeks minimum.

(OG and FG are given as before lactose and fruit added. Estimated ABV includes sugar from strawberry puree. Lactose will boost beer's FG by about 4 "gravity points.")

Strawberry Choco
(5 gallons/19 L, all-grain)

OG = 1.051 FG = 1.013
IBU = 23 ABV = 5.3%

Ingredients

8.5 lb. (3.9 kg) pale malt
1 lb. 6 oz. (0.63 kg) crystal (60 °L)
0.20 lb. (91 g) CaraPils® malt
6.1 AAU Nugget hops (60 mins) (0.5 oz./14 g of 12% alpha acids)
1 whirlfloc tablet (15 mins)
Nottingham dried ale yeast
3.0 lb. (1.4 kg) Sweet Cherry Puree Vintner's Harvest (secondary)
0.33 cup baker's chocolate (secondary)
2.0 oz. (57 g) strawberry extract (bottling)
0.50 lb. (0.23 kg) lactose (bottling)
¾ cup brown sugar (for priming)

Step by Step

Mash at 152 °F (67 °C). Boil for 90 minutes, adding hops with 60 minutes remaining. Ferment at 72 °F (22 °C), then rack to secondary, adding fruit puree and chocolate. Add lactose and fruit extract at bottling, along with priming sugar.

Hot Chocolate Porter
by Kevin Trayner
(5 gallons/19 L, extract with grains)

OG = 1.050 FG = 1.012
IBU = 53 ABV = 4.8%

Ingredients

6.6 lbs. (3.0 kg) amber liquid malt extract
0.50 lb. (0.23 kg) chocolate malt
0.50 lb. (0.23 kg) black patent
0.50 lb. (0.23 kg) CaraMunich® malt
2.5 oz. (71 g) Ancho chile powder
5.0 oz. (142 g) cocoa powder
8.0 oz. (227 g) milk chocolate bar
4.5 AAU Northern Brewer hops (60 mins) (0.50 oz./14 g of 9% alpha acids)
9.0 AAU Northern Brewer hops (45 mins) (1.0 oz./28 g of 9% alpha acids)
4.5 AAU Northern Brewer hops (10 mins) (0.50 oz./14 g of 9% alpha acids)
Wyeast 1099 (Whitbread Ale) yeast

Step by Step

Bring two gallons water to 160 °F (71 °C). Turn off heat and add specialty grains. Steep for 30 minutes. Stir in extract. Return to heat and bring to boil. Add cocoa powder, chile pepper, and chocolate bar. Boil for 60 minutes, adding hops as indicated. Remove from boil. Top up to 5.0 gallons (19 L). Cool, aerate and pitch yeast at 72 °F (22 °C). Ferment at 65–68 °F (18–20 °C) for two weeks then rack to secondary. Prime, bottle and condition at room temperature for one week.

You can use different peppers for different flavors. I like the smokiness of Ancho. Alternate pepper flavor method: Sear 1–3 whole peppers on a grill. Add to secondary.

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

OG = 1.050 FG = 1.012
IBU = 53 ABV = 4.8%

Ingredients

8.5 lbs. (3.9 kg) pale malt
0.50 lb. (0.23 kg) chocolate malt
0.50 lb. (0:23 kg) black patent
1.25 lb. (0.57 kg) CaraMunich® malt
2.5 oz. (71 g) Ancho chile powder
5.0 oz. (142 g) cocoa powder
8.0 oz. (227 g) milk chocolate bar
4.5 AAU Northern Brewer hops (60 mins) (0.50 oz./14 g of 9% alpha acids)
9.0 AAU Northern Brewer hops (45 mins) (1.0 oz./28 g of 9% alpha acids)
4.5 AAU Northern Brewer hops (10 mins) (0.50 oz./14 g of 9% alpha acids)
Wyeast 1099 (Whitbread Ale) yeast

Step by Step

Mash at 152 °F (67 °C). Boil for 60 minutes, adding hops as indicated. Ferment at 65–68 °F (18–20 °C) for two weeks then rack to secondary. Prime, bottle and condition at room temperature for one week.

The competition was collegial rather than cutthroat with an emphasis on participation, education and enjoyment. Newbies were as welcome to enter the competition as were the club's founders.

The event featured three broad categories of judging. The first two were based on gravity. Category 1 included brews with an original gravity of less than 1.060. Category 2 concoctions were those with an OG of 1.060 or higher. But the third category was where we all felt the love. The centerpiece of the afternoon, the aphrodisiac category, allowed brewers to highlight their creativity and to channel their inner Cupid.

The term "aphrodisiac," which is derived from Aphrodite, the ancient Greek goddess of love and beauty, and which Webster's defines as, "an agent that arouses . . . sexual desire," was loosely interpreted by the brewers, and that was a good thing. The aphrodisiac ingredients ranged from the perennial Valentine favorite, chocolate, to beers brewed with honey, strawberry extract and, to really spice things up, ancho chile peppers.

THE RESULTS ARE IN

Dave Rawlins was inspired to create his Jolly Roger Double Mocha Porter after falling hard for Rogue Brewery's Double Mocha. A homebrewer since 1997 who loves French roast coffee, he explained, "I was "trying to get a mocha edge." He got his edge and stole the hearts of the judges as his beer took top honors. This smooth robust porter was dark brown, almost black, with surprisingly subtle chocolate notes. Coffee dominated — a pound of kiln coffee malt, from Belgian maltsters Franco-Belges, will do that — but never overpowered this fine brew. (See all the recipes on page 36.)

Though nosed out at the finish line, the dynamic brewing duo of Dawn

Caluccio and Kate Saik were thrilled to finish second with their own chocolaty entry. Their Gato Negro – named for Kate's thirsty feline who got a little too close to the kettle and almost met the proverbial fate of all curious cats – was a black beauty of a beer with a thick, *café au lait* head and a rounded milk chocolate flavor. To get that flavor this brewing tandem did their homework.

"We thought about using actual chocolate but after . . . asking many questions of our more seasoned brew buddies [in the club] we decided on using the classic Hershey's unsweetened cocoa powder." Theirs was a double whammy, too, with vanilla bean adding richness and depth of flavor.

Chocolate was clearly a hit with the judges but honey, too, was well received. Russ Acevedo's Belgian Honey received an honorable mention.

THE BEST OF THE REST

Brewer Mike Moreken was covering all

the bases. "I figured strawberries are kind of a romantic thing, you know, strawberries dipped in chocolate." So he whipped up a strawberry-infused chocolate beer. His recipe produced a relatively light-bodied brew. And, perhaps not surprisingly, the judges were split on this one. Some said it was pleasingly sweet, while others found the berry blast too strong. Strawberry was immediately obvious in the nose but mellowed on the palate.

Mike allowed, "The brew left no doubt it was a strawberry beer. The beer had a huge strawberry aroma at about 3 weeks." But after another month in the bottle Mike reported, "Wow, what a difference! The power of the strawberry fell nicely into the background."

PALEALES President, Kevin Trayner considered several aphrodisiac ingredients, including saffron and oysters, before deciding to play to his own preference for hot, spicy foods. Ancho chile powder was the aphrodisiac in his Hot Chocolate Porter.

A prior attempt to brew a jalapeño lager had taught Kevin a hard lesson. "I

put three peppers in the fermenter for a week and guess what, three is too many." This time out he was more conservative but wishes he'd used more of the hot stuff. "I would add a little more pepper next time, or consider "dry hopping" with dried or roasted whole peppers." The emphasis here was on the chocolate malt sweetness, with a minimal pepper presence.

Spared a pepper blast, our palates were able to focus on all the tasty brews in the competition.

As for the aphrodisiacs, they worked their magic. The PALEALES members were romanced by these beers. Dawn Coluccio put it best, "What's not to love about Valentine's Day? A good homebrew to share with family and friends . . . brings people together and that feels good."

So for your next homebrew recipe or competition, add a dash of romance with an aphrodisiac ingredient because at this time of year, love is in air . . . and also in the beer. BYO

Richard Bolster wrote about pretzels in the September 2011 issue of BYO.

Improve your HOMEBREWS

THE PATH TO PERFECTION

Story by **Chris Colby**

After brewing for awhile, many homebrewers reflect on their beer and wish to improve upon it. However, the path to better beer is not always obvious. This article is written for homebrewers who wish to increase their brewing skills, produce better beer and are willing to make an effort towards that end. There are essentially two steps to improving your homebrew — identifying avenues for improvement and making the necessary changes. Put more simply, you find the problem and fix it. Then you repeat the process.

