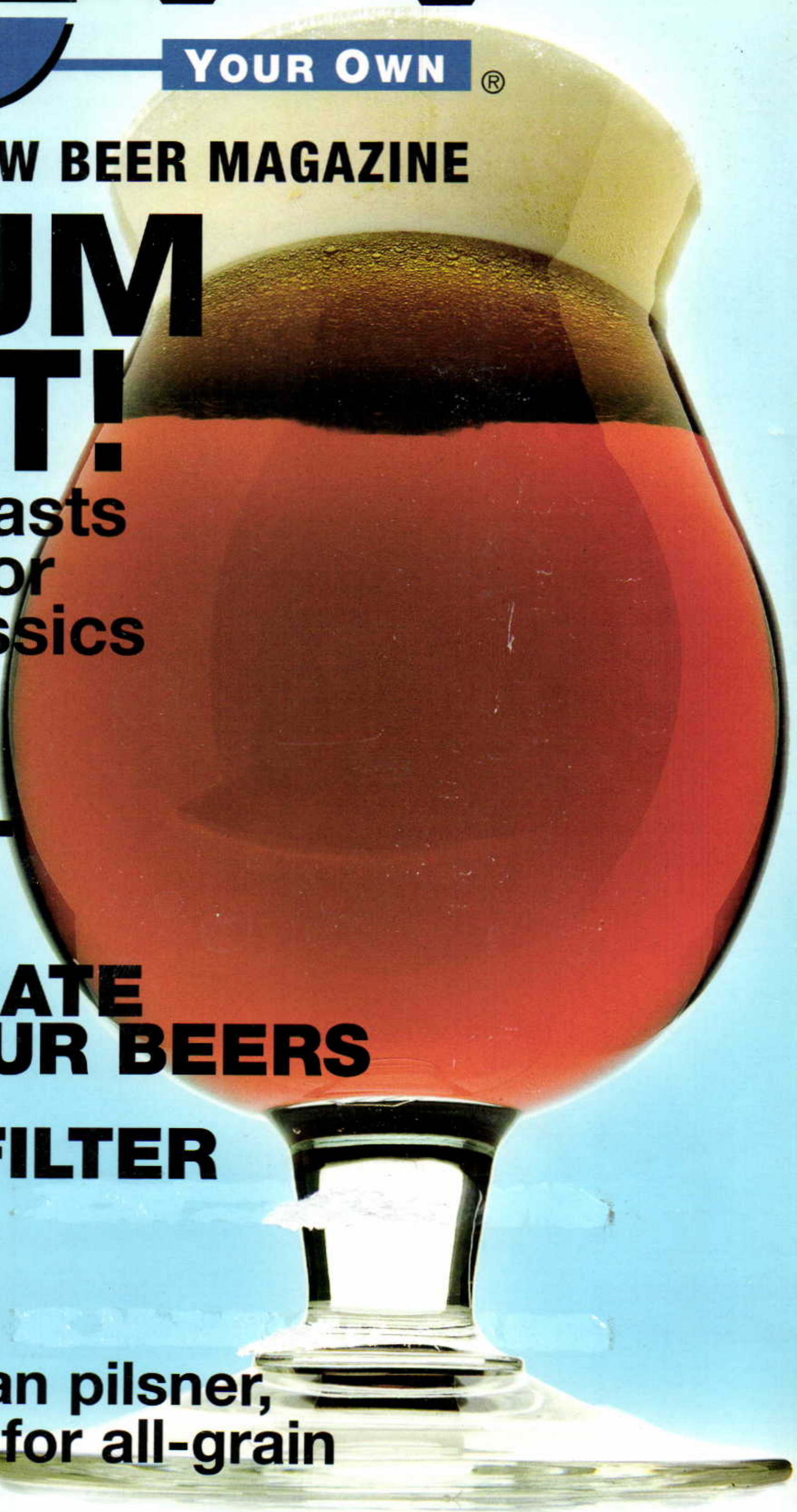
GET DRAFTED: KEGGING GADGETS & KNOW-HOW

Brew YOUR OWN®

JANUARY-FEBRUARY 2007, VOL.13, NO.1

THE HOW-TO HOMEBREW BEER MAGAZINE



BELGIUM or BUST!