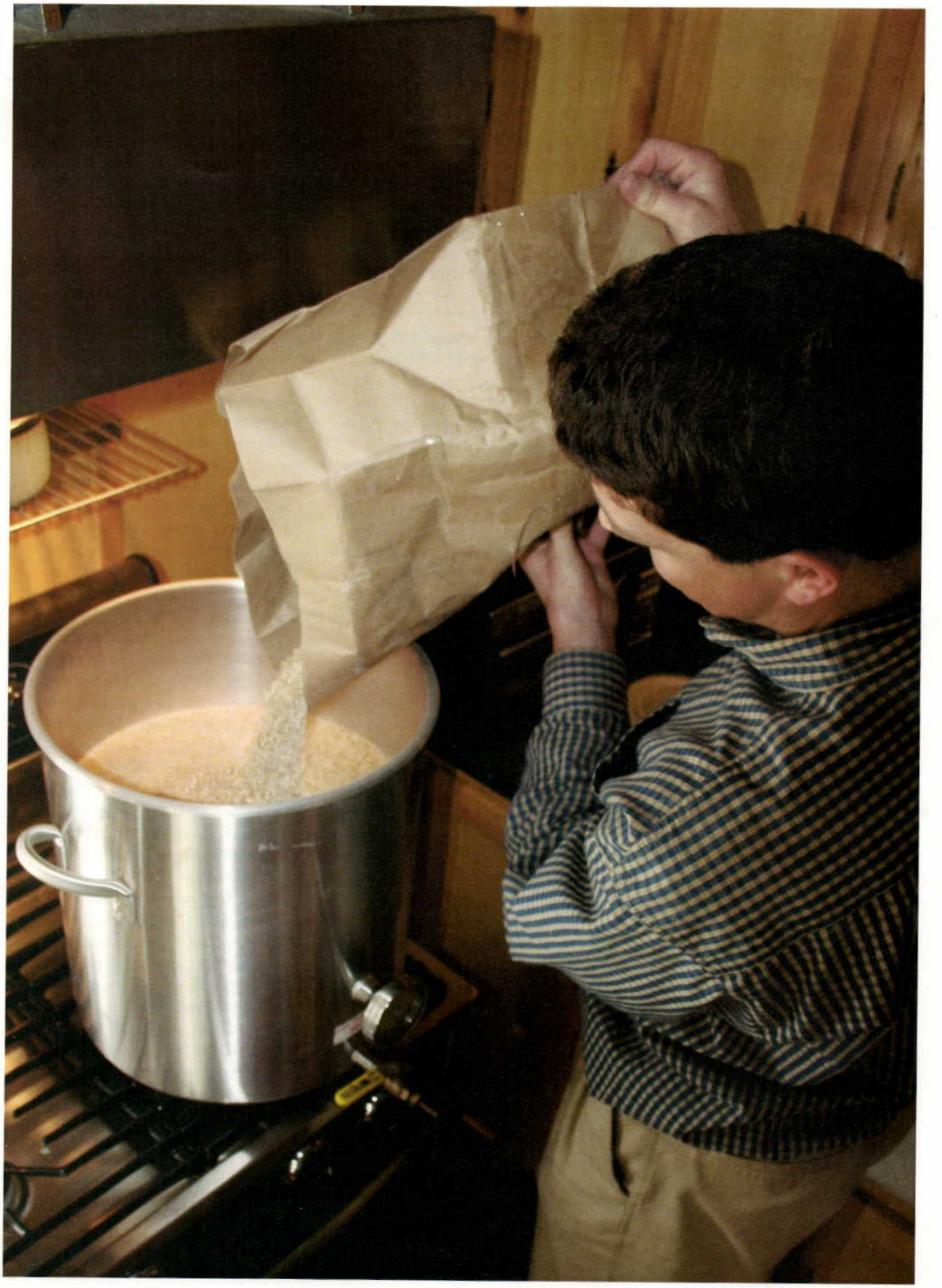
Every homebrewer has a unique combination of equipment, water, other ingredients, recipes and skills. Solid advice that is helpful to one homebrewer may be useless for another. For some generic advice that may apply to you, see "10 Steps to Better Beer" in the September 2005 issue of *BYO* and, if you are an extract brewer, "10 Steps to Better Extract Brewing" in the October 2005 issue. Both of these articles are available online at byo.com.

The first step on the path to improving your brewing is to brew some beer. Start your quest by choosing a beer you enjoy, that you have brewed successfully before and are willing to brew several times while you hone your skills. Brew this beer and take good notes (see the sidebar on keeping a brewing notebook on page 46). Once the beer is ready, try to get some useful feedback on it.

Gather Information and Identify Problems

An excellent source of information on your beer would be an accomplished brewer who is willing to honestly assess it. If you are lucky enough to live somewhere with an active homebrew club, he or she may be at the next meeting. If you join a local club and get to know the most accomplished brewers, getting help is usually as easy as asking. Most homebrewers are excited to talk about brewing and offer advice. Plus, this brewer will likely understand local issues that apply to you, such as treatment plans for your local water for various kinds of beer.

If your town has a commercial brewery, the brewer there could potentially be helpful as well. If the brewery offers tours, take one and see if the tour guide is the brewer (or one of the brewers). Tell him or her you're a homebrewer and are look-



MANAGING THE MICROBES — BEYOND CLEANING AND SANITATION

Thoroughly cleaning and sanitizing your brewing equipment is an overarchingly important step in brewing quality beer. Any other choice you make in brewing will be overshadowed by off odors and flavors if your beer is contaminated. However, it's also simultaneously the least exciting part of brewing and yet the part that requires the most labor on a homebrew scale. One thing you can do to maximize the benefits of your hard work in this area is to view it as part of a larger program of managing the microbes in your brewery. These microbes include all the various unwanted yeast and bacteria that could contaminate your beer as well as the one microbe you want to grow healthily in your wort — brewers yeast.

Cleaning and sanitizing your equipment minimizes one major pathway of contamination, but you should also be aware of others and seek to make things difficult for contaminants that do get in your wort. You cannot completely eliminate contaminants from your wort or beer. No brewery (home or commercial) operates under sterile conditions. The best you can do is brew in a way that minimizes the degree of contamination and its effects.

On brew day, everything in your brewery should be clean. Everything that is going to touch wort should also be sanitized. Although wort or beer can be contaminated from many sources — microbes from the air, unwanted microbes in the pitching yeast, contact with the brewer, etc. — the surfaces that touch wort are a prime source of contamination. If an object that is going to touch wort contacts something that isn't sanitized, that object is no longer sanitary. For example, if you pick up your racking cane near the inlet of the cane, you can transfer unwanted microbes from your hand to your beer.

Working quickly at key times in your brew day minimizes the extent of contamination. At the end of the boil, your wort is effectively sterile. (There are microorganisms that can withstand boiling temperatures, but they don't grow quickly in wort.) When you chill wort, it soon enters a temperature range in which microbes that land in the wort can take hold. Cooling the wort as quickly as is feasible, and keeping the vulnerable wort covered as you chill, will keep the levels of airborne contaminants to a reasonable level. Chilling the wort quickly down to fermentation temperature also means that contaminants won't have an extended time to grow quickly in warm wort.

All chilled wort is contaminated, but pitching an adequate amount of yeast limits the potential of the contaminants to negatively affect your beer. Brewers yeast produces alcohol, and alcohol kills many unwanted microorganisms at low concentrations (just a few percent). Likewise, as beer ferments, the pH drops and low pH conditions are hostile towards most microorganisms. (The brewing contaminants we know best — *Brettanomyces*, *Lactobacillus* and *Pediococcus* — are unusual in that they produce copious amounts of alcohol, acid or both, and so they are tolerant to these conditions.)

All brewers should take the time to assess the degree of contamination in their chilled wort. To do this, you need to perform a forced wort test. On brew day, take a clean glass jar (such as the kind maraschino cherries, and an wide variety of other foods, come in) and submerge it and the lid in boiling water for 5 minutes. As you are filling the fermenter, fill the sanitized jar about half way with chilled, unpitched wort. Place the cover on the jar loosely and place it somewhere warm (ideally, about 80 °F/27 °C) and away from strong light. Check the jar every 24 hours for signs of fermentation. At 48 hours, the wort should be clear and smell like fresh wort. If not, your beer will likely suffer from the contamination it is harboring (even if it doesn't quickly turn sour). If your cleaning and sanitation is really good, the wort may remain clear until 72 hours. This is a simple test and an easy way to assess if you really are producing quality wort or if you need to pay more attention to your sanitation.

Another pathway for contamination is microbes that are pitched along with the brewers yeast. This can come into play if you make a yeast starter. When making or stepping up a yeast starter, pay extra attention to cleaning and sanitation and always aim to get the yeast strongly fermenting as quickly as possible. As a rule of thumb, never step up a simple starter (not aerated or continuously stirred) more than 10-fold. In other words, 1 volume of fermented wort to a maximum of 10 volumes of fresh wort. (Note: if you pitch a 2 qt./2 L starter to 5 gallons (19 L) of beer, this is roughly a 1:10 pitching rate.)

Once fermentation starts to slow, the biggest thing you can do to minimize the effects of contamination is to keep the beer away from oxygen. This will slow the growth of aerobic, acid-tolerant microbes such as *Acetobacter*.

If you focus on minimizing the number of organisms that contaminate your wort, and subsequently minimizing the impact of those that do, your beer will taste fresh and be stable for relatively long periods of time.

ing for some feedback. The worst he can say is no. If he does agree, bring a bottle of your best beer (don't ask him to slog through multiple brews, or an absolutely awful beer). Tell him what kind of beer you intended and then let him taste it and give you his opinion. Be ready to answer questions about your procedures, but the brewer probably won't need to know all the minute details — he brews and tastes beer every day and will likely be able to give helpful feedback after one sip.

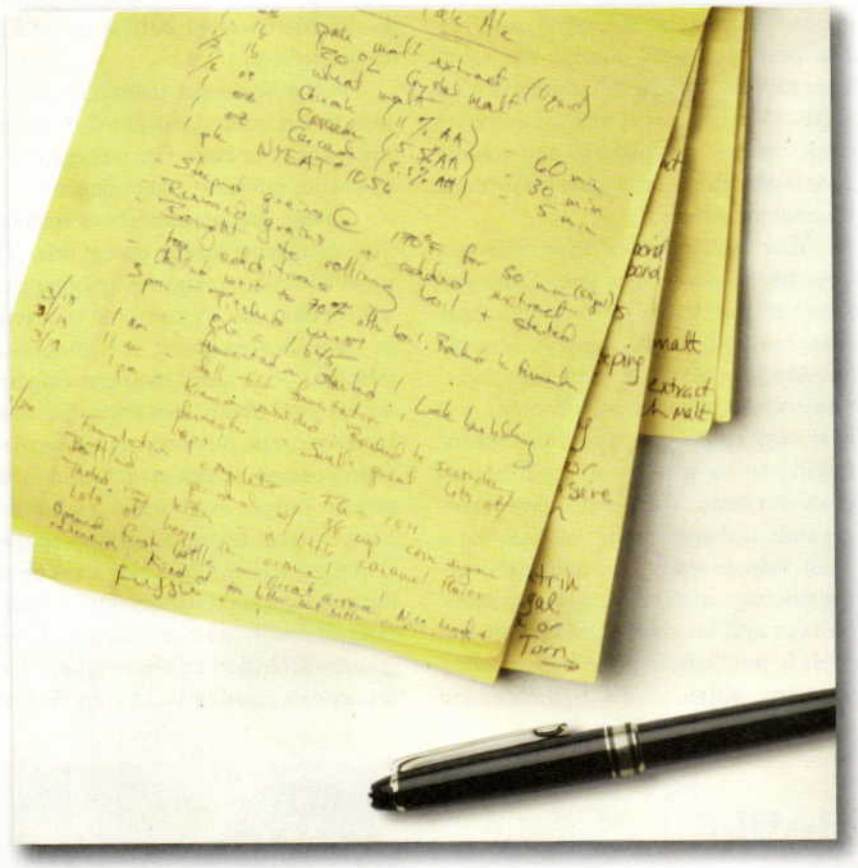
Homebrew contests can be another source if information, but the feedback you get will vary in quality. In the best case scenario, the judge will identify problems with your beer and suggest solutions. Sometimes, however, all the judge will do is point out the problem. This is still useful because you can easily find solutions to a problem once it is identified. In the worst case scenario, the feedback will be useless. For example, if the judge simply writes "not to style" on your scoresheet, you won't know what, exactly, the problem is. (Also, if you are looking for basic brewing advice, the style-centric feedback you get on a BJCP scoresheet may be of limited use.) For the best feedback, submit the same beer to a few different homebrew contests. When you get the scoresheets back, ignore the highest and lowest scores and focus on suggestions made by multiple judges.