mastering the yeasts and techniques for belgian-style classics

WONDERFUL wheat beers

HOW TO EVALUATE (and improve) YOUR BEERS

build a WATER FILTER

www.byo.com
U.S. $4.99 • CAN. $5.99

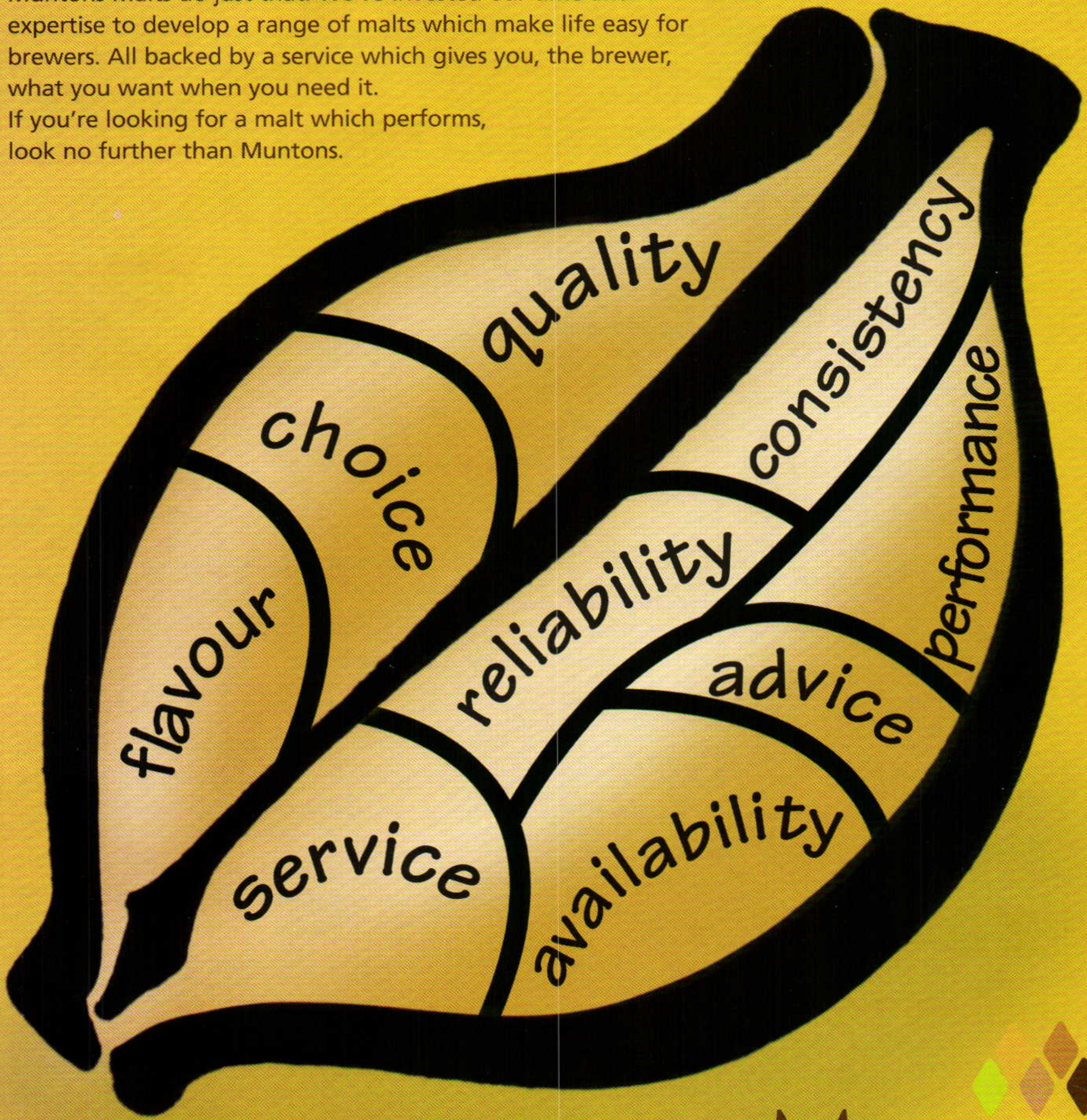
$4.99US $5.99CAN
02>
0 71486 02485 9

PLUS:
american pilsner,
extract for all-grain

Malt with a brain for brewing

ASSURED UK MALT

Busy brewers expect their malt to perform. Every time. And Muntons Malts do just that. We've invested our time and expertise to develop a range of malts which make life easy for brewers. All backed by a service which gives you, the brewer, what you want when you need it.
If you're looking for a malt which performs, look no further than Muntons.



Muntons

WORLD CLASS MALT

Muntons PLC, Cedars Maltings, Stowmarket, Suffolk, IP14 2AG, England Tel (+44) (0) 1449 618300 Fax (+44) (0) 1449 677800 email james.smith@muntons.com