Your best source of information on your beer, however, is you. Only you know all the details of how your beer was brewed. If you aren't already knowledgeable about critiquing beers, you should become so. Probably the best way to do this is to start volunteering to be a judge at local homebrew contests. Your local homebrewing club, if there is one, will likely be a great help as well. Learning to speak the language of describing beer characteristics and beer faults will allow you identify problems in your beer and find solutions, either in the homebrewing literature or by speaking to fellow brewers using descriptive terms they will understand. (See the article "Evaluating Beers," by Gordon Strong, in the March-April 2010 issue of *BYO* to get started.)

In the best case scenario, you'll be able to get several independent assessments of your beer. From there, it's up to you to interpret the criticisms.

There are at least two mistakes you can make when doing this. The most common mistake is ignoring good advice because it's not what you want to hear. For example, a homebrewer who just got a fancy new brew rig may want hear about tweaking his mash temperatures, not keeping his fermentation temperatures steady and in the proper range. And more commonly, brewers will brush aside any suggestion that calls into question their cleaning and sanitation. (Even if your beer is not noticeably sour or phenolic, paying greater attention to cleaning and sanitation can pay big dividends. See the

BREWING NOTEBOOK — YOUR GUIDE TO YOUR BREWERY



There are many tools that help you become a better brewer. One of the most valuable things in your brewing "toolkit" should be your brewing notebook. Your notebook should be a repository of what you did and how it turned out. It should contain the answers for many simple questions, like "How much strike water will I need for a 5-gallon (19 L) batch of pale ale?" or "How long will it take me to heat that volume to strike temperature on my burner?"

I'm not the sort of person who does things just because it's considered good form. On my desk at home, I consider a pile of papers a perfectly fine system of organization, as long as I know where everything is in the pile. I'll only organize anything if the time I spend organizing is more than repaid by time saved later. And, I take the same approach with my brewing notebook — I want to minimize the time and effort I put into keeping it, but have it yield maximum benefits for me. Here's how I keep my notebook:

The day before brew day, I write out my list of ingredients and a step by step explanation of my procedures. I include what measurements I plan to take (temperature readings, volume checks, pH, refractometer readings, etc.) on brew day and what the expected readings are. I write down all target values (OG, FG, etc.) I'm hoping to achieve in the final wort and beer, plus a statement of the purpose of the brew day (if there is one beyond the obvious purpose of making beer). For example, if I'm testing out a new wort chiller, I'd write that down. Writing down the plan beforehand serves two purposes — it reduces the amount of writing required on brew day and it serves as a checklist, so I don't forget planned aspects of the brew day.

Writing down the plan is a good start, but it's only the beginning. On brew day, I record what actually happened. The simplest way to do this is to put a check mark by every procedural step that went as planned (or the observed number when a measurement is called for). A slightly improved version of this is to write the time next to each step when it is finished. If something doesn't go as planned, I write what happened in the margins or as a footnote. If I see an opportunity to improve on the brew day, I make a note of that. For example, if I stood around waiting for my sparge water to reach the correct temperature, I would note to start heating my sparge water with "X" minutes left in the mash. Also, I'll make any relevant notes pertaining to the purpose of the brew day. For example, if I'm testing a new wort chiller, I'll record the start and finish time of chilling and the final wort temperature. After a few brew days of taking good notes, you'll have recorded all the little things you need to manage a brew day on your system and be able to plan future brew days to go more smoothly and predictably.

Although your brewing notebook can help you plan your brew day, the biggest benefit comes when you tie your brew day notes to your tasting notes. I leave a blank page after each brew day, so I can write tasting notes as the beer ages. Once the beer is ready, I'll sit down with it — and maybe a "ringer," a commercial beer that's similar to what I brewed — and taste it critically. If I'm brewing the same beer over again, I'll pour a sample of the previous batch for comparison. If the brew day had a purpose, I'll tie that into my tasting notes. For example, did the new wort chiller cool the wort so quickly that the bitterness from the late hop additions was affected? When you're troubleshooting your beers, tasting a previous batch and a newer batch side by side can help you quickly decide if your changes are making your beer better, worse or having no effect. Depending on the beer, sometimes I'll record multiple tastings at various stages of aging.

Keeping a detailed brewing notebook is indispensable to becoming a better brewer — it quickly becomes your guide to your own brewery and beer.

ASSESSING YOUR EQUIPMENT — THE UPGRADES THAT MAKE A DIFFERENCE

One of homebrewing's many appeals is that you can start out with minimal equipment — a bucket, some tubing and a bottle capper — and make your own beer. The longer you homebrew, the more you are likely to upgrade your brewing setup. And sometimes these upgrades do more than make brewing more convenient or allow you to brew larger batches — some upgrades allow you to brew better beer.

Typically, the first major equipment upgrade a brewer makes is to a brewpot large enough to conduct a full-wort boil in. Upgrading from a stove-top sized brewpot (up to 4 gallons/15 L) to a kettle large enough for a full-wort boil of a 5-gallon batch (7-gallons/26 L or larger) also requires the brewer to get a wort chiller and likely a more powerful heat source. By far the most popular solution is to get a "turkey fryer"-type propane burner for the heat. Often, a brewer's switch to full-wort boils is accompanied by his switch to all-grain, in which case he'll also need a combination mash/lauter vessel.

One of the primary benefits of stepping up to a full-wort boil is the effect it has on wort color. Boiling high-gravity worts, which are later diluted to working strength in the fermenter, leads to wort colors that are darker than comparable worts boiled at working strength. A secondary benefit is that less wort sugars are lost in the break material and hop debris at the bottom of the kettle. Whether you brew with malt extract or are stepping up to all-grain methods, boiling your full wort at working strength — if done properly — will improve your brews.

The phrase "if done properly" is important. Getting a larger kettle, but settling on a weak boil followed by a slow cooling method, such as cooling the pot in your sink, that takes too long (longer than, say, an hour) can actually lead to poorer quality beer. You need a heat source capable of reaching a nice, rolling boil in order to get an adequate hot break. A vigorous boil also expels unwanted volatiles, such as DMS when brewing using lightly-kilned base malts. After the boil, reasonably quick cooling not only makes your brew day more manageable, it reduces the time frame during which your wort is susceptible to contamination by wort-spoiling bacteria. Quick cooling also reduces DMS in your wort by dropping the temperature below the threshold where the precursor to DMS (SMM) is chemically reactive. A copper immersion chiller is the most popular option for wort chilling on the homebrew scale, but counterflow chillers and plate chillers are becoming more widely used.

If your finances or space don't allow for expanding to a larger brewpot, you can get the same benefits by scaling down your recipe volumes. Almost any home stove can bring 2 or 3 gallons (7.6–11 L) of wort to a vigorous boil. Boiling this volume of working strength wort followed by quickly cooling the brewpot in your sink can yield the same high-quality wort as the 5-gallon full-wort set-up. (And, if you really can't bear to brew less than 5 gallons (19 L) at a time, you can simply make your wort in two 2.5-gallon (9.5-L) increments. Cool, aerate and pitch the first 2.5 gallons (9.5 L), then add the second batch of (cooled) wort when it's ready, no later than 24 hours after the first is added. You won't need to aerate this wort. This is more work, but the quality of the beer won't suffer. (Many commercial breweries use fermenters that require two or three batches of wort to fill.)

A very important upgrade for many brewers is the move to temperature-controlled fermentations. If you live where the ambient temperature is rarely within a suitable range for fermentation, you need a way to hold your brews at an acceptable, constant temperature while they ferment. Low-tech approaches, such as the "wet T-shirt" method work well when you need to cool the beer a few degrees — up to a maximum of about 10 °F (~5 °C) for 5 gallons (19 L) of fermenting beer, depending on the humidity and airflow past the fermenter. A far more robust approach however, is to buy a large chest freezer and an external thermostat (sold at most homebrew stores). A chest freezer fermentation chamber lets you ferment both ales and lagers and can also hold kegs for serving (not at the same time, of course). Cylindrical conical fermenters with built in glycol chillers are also available. These cost substantially more than a chest freezer, but take up far less space.

Finally, assembling a brewing lab can help advanced brewers really fine tune their brews. As a first step, getting a decent pH meter is a big help. Later, getting a microscope, hemacytometer and methylene blue stain so you can count yeast is a good option. If you have some money to spend, dissolved oxygen (DO) meters are becoming more affordable. In the "bang for your buck" department, the best investment a homebrewer can make is in two glass jars with metal lids. In one jar, you can perform a forced wort test (described in the sanitation sidebar on page 44). In the other, you can perform a forced fermentation test. In a forced fermentation test, you take a sample of chilled, aerated wort — large enough to fill your hydrometer test cylinder — pitch it with a gross excess of yeast and set the lid on the jar loosely. Ferment this sample warm (around 80 °F/27 °C) and take the final specific gravity (FG). This will tell you ahead of time what your beer's FG should be. With this knowledge, you will be able to tell the difference between a stuck fermentation and a beer made from a wort that exhibited a low fermentability.

sidebar on page 44 for more.) The odds are actually fairly good that your greatest brewing fault lies in the part of brewing that you are least interested in and consequently are making the least effort in regards to.

The opposite mistake is to accept every bit of advice uncritically. Even knowledgeable brewers and good homebrew judges can make mistakes. If you are sure a certain piece of criticism really doesn't apply, just make a note of it and move on.

At the same time you are getting feedback on your beer, it also pays to gather as much information as you can about the kind of beer you are brewing, and even related styles. Learning about brewing should be an ongoing process for the brewer serious about his craft. Do not, however, quit brewing until you think you have mastered everything there is to know. Learning about brewing is a lifelong process and the practice of how you brew also matters.