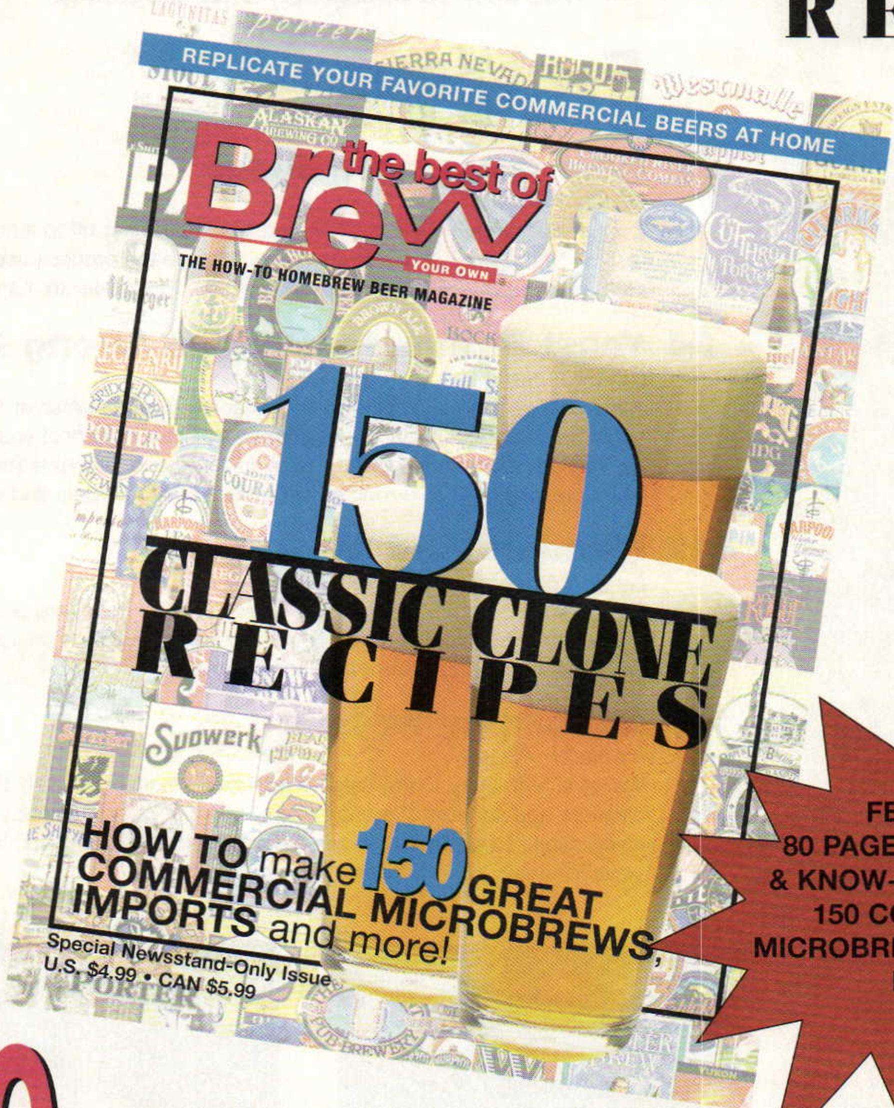
www.muntons.com

ANNOUNCING...

the best of Brew YOUR OWN

THE HOW-TO HOMEBREW BEER MAGAZINE

150 CLASSIC CLONE RECIPES



FEATURES
80 PAGES OF RECIPES
& KNOW-HOW TO BREW
150 COMMERCIAL
MICROBREW AND IMPORT
BEERS

150 CLONE RECIPES IN ONE GREAT SPECIAL ISSUE!

Replicate your favorite commercial beers featuring the best clone recipes from the last ten years of BYO.

- Intro on how to clone brew commercial beers
- 150 recipes provided for all-grain and extract brewers
- Cross indexed so you can easily find your favorite recipes by brewery or style

At just $4.99 ($5.99 CAN) retail, you won't find a more valuable recipe collection to brew beers like the pros make!

This special newsstand only issue is available at better homebrew retailers
or order today by calling 802-362-3981
also available online at brewyourownstore.com

* Attention homebrew supply shop owners - call us today at 802-362-3981 to discuss volume discounts to resell the BYO 150 Classic Clone Recipes issue in your shop

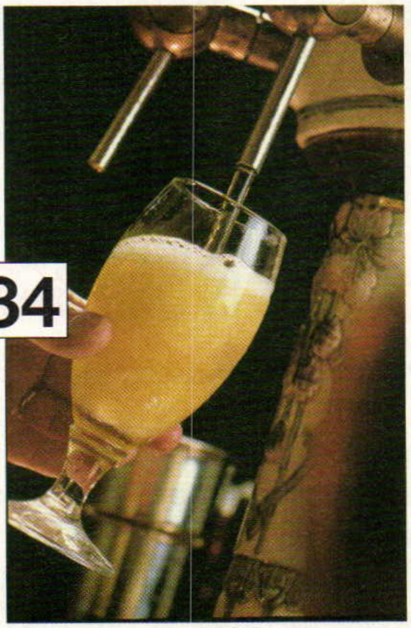
JANUARY-FEBRUARY 2007
Volume 13 Number 1

Departments

COVER PHOTO: CHARLES A. PARKER

Brew YOUR OWN®
THE HOW-TO HOMEBREW BEER MAGAZINE

Features


34


42


50

Where to find it


Let There Be Beer.
IN EARLY 1933, BEFORE PROHIBITION COULD BE OFFICIALLY REPEALED, PRESIDENT ROOSEVELT SIGNED EMERGENCY LEGISLATION ESSENTIALLY DECLARING LET THERE BE BEER. IT WASN'T UNTIL DECEMBER THAT WINE AND HARD LIQUOR LEGALLY RETURNED. AFTER BEING DEPRIVED OF LEGAL ALCOHOL FOR 13 MISERABLE YEARS, THIRSTY AMERICANS NEEDED A BEVERAGE OF MODERATION.
FDR MUST HAVE KNOWN BEER IS ALWAYS THE BEST CHOICE TO ENCOURAGE ADULTS' RESPONSIBLE ENJOYMENT.
HERE'S TO BEER
FOR EVERYTHING ABOUT BEER AND MORE, VISIT HERESTOBEER.COM
©2006 Here's to Beer, Inc. Washington, D.C.