Brew It Again

Once you've got some feedback on your beer, or even just done enough research to give you some ideas, it's time to brew that same beer again. (And hopefully, you've saved a few bottles from your previous batch for comparison.) How to approach the first tweaking of your beer depends on your situation. If you are new and the feedback you've gotten or the research you've done leads you to believe you have been making multiple mistakes, you should plan to address all of your shortcomings in your next brew. Sometimes, especially when trying out new equipment, you need to make several changes simultaneously. For example, if you step up to full wort boils of 5 gallons (19 L) or more, you'll also need to learn to use a wort chiller at the same time. (See the sidebar on page 48 for equipment upgrades that may improve your brews.) If you have it on good authority that you have made multiple mistakes, see if you can correct them all in your next brew.

On the other hand, if you've been brewing for awhile and your beer tastes pretty good, the surest path to improvement is to explore possible

changes one at a time. If you change more than one variable in your brewing equation, it can be hard to know what is to blame if a problem arises. For example, if you tried both a different way of propagating your yeast and a new ingredient in your beer and an off-flavor showed up in that batch, you wouldn't know if the problem was with the yeast or the new ingredient. Early on, you may need one brew session in which you address multiple shortcomings — after that, change only one thing at a time.

Sometimes changing one aspect of your brewing forces you to make other changes. For example, if you decide to change the hop bill on your IPA from mostly high-alpha bittering hops to a higher percentage of lower alpha aroma hops, you will end up with more debris at the bottom of your kettle and you'll have to adjust your procedures to yield the same amount of wort as before.

During your first rebrewing, take good notes on brew day, making particular note of the thing (or things) you've changed. Also, describe what effect you expect the changes to bring about. For example, if you think swapping the high-alpha hops for more aroma hops will yield a more pleasing hop aroma, say so explicitly.

When the new batch is ready, taste it critically — ideally alongside a sample from the previous batch. Describe the beer in your brewing notebook, and note if the changes you made had the desired effect. Also, describe any unintended consequences you detected.

If you take your improved beer back to your homebrew club or to the brewer who tasted it before, you'll likely get more detailed feedback. If a brewer thinks you are listening to his advice and acting on it, he is much more likely to take the time and effort to give you constructive criticism.

And Keep Brewing It

Your plan for the second rebrewing and beyond is always going to be the same — gather information and rebrew the same beer, changing only one variable at a time. You'll notice that the first few "turns of the crank" will result in dramatically improved beer. (If it doesn't,

something has broken down along the way, most likely you have been dismissing good advice.)

In the early stages of improving your beer, always have a purpose to each brew day. Your purpose may be to try a recipe alteration, a new technique or a new piece if equipment. Your purpose may be as mundane as compensating for the effects of a previous change; for example, adjusting your volume to take into account the extra hop debris from the previous example. Whatever it is, write down the purpose in your brewing notebook on brew day and comment on it when you taste your beer. Don't just idly brew the same beer over and over again, hoping it improves on its own.

Eventually, you will reach a point at which you're stumped with regards to how to improve the beer. This can be a good time to rebrew the beer and see if you can replicate the results of the previous batch. If you're happy with your beer and you can brew it repeatably, you can branch out and conquer another beer style.

If you are stumped, but still not satisfied with the quality of your beer, you may need to challenge yourself to move outside of your comfort zone and learn or try something completely different. For example, some brewers are chemistry-phobic and may have avoided learning about water chemistry. Yet, this may be just the thing they need to move their beer forward. As the old saying goes, "No pain, no gain."

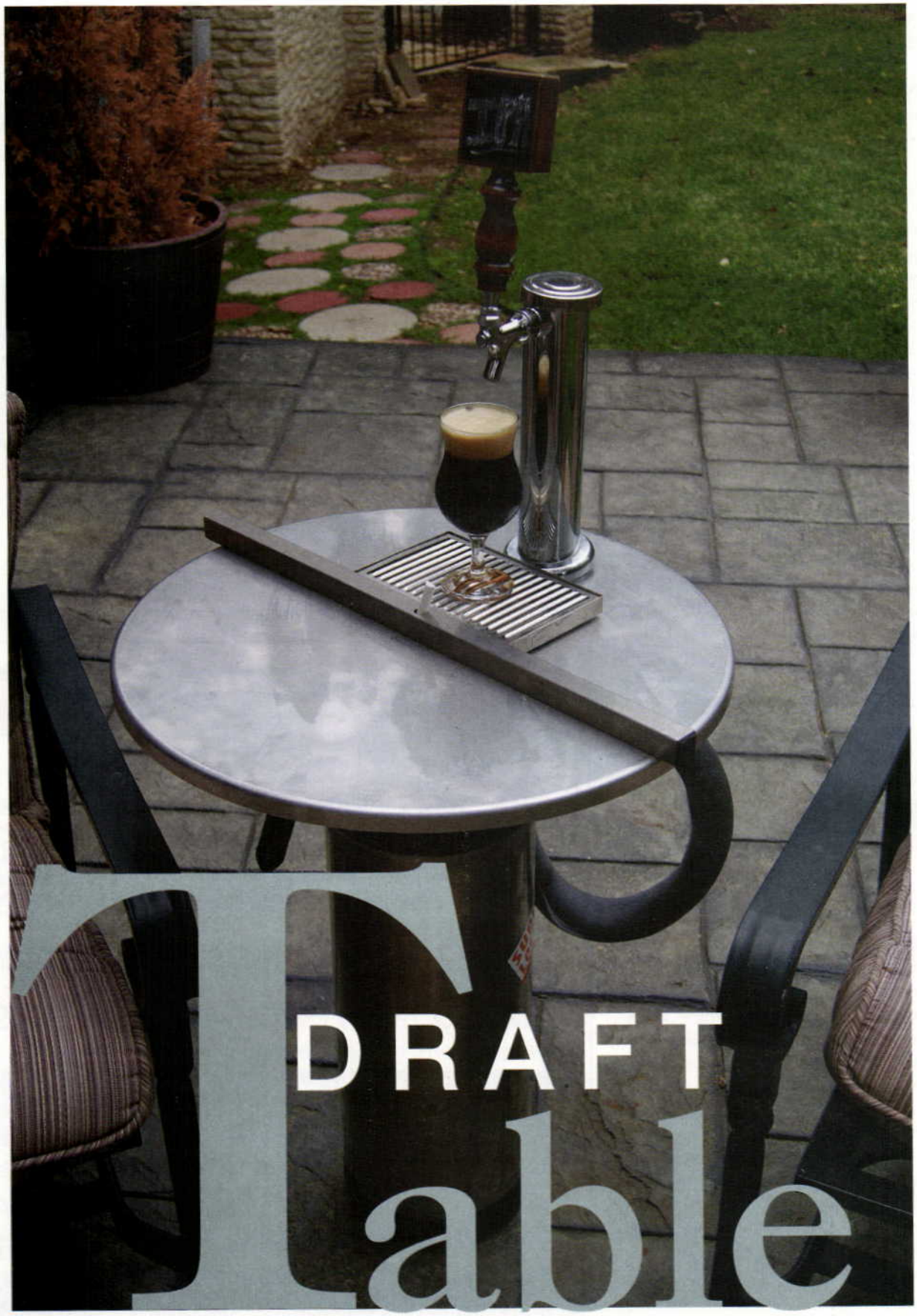
Keep It Fun

You don't have to put all your other brewing plans on hold to follow this path. You might, for example, brew your beer just once or twice a year, perhaps before key homebrew competitions, and just slowly improve upon it over the years, all the while trying out other recipes that catch your interest.

If you think you'll get bored brewing the same beer over and over, consider that the valuable lessons you learn and the excellent beer you'll have on hand will be your compensation for your commitment. BYO

Chris Colby is Editor of BYO.

Story and photos by **Christian Lavender**



DRAFT Table

DISPENSE HOMEBREW DIRECTLY FROM A TABLE TOWER

The beers had been made and I was ready for our annual holiday homebrew tasting party, which traditionally consists of three to four different brews and a few dozen friends. This year would be different. After building the Ultimate Homebrewer's Bar back in the November 2011 issue of *BYO*, I somehow convinced myself to do more even with a baby on the way and after recently moving into a new home. This year we would have upwards of fifty invitations going out and seven beers on tap for the party. I had room for six beers on tap in my kegerators, but I had no place for the seventh. Enter the draft keg table to save the day.

The keg table would solve another issue, which was seating. With the possibility of fifty plus beer drinkers arriving, I needed more spots for people to hang out. The functional dispensing table would create a unique place for a few friends to sit and enjoy some homebrews. Whoever was sitting at the table also got to play bartender for newbies trying to figure out what that weird tower table thing in the corner was. A beer would be poured and a classic beerversation would ignite.

Temperatures would be tip toeing around 50 °F (10 °C) during the party, so I thought I could take advantage of nature's refrigeration and put a keg outside with a top and draft tower. This all sounds good in theory, but how do you make it functional, easy to move and easy to reuse? Plus, kegs go quickly, so I needed to have an easy way to lift off the top and click in a new keg when needed. Read on to see my solution and perhaps gather ideas for your own draft creation.

parts
and equipment list

- 5-gallon (19-L) Cornelius keg
- Carboy drying rack
- Stainless steel round top
- Perforated steel (false bottom)
- Draft tower, faucet and tap handle
- Draft tower fastening nuts and bolts
- Zip ties
- Crossbar with wing nut screw and washer
- Portable CO_2 keg charger
- MFL gas and liquid quick disconnects (threaded)
- ¼" x 5/16" standard swivel nut set
- Faucet wrench
- Power drill
- Step bit
- Dremel with grinding stone bit
- Snip scissors

1. GATHER THE HARDWARE

If you keg your beer, you likely have many of the required parts already. You can improvise for some of the other parts, such as the material used for the table top. I used a ball lock Cornelius keg and MFL quick disconnect fittings along with a portable CO_2 keg charger. I had a few perforated steel rounds from some old cooler mash tuns and I cut them up and used them as large "washers." The carboy drying rack was slightly modified, but would still be functional as a drying rack if I ever disassembled the table.

2. GET FITTED

I tightly screwed the CO_2 keg charger onto the gas MFL fitting and clicked the gas fitting into the ball lock homebrew keg. On the opposite side of the keg, I assembled the beer line MFL quick disconnect and the ¼" x ⅜" standard swivel nut set. I clicked in the beer MFL and placed the carboy drying rack over the top of the keg. I used some snip scissors and cut out ½-in. (1.27 cm) notches to make the rack sit flush on the keg top. The carboy rack base had L-shaped feet and was a perfect fit. It was like they were meant for each other.