RECIPE INDEX

Page

BYO RECIPE STANDARDIZATION

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

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

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

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

Brew Your Own

THE HOW-TO HOMEBREW BEER MAGAZINE

EDITOR
Chris Colby

ART DIRECTOR
Coleen Jewett Heingartner

ASSOCIATE EDITOR
Garrett Heaney

TECHNICAL EDITOR
Ashton Lewis

EDITORIAL INTERN
Dave Green

CONTRIBUTING WRITERS
Steve Bader, Thom Cannell, Horst Dornbusch, Bill Pierce, Marc Martin, Terry Foster, Glenn BurnSilver, Kristin Grant, Paul Zocco

CONTRIBUTING ARTISTS
Don Martin, Ian Mackenzie, Shawn Turner, Jim Woodward

CONTRIBUTING PHOTOGRAPHER
Charles A. Parker

CANINE ASSISTANT
Heidi

PUBLISHER
Brad Ring

ASSOCIATE PUBLISHER & ADVERTISING DIRECTOR
Kiev Rattee

ADVERTISING SALES COORDINATOR
John Ragozzine

BOOKKEEPER
Jim Moulton

NEWSSTAND DIRECTOR
Carl Kopf

EDITORIAL REVIEW BOARD
Matt Cole • Rocky River (Ohio) Brewing Co.
Horst Dornbusch • Beer Author
Mark Garetz • Homebrew Consultant
Chris Graham • Beer, Beer and More Beer
Craig Hartinger • Merchant du Vin
Anita Johnson • Great Fermentations (IN)
Marlon Lang • Homebrew Consultant
John Maier • Rogue Ales
Paul Manzo • Homebrew Consultant
Kirby Nelson • Capital Brewing Co.
Greg Noonan • Vermont Pub & Brewery
Ralph Olson • Hopunion USA Inc.
Mark Szamatulski • Maltose Express
Tess Szamatulski • Maltose Express
John Weerts • Homebrew Consultant
Chris White • White Labs
Anne Whyte • Vermont Homebrew Supply

How to reach us

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

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

Advertising Contact
Kiev Rattee
kiev@byo.com

Editorial Contact
Chris Colby
chris@byo.com

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

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

Special Subscription Offer
8 issues for $24.95

Web Site
www.byo.com

Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for $24.95 per year by Battenkill Communications, 5053 Main Street, Suite A, Manchester Center, VT 05255; tel: (802) 362-3981; fax: (802) 362-2377; e-mail: BYO@byo.com. Periodicals postage rate paid at Manchester Center, VT and additional mailing offices. Canada Post International Publications Mail Agreement No. 40025970. Return undeliverable Canadian addresses to Express Messenger International, P.O. Box 25058, London BC, Ontario, Canada N6C6A8. POSTMASTER: Send address changes to *Brew Your Own*, P.O. Box 469121, Escondido, CA 92046-9121. Customer Service: For subscription orders call 1-800-900-7594. For subscription inquiries or address changes, write *Brew Your Own*, P.O. Box 469121, Escondido, CA 92046-9121. Tel: (800) 900-7594. Fax: (760) 738-4805. Foreign and Canadian orders must be payable in U.S. dollars plus postage. The subscription rate to Canada and Mexico is $30; for all other countries the subscription rate is $40.

All contents of *Brew Your Own* are Copyright © 2007 by Battenkill Communications, unless otherwise noted. Brew Your Own is a registered trademark owned by Battenkill Communications, a Vermont corporation. Unsolicited manuscripts will not be returned, and no responsibility can be assumed for such material. All "Letters to the Editor" should be sent to the editor at the Vermont office address. All rights in letters sent to *Brew Your Own* will be treated as unconditionally assigned for publication and copyright purposes and subject to *Brew Your Own's* unrestricted right to edit. Although all reasonable attempts are made to ensure accuracy, the publisher does not assume any liability for errors or omissions anywhere in the publication.

All rights reserved. Reproduction in part or in whole without written permission is strictly prohibited. Printed in the United States of America. Volume 13, Number 1: January-February 2007.

Stumped on Standardization

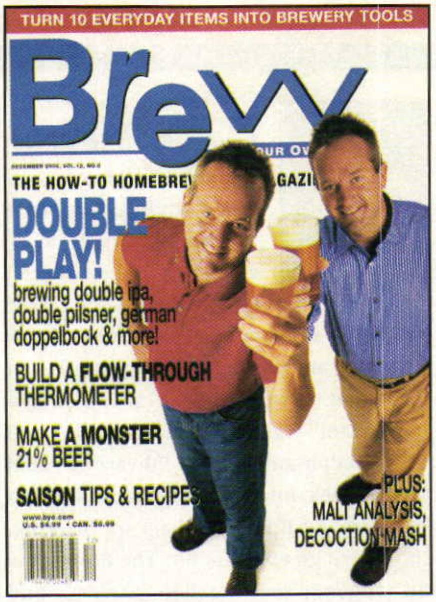
In your December issue, I saw the "BYO Recipe Standardization" box that appears in every issue and it got me thinking. I understand the basic idea that every recipe is formulated using the same extract efficiency and hop utilization. But, what happens when an author submits a recipe that doesn't match your numbers? And what should I do if my extraction efficiency differs from yours? I understand that if my efficiency is higher, I would need to add less malt. But if a recipe contains, say, four malts, do I add less of all four? Or just less base malt?

Bill Worthington
North Platte, Nebraska

Starting in 2003, we standardized all homebrew recipes appearing in Brew Your Own (BYO). *The idea being that a homebrewer will know what extract efficiency and hop utilization is assumed for every recipe. Likewise he (or she) can apply what he has learned from brewing one recipe when he brews other* BYO *recipes later on. For example, if you brewed an all-grain* BYO *recipe and your original gravity was a little higher than the recipe projected, but the bitterness seemed a little low, given the IBU value, you'd know to add less malt and more hops the next time you brew another recipe from our magazine.*

If an author submits a recipe and his assumptions are different than ours, we adjust the submitted recipe to fit our assumptions.

In the case of differences in extraction efficiency, there are a couple ways this adjustment can be made. If the recipe calls for pale malt and one or more darkly kilned malts, including most specialty malts, the amount of pale malt is increased or decreased to hit the target original gravity specified by the author. The amount of darker malt remains the same because these contribute flavors, colors and aromas, as well as extract (fermentable sugars and non-fermentable carbohydrates that add to the specific gravity of a wort). If the recipe contains a blend of pale malts — or a blend of pale malts and lightly colored, lightly flavored



adjuncts — the amounts of the pale malt(s) and adjunct(s) are all scaled proportionally.

In practice, the amount of pale malt a recipe is adjusted by is usually fairly small — most often under 1.5 lbs. (0.68 kg) per 5.0 gallon (19 L) recipe. In the case of extract recipes, the adjustment — if any is needed — is usually less than a couple ounces (<57 g).

In the case of differences in hop utilization, the amount of bittering hops are changed to hit the author's intended IBU value. The amount of late addition hops remains the same because they contribute hop flavors and aromas in addition to bitterness (IBUs). In practice, the amount of hops in homebrewer submitted recipes almost always yields IBU estimates similar enough to ours that little or no adjustment is needed. In every case, the adjusted recipe is sent back to the author for approval.

So, if you are brewing a BYO *recipe and your extract efficiency differs from ours, scale the amount of pale malt or malts such that your target original gravity matches the OG printed in the recipe. Likewise, if the hop utilization curve you use predicts a different IBU value than specified in our recipe — and you feel that the curve reflects the hop utilzation you achieve on your system — change the amount of bittering hops so that your calculated IBU value matches ours.*

For moderate-strength beers with moderate hopping levels, your adjustments should be small. In the case of very big, very hoppy beers, the adjustments may be larger.