3. MAKE SOME HOLES

The flat fermenter lid I used for the table top came off of a 26-gallon (98-L) conical that was upgraded to a newer dome shaped lid. The lid already had a punched hole on the side, so I measured the tower mounting holes around it. I measured the center of the lid to 11½ in. (29.2 cm) and made my marks. I readied the step bit in the power drill and sprayed it with some WD40 for added lube. It took some time to drill down through the steel and it got extremely hot, so be careful if you are doing this type of drilling. (It's a good idea to wear protective gloves during this step.) After I drilled my holes I smoothed down the rough edges with my Dremel and grinding stone.

4. ASSEMBLE THE TOP

After drilling all of the needed holes, I slipped the beer line down the pre-

punched hole and lined up the tower base on the drilled holes in the lid. I used screws and wing nuts, so I could easily remove the tower in the future. With the tower secure, I moved on to the middleware, which would connect the keg and table top togehter. I cut out a rough piece of perforated steel to use as a large washer on the bottom of the carboy rack. I placed the fermenter crossbar on the tabletop and from the bottom, with the wing nut screw and washer I secured the rack to the table top. I slide some zip ties up through the holes of the rack for the next step.

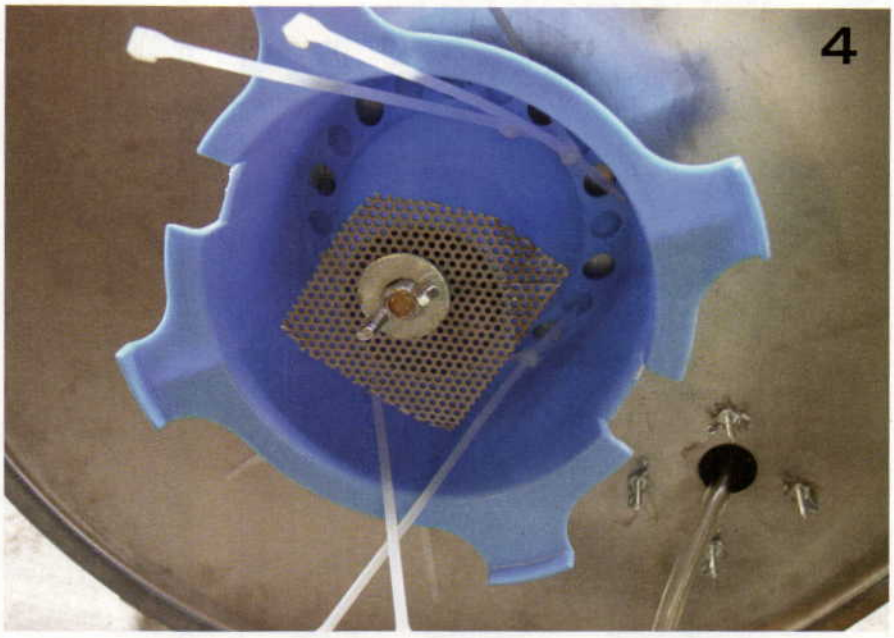
5. STABILITY & MOBILITY

I set the tabletop in place on top of the keg and wove the zip ties through the handle holes of the homebrew keg. I cinched the zip ties down as tight as they would go. The table was solid. (I chose to use zip ties because you can quickly cut them off when you are done with the keg. You can also consider quick release clamps.) When the keg is empty, the keg table becomes top heavy, but still is surprisingly stable. When the keg is full, you have a nice, evenly-balanced table that does not require additional leg support. I was able to quickly move the keg table to the garage, front porch, back porch and home bar area with no problems.

6. INSULATE AND INTAKE

For the final touches, I added a stainless steel drip tray, chalkboard homebrew tap handle and insulated the beer line with some HVAC foam. Though I was building the keg table for colder outdoor weather dispensing, I was also thinking about using this indoors for dispensing cask ales at warmer temperatures. You could slip the table base (keg) into a trashcan full of ice water to keep it cool. Or you could insulate the keg with a keg cozy. Finally, make sure you line the CO_2 keg charger up to be on the front side of the table. This will allow your homebrew tasters the opportunity to charge up the keg themselves adding to the fun of the table. BYO

Christian Lavender is a homebrewer in Austin, Texas and founder of Kegerators.com and HomeBrewing.com.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> "When the keg is full, you have a nice, evenly-balanced table that does not require additional leg support."


5


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Back In Time

Recreating Historical Recipes

by Terry Foster

Michael Jackson described Guinness Foreign Extra Stout as a classic beer. So imagine that I brewed a version of the predecessor of Foreign Extra Stout, West India Porter, and that I was enchanted by the result, as often happens when I recreate old beers. Well, I was not enchanted, I was disappointed! The first time I tried to recreate this classic the result had some good points, but if I were to brew it commercially on a 10-barrel scale, I needed to adapt it to make it acceptable to modern taste. In this installment of "Techniques," I will tell you the story of what I did to bring this beer into modern times. I brewed this as an all-grain beer, but the principles apply just as well to extract beers.

This project all started when I read Bill Yenne's book "Guinness," in which he quoted an 1801 recipe for the very first West India Porter. What piqued my interest was that Yenne said black malt was used in this brew, when it is generally held that black malt was not available until 1817 when it was invented by Daniel Wheeler. If Yenne was correct it would mean Guinness used it first, and received history was wrong. So, I set up a visit with the brewery archivist and hopped on a plane to Dublin.

The next day there I was at the Guinness archives, all agog to see this recipe for myself. I was doubly excited because up to now all of my brewing history research on the other side of the pond has been in England, mostly at places such as The National Brewing Library, The British Library and The London Metropolitan Archive. I did not have to wait long to have the archivist put the 1801/1802 Guinness brewing book into my hands, which contained the recipe for West India Porter written in beautiful copperplate, probably by one of Arthur Guinness' sons.

So what did that recipe tell me? First of all, there was no black malt used in the original recipe, only pale and brown malts. What Yenne had read as "75 parts of black malt" was actually 75 bushels of malt used in total, made up of 55 bushels of pale and 20 bushels of brown malt. I confirmed this by checking the malt bills on recipes before and after the West India Porter in the brewing book. Second, the only other ingredients of note were 4 cwt 2 qu. (504 lb./229 kg) of "Own English hops," and the final yield was 148 barrels of porter at an OG of 22.5 brewer's lbs. (SG 1.063/15.4 °P). There was no mention of sparging the mash, but four separate mashes were carried out, and the four worts were combined into two batches for the boil. As was the custom at that time, mash temperatures were not recorded, only the temperature of the strike water. From the latter the first mash was probably only around 145 °F (60 °C), and the others were somewhat higher.

Brewing the beer

Back home in the USA, the next step was to actually try to replicate this porter in my 5-gallon (19-L) brewery. This meant some calculating after having made certain assumptions. Bushels are a volume measure and brown malt was 20–25% less dense than pale. I took 20% so that the malt bill would be 77.5:22.5 pale:brown. I calculated how much I needed using the standard *BYO* extract efficiency of 65%. The hops presented more of a problem, since I had no idea as to what their alpha-acid content might be. I assumed that the alpha-acids would be low in such an old variety, and that the hops had been warm stored for perhaps as much as a year, and settled on the conservative figure of 2% alpha. The amount Guinness used translates to about 6 ounces for 5 US gallons, but I had to use a modern hop variety, namely Liberty at 3.5% alpha and so had to halve this amount.

> "Yenne said black malt was used in this brew, when it is generally held that black malt was not available until 1817 when it was invented by Daniel Wheeler."

Photo courtesy of Guinness Brewery

Taking all this together, I worked out this recipe:

West India Porter (test batch)
(5 gallons, 19 L, all-grain)
OG = 1.063 (15.4 °P)
FG = 1.015 (3.8 °P)
ABV = 6.3% SRM = 40–50 IBU = 39

Ingredients

10.4 lb. (4.7 kg) Rahr 2-row pale malt
3.0 lb. (1.4 kg) Crisp brown malt
3 oz. (85 g) Liberty hops pellets (10.5 AAU at 3.5% alpha-acid; 39 IBU at 25% utilization)
White Labs WLP002 (English Ale) yeast

Step by Step

Mash grain at 148–150 °F (64–66 °C) for 60 minutes, run off and sparge to collect 5.5–6 gallons (21–23 L). Add hops to wort and boil 90 minutes, cool and add the yeast (preferably as a 1-qt or 1-L starter). Let ferment one week, then rack to secondary fermenter, and leave for one to two weeks before racking into keg or bottle. (Note that I used a yeast strain which I had available rather than an Irish Ale strain. However, WLP002 is rated as suitable for stouts and porters, and the present Guinness yeast may not be very similar to that used in 1801.)

How was it?

As soon as it was properly conditioned, I poured myself a glass of this beer and took a look, a sniff and a sip. The color was lighter than you would expect from Guinness, being dark brown rather than black, but I had expected that from my color calculations. There was not much in the aroma, but the taste was initially pleasing, with some nice malty, nutty liquorice notes up front. But then everything went flat, and there was nothing else to balance the sweetness of the malt, so the end result was just, well, flabby. Perhaps this was why Guinness later went to using black malt; or perhaps my estimate of hop alpha-acid was too conservative, and the original had more hop bitterness to balance the malt? But also it is likely that this beer was stored in vat for some time (perhaps a year or more) before shipping, and probably developed acid flavors in storage. There is certainly evidence from later in the 19th century that Foreign Extra Stout contained significant levels of lactic acid.

I took the beer into BrüRm@BAR in New Haven, Connecticut and offered it to Jeff Browning, the brewer, and two of his voluntary-but-experienced assistants. Sure enough, without any prompting from me their verdict chimed exactly with mine — it's promising, but not there yet. But Jeff was intrigued enough that he wanted to do a version of it on his 10-barrel setup.

What we did

First, we asked, "did we want to change the malt bill?" And the answer was yes, so the next question was "how?" The obvious answer was to use some black malt, but we felt that black malt would drown out the caramel/liquorice flavor of the brown malt and take the beer too far away from the original. A better approach was to use a little Victory® malt (about 7% of the total), to bring in some nutty and light toasty flavor, and to add a corresponding amount of chocolate malt. The latter we felt would give the beer some roasty notes, but without adding any harshness. We also increased the proportion of brown malt to about 29% of the total, to make sure its flavor would not be drowned out by our additions, which meant the pale malt had to be reduced to 57% of the total grist. We did not want to take this any lower, because we wanted to ensure we got full starch conversion in the mash. Therefore our OG was going to be around 1.073, but since foreign extra stout was generally brewed around this gravity, we felt that we were not straying too far from the original. We also went with Maris Otter instead of regular 2-row to give the beer a slightly fuller flavor without adding sweetness.

But we also felt we wanted some more hops in there, both as bittering, and to give some flavor and aroma. So we opted for Columbus at the start of the boil, with a smaller addition of Columbus for the last 30 minutes, and a generous amount of both Willamette and East Kent Goldings at the finish. We aimed at 48 IBU, and chose the hops on the basis that a pronounced citrus aroma was not suitable. We wanted a spicy, floral, but subtle hop character in the beer.

These flavors would balance and complement the brown malt, not swamp it. Oh, and of course, we used our house yeast, White Labs WLP002. The end result of our tweaking was an excellent, well-balanced and full-flavored brown porter which I shall not hesitate to brew again. A 200-year-old brew brought to perfection by a little tweaking in the light of modern knowledge and taste!

West India Porter

(5 gallons/19 L, all-grain)

OG = 1.073 (17.7 °P) FG = 1.018 (4.6 °P)
ABV = 7.2% SRM = 50-60 IBU = 48

Ingredients

9.0 lb. (4.1 kg) Maris Otter pale malt
4.6 lb. (2.1 kg) Crisp brown malt
1 lb. (0.45 kg) Briess Victory® malt
1 lb. (0.45 kg) Crisp chocolate malt
11 AAU Columbus pellet hops
(0.9 oz./25 g at 12.3% alpha acids) (70 mins.)
4.3 AAU Columbus pellet hops
(0.35 oz./10 g at 12.3% alpha acids) (40 mins.)

1 oz. (28 g) Willamette pellet hops (0 min.)
1 oz. (28 g) East Kent Goldings pellet hops (0 mins.)
White Labs WLP002 (English Ale) yeast

Step by Step

Mash grain at 148-150 °F (64-66 °C) for 60 minutes, run off and sparge to collect 5.5-6 gallons (21-23 L). Add first addition of Columbus hops to wort and boil 70 minutes. Add the second addition of Columbus 30 minutes before the boil is finished, and add the Willamette and Goldings at knock-out. Chill the wort and add the yeast (preferably as a 1-qt or 1-L starter). Let ferment one week, then rack to secondary fermenter and leave for one to two weeks before racking into keg or bottle.

West India Porter

(5 gallons/19 L, extract plus partial mash)

OG = 1.070 (17.1 °P) FG = 1.018 (4.6 °P)
ABV = 7.2% SRM = 50-60 IBU = 48

It is difficult to match this beer using malt extract because we need that brown malt flavor in there, however, this will come reasonably close to it.

Ingredients

9 lb. (4.1 kg) Munich liquid malt extract*
12 oz. (0.34 kg) Crisp brown malt
12 oz. (0.34 kg) 2-row pale malt
2 oz. (56 g) Briess or Weyermann de-husked black malt
11 AAU Columbus pellet hops (0.9 oz./25 g at 12.3% alpha acids) (45 mins.)
4.3 AAU Columbus pellet hops (0.35 oz./10 g at 12.3% alpha acids) (15 mins.)
1 oz (28 g) Willamette pellet hops (0 min.)
1 oz (28 g) East Kent Goldings pellet hops (0 min.)
White Labs WLP002 English Ale yeast

Step by Step

(*Look for an extract made from 50% pale malt and 50% Munich malt.) Add grains to 1 gallon (3.8 L) water, bring to about 150 °F (66 °C), and hold at this temperature for 30-45 minutes, then strain off grains, rinsing them with 1 gallon (3.8 L) hot water. Add water to about 3 gallons (11 L), and bring to a boil. Turn off heat, and add malt extract, stirring well to ensure the extracts dissolve properly. Bring to a boil, add the first dose of Columbus hops, and boil 45 minutes, adding second dose of Columbus for last 15 minutes, and Willamette and Goldings at end of boil. Strain, or siphon off from the hops, and add cold water sufficient to obtain the starting gravity of 1.070. Cool to around 70 °F (21 °C), pitch yeast (preferably as 1 qt starter). Let ferment one week, then rack to secondary fermenter, and leave for 1-2 weeks before racking into keg or bottle. BYO

Insulation and Heat

Stabilize your mash temperatures

by Chris Bible

Energy is used extensively throughout the malting and brewing process. Energy from fuel is required in order to operate the equipment that is used to plant, harvest and process grains and hops. Heat energy is used to kiln barley and turn it into the various types of roasted malt. Heat energy is used to heat water in order to mash and sparge the malt. Heat energy is also used to heat and boil the wort.

Clearly brewers need lots of heat energy in order to brew great beer.

A common way that brewers produce heat energy in a homebrewery is by the combustion of a hydrocarbon fuel such as propane or methane. Combustion of hydrocarbon fuel produces heat, and the rate of heat production can be managed using burners and valves to regulate the flow of fuel and air.

Unfortunately, heat is often used very inefficiently in homebreweries. Any process that uses energy in the real world will, of course, be much less than 100% efficient, but one great way to improve the efficiency of heat use within a homebrewery is to insulate the brewing vessels.

How insulation works

Insulation works by increasing the resistance to heat "flow" between areas that are at different temperatures. At a molecular level, heat energy within a substance is manifested by the intensity of vibration or movement of molecules. The more heat energy that is present, the faster the molecules are vibrating (in a solid or liquid phase substance) or moving about (in a gas phase substance).

Heat can be transferred from one substance to another by conduction, convection or radiation.

Heat transfer by conduction occurs when there is physical contact between the molecules of two or more substances that are at different temperatures. Physical collision of the molecules within the substances occurs, and energy is transferred by the hotter, faster-vibrating molecules colliding with the colder, slower moving molecules.

Heat transfer by convection happens in much the same way as with conduction, but in the case of convection there is no direct contact between the hot and cold substance. Instead a third substance is involved as the heat transfer go-between. A good example of convective heat transfer is the heating of food using a convection oven. In a convection oven, air is blown across a hot heating element and picks up heat energy from the element. The hot air then contacts the cooler food and transfers heat energy to the food.

Heat transfer by radiation occurs when an object becomes hot enough to emit significant amounts of electromagnetic energy in the infrared or visible-light range of the electromagnetic spectrum, and this energy then hits and is absorbed by a cooler object. A great example of this is an electric stove-top heating element that is glowing red-hot.

Substances that are good thermal insulators have a molecular structure that either has very strongly-bound atoms and electrons within the molecular structure, or have molecules bound together in such a way that the macro-structure of the substance has lots of low-density, empty space.

Strongly bound atoms within a substance have a greater resistance to vibration, and therefore will not heat up as quickly or as much when bombarded by fast vibrating, hot molecules. Ceramics and plastics are two good examples of this kind of thermal insulator.

Substances that have molecules bound together in such a way that the macro-structure of the substance contains lots of empty space act as insulators by trapping air within their structure. Air and other gas-phase

> "Minimizing heat loss from brewing vessels, especially from the mash tun, may allow the homebrewer to produce better beer."

Photo by Charles A. Parker/Images Plus

substances are excellent thermal insulators and are much more resistant to heat flow than most liquids or solids. Examples of this kind of insulator are the fiberglass wool insulation in your home, the jacket that you wear on a cool evening (trapping a layer of air between you and the night air), and the foam-rubber "beer cozy" that you might slip over a bottle of beer on a hot summer day.

Insulation in the homebrewery

Heat loss from any heated vessel within the homebrewery can be reduced by using insulation. Reducing heat loss is desirable for two reasons:

1. Less heat loss means less fuel is needed to brew. This is a "green" benefit both to the environment and to your pocket because less fuel use results in lower fuel costs.

2. Reducing heat loss from a mash tun will allow better, more uniform control of the temperature profile within the mash. Better control of mash temperatures can lead to better beer.

Conductive heat transfer rate is described by Fourier's law, which can be written in several equivalent ways:

$$q = (kA\,(t_1-t_2))/L = (A(t_1-t_2))/R = UA(t_1-t_2)$$

Where:

q = rate of heat conducted through a plane, BTU/hr
k = thermal conductivity of wall material, BTU-in/hr-ft^2-°F
A = area of plane, ft^2
L = thickness of wall, inches
$(t_1 - t_2)$ = temperature difference across the wall, °F
R = L/k = unit of thermal resistance. This is the "R- factor" seen on insulation
U = 1/R = overall heat transfer coefficient

To illustrate the benefit of insulation on a homebrewing vessel, let's assume that you have a 7.5-gallon (28-L) capacity wort-boiling vessel with a 2" (5 cm) thick blanket of fiberglass insulation around the curved, outer surface of the vessel. The approximate R-value for the fiberglass blanket insulation is ≈ 3.33/inch x 2 inches = 6.66. Figure 1 (on page 63) shows the setup.

Using Fourier's law, we see that the heat loss by conduction through the insulated wall is:

$$q = (A(t_1-t_2))/R = [(2042\ in^2)(212°F-70°F)]/(6.66\ BTU/in^2\text{-}°F\text{-}hr) = 43{,}539\ BTU/hr$$

This seems like a very large amount of heat loss until you consider the amount of heat loss that occurs without any insulation. Figure 2 (on page 64) shows the effect of insula-

tion thickness on conductive heat loss for a vessel with the dimensions and assumptions given above.

Note that the rate of heat loss from a vessel with 0.5 inches (1.3 cm) of insulation is almost four times as great as the loss from a vessel with 2 inches (5 cm) of insulation. Note also that Fourier's equation is only approximately describing heat loss from the vessel by conduction. In reality, heat loss is also happening from convection and, to a smaller extent, from radiative transfer.

Conclusions

It is important to try to minimize heat loss within a brewery. For commercial breweries, the energy used to brew beer is a significant part of the overall cost to produce the beer. Minimizing heat losses in a commercial brewery are very important for the overall economic viability and profitability of the brewery.

As homebrewers we are, perhaps, less concerned with the economics of minimizing energy consumption in our breweries, but very concerned with the quality of our beer. Minimizing heat loss from brewing vessels, especially from the mash tun, may allow the homebrewer to produce better beer.

By minimizing heat losses from the mash tun, a brewer is able to maintain better control of the temperature of the mash and improve the uniformity of temperature

Figure 1: Insulated Boiling Vessel Setup

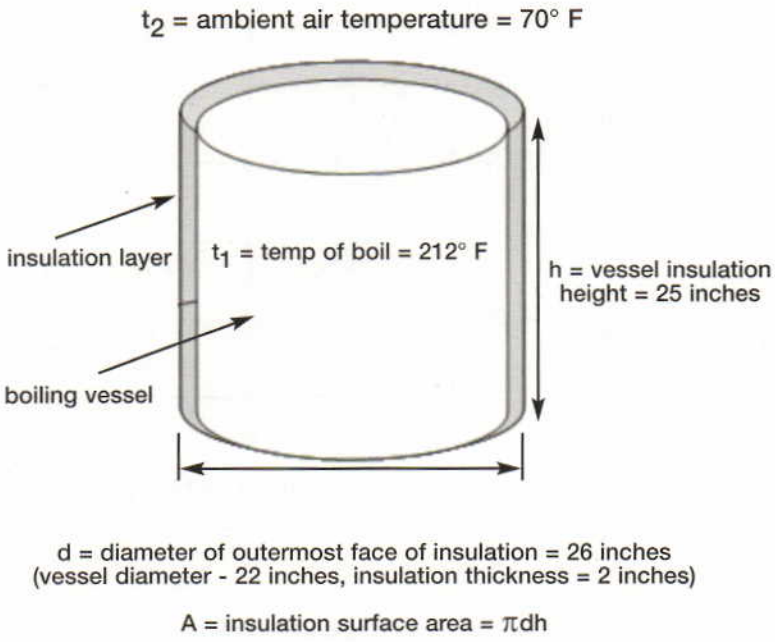
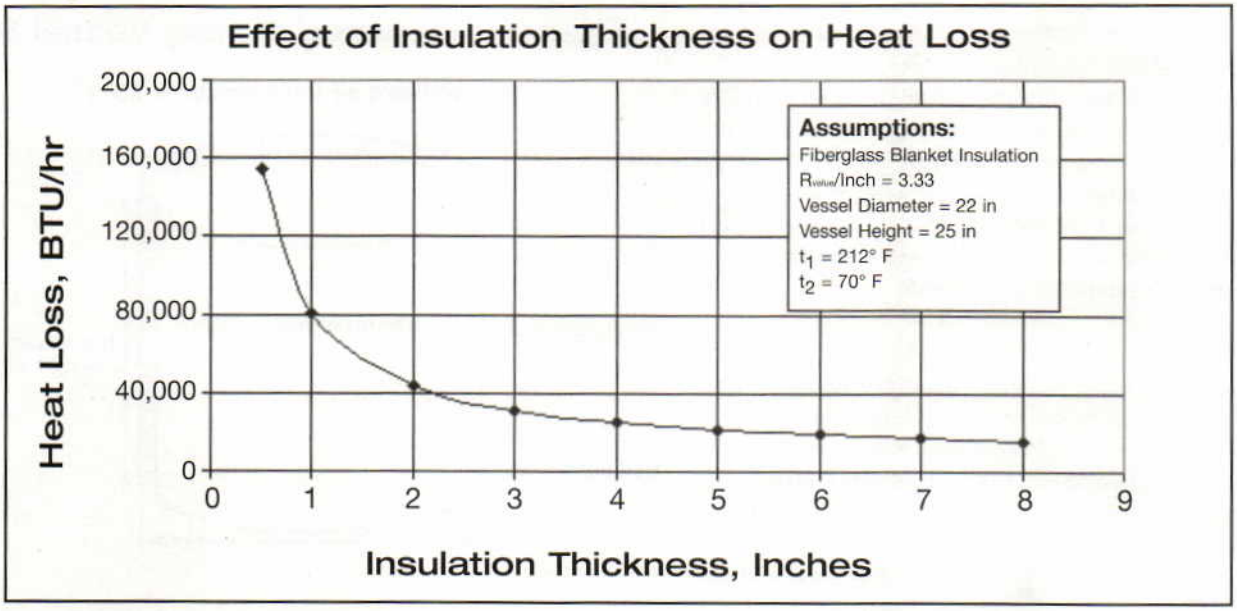


Figure 2: Effect of Insulation Thickness on Conductive Heat Loss



throughout the mash bed. This is especially true when you consider that many homebrew mashes are not stirred, so temperature gradients can develop as the sides of the mash cool faster than the interior. The enzymes doing their work in the mash tun are very temperature sensitive. Having a grain bed that is at a uniform temperature ensures that the enzymes are working their magic throughout the mash in a way that is aligned with the brewer's goals. Focus on minimizing heat loss from the mash tun and you will brew better beer. BYO

Chris Bible is BYO*'s "Advanced Brewing" columnist.*

Keep it Cool (or Hot)

Build a fermentation temperature controller

by Jay Cummings

Keeping your beer at steady temperatures is crucial for a better fermentation. If the temperature drops too low, the yeast may go dormant and fermentation can stop entirely. If it gets too warm, the finished beer will likely have undesirable flavors, such as excessive fruitiness from esters, a "hot" finish due to fusel alcohols produced at high temps, and various other unwanted flavors.

Perhaps more important than avoiding off flavors, adding a temperature controller to your fermentation gear will allow you to explore beer styles with more precise fermentation temperature requirements. A controller with a heating belt or heat pad will allow you to brew Belgians in the colder months, and with a refrigerator or chest freezer you could do lagers year round (or nail your ale temps precisely). A controller could also be used with any of the various fermentation chiller box projects that use a fan to keep the air circulating.

My basement closet is the area I use for fermenting, and it can get quite cold in the winter months. And conversely in the summer it gets well above ideal ale fermenting temperatures. A lot of homebrewers are in the same boat as me in terms of not having a 100% dedicated brewing space, so being able to control temperatures in less than ideal conditions is very handy. If you are looking to control your ferment temperatures, this mini temp control box project should be just the ticket. For about $45 and a little elbow grease, you can build a snazzy temperature controller with a backlit LED readout.

This controller has a limit of 10 amps (1100watts @ 110volts), so do not use it to control any equipment that requires more power then 10 amps. As with any DIY project, use caution, and never attempt to perform any type of electrical project if you don't have experience with wiring — no matter how small the project. Ask a licensed electrician to wire the project for you, instead. Also refer to the wiring diagram on page 67 for more details.

For more information about fermenation temperature control, visit www.byo.com/component/resource/article/1923.

> "Adding a temperature controller to your fermentation gear will allow you to explore beer styles with more precise fermentation temperature requirements."

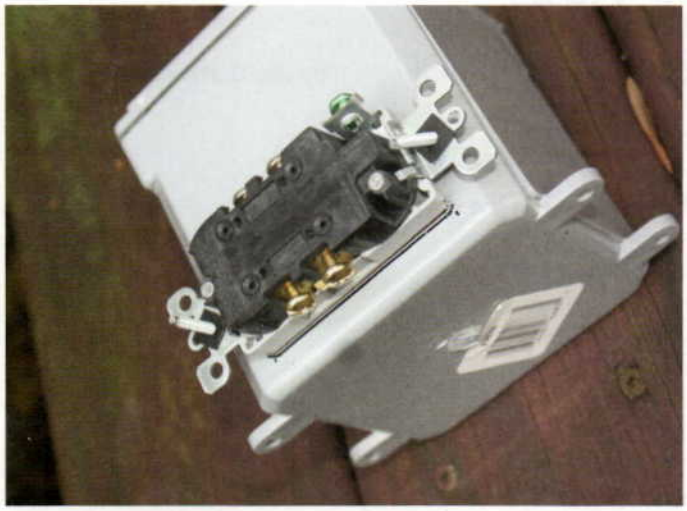
Tools and Materials

Materials

- 1 STC-1000 Two stage 110v temperature controller
- 4-inch x 4-inch x 4-inch electric junction box
- 15 feet of 16-gauge extension cord
- 3 feet of 16-gauge black wire
- 1 Decora gray 15-amp outlet
- (1) 10 amp panel mount fuse holder with fuse
- 1 Bag 6-32 ⅜-inch machine screws
- 2 Wire nuts
- 2 Female Crimp-on spade connectors
- (1) ½-inch 2-screw cable connector

Tools

- Sharpie marker or pen capable of marking on plastic
- Needle nose pliers, tape measure, wire strippers, wire crimper, soldering iron (optional)
- Jigsaw or Dremel tool with a cutting wheel that can handle thick plastic
- Cordless drill with a ⅛-inch and ½-inch bit
- ⅞-inch drill bit or hole-saw
- Phillips Screwdriver
- Small (jewelry style) flat head screwdriver



1. PREP WORK

Remove the top of the junction box and set the top and four screws aside. Now hold the outlet with the flat (plug side) to the junction box, centered side-to-side and about ⅞-inch above bottom of box. Carefully trace the outlet with a Sharpie or similar pen. Next drill a ½-inch hole in each corner of your outline; these are starter holes for your jigsaw blade. If you will be using a Dremel or other rotary tool for cutting, you won't need starter holes. Use a jigsaw (or Dremel) to cut out the outline of outlet. I found that the side of a large flat head screwdriver can help "cut" the plastic burr off after your cut out is done. A quick pass of a propane torch will melt the burrs away as well.

2. FIT THE OUTLET

The next step is the trickiest part of this build. You'll notice the outlet does not quite fit into the side of the box, so you'll have to improvise a bit. First take the pre-mounted screws out of the tabs. Then use the needle-nose pliers to carefully bend the tabs of the outlet to make sort of a "L" shape. Once you have the tabs bent, try to dry fit the outlet into the opening you just cut. You may need to adjust the bends or trim your opening at this point. The middle threaded hole on the tab should be flat with the side walls if looking in from the top. If the outlet fits, remove the outlet then break and remove the bridge connecting the two brass screws on the "hot" side. This keeps each side of the outlet working separately.

3. DRILL AND CUT

Now drill one ⅜-inch hole centered side-to-side and 1-inch from bottom, install the ½-inch cable connector with the clamp end outside the box. Drill a ⅛-inch hole next to the ⅜-inch hole, for the temperature probe wire. Drill a ½-inch hole on the other side of the ⅜-inch hole, install the fuse holder. Next measure the back of the STC-1000 temperature controller unit and write down the measurements. Make sure to be very accurate with these measurements. Draw a rectangle of the measured size on the OPPOSITE side as your outlet (this will be the front on the controller when finished). The bottom of the rectangle should be at least 2.25 inches from the bottom of junction box. Next, slide the orange clips off the side of the temperature controller. Cut out your rectangle and de-burr the cutout as needed. Slide the STC in the cutout (dry-fit). Trim if needed.

4. PREPARE TO WIRE

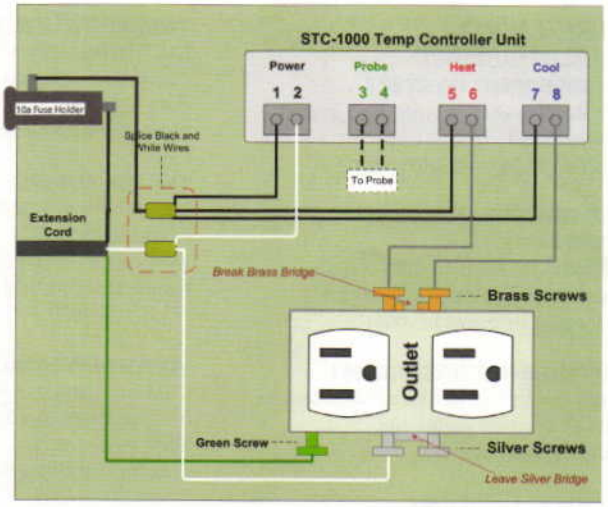
Cut about 18 inches off the extension cord (the female end) and strip off the outer jacket. Now cut these wires in half, this will leave you with 6 lengths of 9-inch wires. Cut the 3 feet of black wire into 4 lengths of 9-inch wires. Strip 6 inches of the outer jacket off the cut end of extension cord. Use the wire strippers to strip ½-inch of insulation off each end of all the wires. Drill two ⅛-inch holes (these are the holes for the outlet screws). This takes a little "eyeing up" to get it right. My holes happened to be about an inch from the bottom of the junction box, and I got close by sighting the tab hole from the top and marking the hole. The holes being ⅛-inch gives the screws a little wiggle room. Insert and tighten the 6-32 screws. One of the outlet terminals will be wired for controlling a refrigerator (cooling) and the other is wired for operating a heating belt or pad. Loosen the clamp on the cable connector, put the stripped end of the extension cord through the connector, leave the clamp loose for now.

5. WIRING IT UP

The extension cord has three leads: black (hot), white (neutral) and green (ground). For the black lead, install one of the female spade connectors or solder the wire directly to the end terminal of the fuse holder. Install the other spade connector on one of the black lengths of wire and connect it to the mid terminal of the fuse holder. Take the other end of this wire and 3 of the black wires, connect together with a wire nut; then connect the other end of the three black wires to terminals 1, 5 and 7 on the STC unit. The extension cord's white lead (neutral) will connect with the two lengths of white wires with a wire nut; one of these leads attach to the silver-colored screw terminal on the outlet, the other white lead will connect to terminal 2 on the STC. The extension cord's green lead (ground) should be connected to the outlet's green screw terminal (it is actually green). Use two lengths of black wire to connect terminals 6 and 8 on the temperature controller to the brass-colored screw terminals on the outlet. Terminal 6 is the heating side of the controller, and terminal 8 is the cooling side. So make a note of which terminal is connected to which receptacle on the outlet. If you forget to note which is which, you can open up the junction box and follow the leads back to the controller unit itself (it is labeled with a wiring diagram sticker). Connect the temperature probe wire to terminals 3 and 4 on the STC unit. Then tighten the clamp on the cable connector (make sure the jacket of the extension cord extends 1 inch inside the box.)

Slide the temperature control into the junction box and slide the orange mounting tabs (removed earlier) on to the sides. Click the orange tabs towards the front of the controller unit to lock it in place. Replace junction box lid with the four included screws. Program the STC to your desired settings, and you are ready to brew! BYO

Jay Cummings founded the NJ HOPZ homebrew club, and created the Final Gravity Podcast.



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Hope for Emma

How Homebrew Can Help

Eric Wentling • Waconia, Minnesota

> "As of October, 2011, Emma's final bone marrow biopsy results were negative for neuroblastoma, which means that she is officially, 100%, really and truly CANCER FREE."

Emma German's battle with a form of childhood cancer inspired homebrewers to organize an event in her honor.

What do a young girl, cancer, hope and homebrewing have in common?

In 2010, four-year-old Emma German was diagnosed with neuroblastoma, a malignant childhood cancer. Emma's dad, Chris, a member of the Jack of All Brews homebrew club, sells grain and brewing supplies to commercial breweries and homebrew shops. Jack of All Brews (JAB) wanted to do something special for their friend and his family, so after some brainstorming, the club decided to host a beer-centric benefit for Emma.

The club contacted several local Minnesota breweries and brewpubs who generously supplied the club with beer to serve at the event as well as donated prizes to hand out. When all of the equipment, products and promotional items started arriving, however, the club decided they wanted to create an even bigger draw to increase event attendance. When JAB members learned that Northern Brewer had created an English brown ale kit called "Emma's Ale," with all the proceeds going toward pediatric cancer research and treatment at Children's Hospital and Clinics, the lightbulb turned on and JAB members incorporated a homebrew challenge into the benefit: brew your own version of "Emma's Ale."

From all-grain, boil-in-bag and extract with grain versions, many enterprising JAB members embraced the brewing challenge and added some unique twists to the base recipe: pumpkin, spices, smoke, vanilla, bourbon-soaked oak chips and many more formulas — more than 18 different interpretations were concocted!

By the time the day of the benefit arrived, homebrew supply companies, yeast companies, club members and local liquor stores had all jumped on board for an amazing lineup of silent auction items, and the staff from Brewing TV captured the action and even donated a televised brew session to the silent auction. Emma and her brother Brady got in on the fun by drawing the winning raffle tickets.

During the benefit, taps and bottles of the various "Emma's Ale" interpretations were rotated and the public had an opportunity to vote for their favorite version. It was very hard to choose the best, as a lot of club members pushed the envelope of the English brown style. The winner of the traveling Golden Mash Paddle Trophy, however, was Keith Brady, who brewed a chipotle and honey version. The runner-up was Emma's dad's German cocoa-nibbed ale.

Not only was the event a great time, it earned $3,300 for the family! The event has also generated a significant nationwide response from other homebrewers and clubs who have brewed the "Emma's Ale" kit. Emma received chemotherapy treatment and had her tumor removed at Children's Hospital in Minneapolis, followed by a bone marrow transplant at Fairview University Children's Hospital. As of October, 2011, Emma's final bone marrow biopsy results were negative for neuroblastoma, which means that she is officially, 100%, really and truly CANCER FREE.

The "Emma's Ale" kit is still available from Northern Brewer, so it's not too late to brew up a batch and help cure childhood cancer! If you want to follow Emma's progress, check out her CaringBridge site: www.caringbridge.org/visit/emmagerman

To see video of the Hope for Emma Event and tell us about your experiences with the Emma's Ale Kit, go to: www.jackofallbrews.org.

Donations can be made to "Hope For Emma" fund at:
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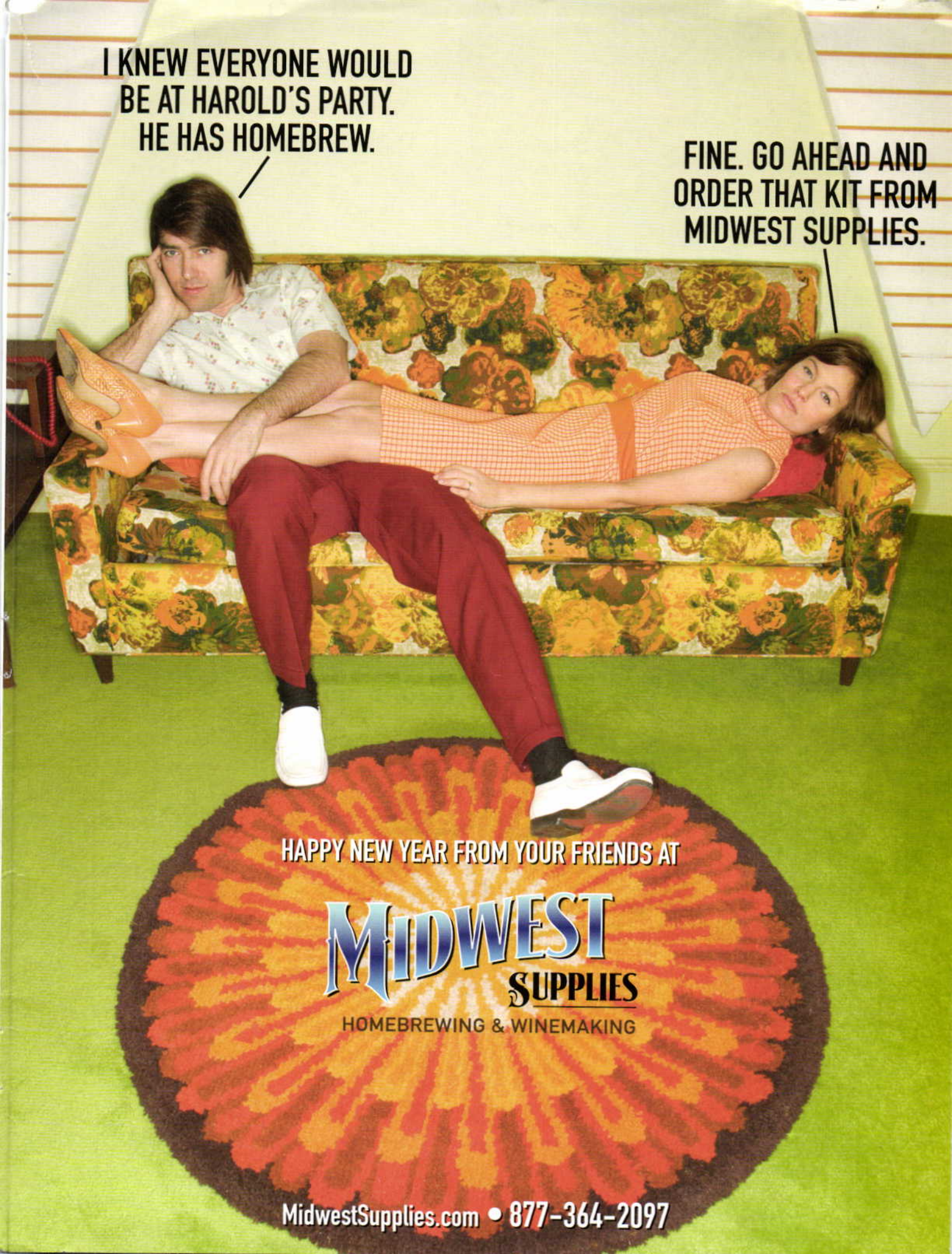
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