When we chose our assumptions, we purposely made them "middle of the road" so that average homebrewers — who may not feel like diddling with recipe calculations — would have a good chance at success. For advanced homebrewers, use your knowledge of the performance of your brewery — and any previous experience with BYO *recipes — to guide your recipe adjustments. And of course, if you brew a recipe once, take good brewing and tasting notes so you can tweak the recipe, if needed, if you brew it again.*

Hops in Extract Clones

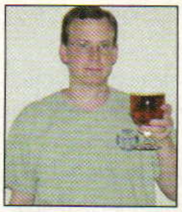
Thanks for the "150 Classic Clone Recipes" special issue! I've been brewing approximately six years, the last year all-grain and almost exclusively clones. My concern is that with many of the recipes you provided, the hop additions are the same for both the extract version as the all-grain, even though the former often doesn't use a full-wort boil. Any insight?

Michael Frenn
via email

With two exceptions, the recipes that appear in the "150 Classic Clones Recipes" special issue all come from recipes that were previously published in BYO. *However, many of the older recipes were reworked to meet our standardized assumptions and to use the "extract late" method of homebrewing. The "extract late" method allows an extract brewer to achieve better hop utilization compared to the standard method of boiling a "thick" wort.*

In the "extract late" recipes, when the target IBU value for the beer is less than 50 IBUs, the amount of hops specified in the extract and all-grain recipes are the same. Alhough the extract brewer will not be boiling his (or her) full wort, he will also not be boiling all his extract for at least the first 45 minutes of the boil. If the recipe is followed, the wort will be roughly the same specific gravity as the target original gravity until the final extract addition is made. In this case, an extract brewer's hop utilization should be comparable to an all-grain brewer's.

Contributors



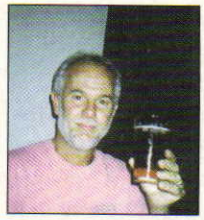
Michael Heniff brewed his first few homebrew batches in college in 1994 at the University of Illinois in Urbana-Champaign while pursuing a degree in Chemical Engineering. After relocating to Houston, Texas, he began regularly brewing in 1997. His highest brewing accomplishments are winning the Templeton Award (for most points) in three of the last four Dixie Cups (the largest single-site homebrew competition in the world) and the Gulf Coast Homebrewer of the Year in 2004. His favorite beers to brew are "anything hoppy, anything big or anything Belgian." Mike particularly enjoys traveling to find new beers, especially to Belgium. He has logged over 2,400 beers in his tasting journal, including over 375 beers from Belgium.

On page 34 of this issue, he discusses how to select yeast strains for brewing a high-gravity Belgian beer. He also gives his recipe for a "devilish" Belgian golden ale.

Ralph Allison resides in Denver, Colorado and was introduced to home brewing in 1969 by a customer who ran a small wine and beer shop as a sideline business. Due to work demands and raising a family, that lasted for about a year and a half, then the equipment was packed away. In mid 2005, Ralph and his son Edward decided to get back into home winemaking and brewing. As Ralph read up on brewing, the bug to go all-grain bit. The brewery is an ongoing construction project, and Ralph enjoys building and modifying equipment second to brewing. Being retired, Ralph finds it easier to devote time to brewing, brewing related projects, and his other hobbies.

He is known on the Northern Brewer and Home Brewing Channel forums as *milehightrader*.

On page 50 of this issue, Ralph discusses how to transform a used Corny keg into a "like new" brewing vessel.



Paul Zocco has been homebrewing for about ten years. For his first beer, he jumped right in and started with an all-grain Octoberfest. Paul opened up his shop — Zok's Homebrewing & Winemaking Supplies — in Willimantic, Connecticut in the fall of 2000 and it is still going strong. Paul is the organizer of the Eastern Connecticut Homebrew Beer Competition, currently the largest competition in New England, drawing about 300–400 entries. He is no stranger to winning medals at homebrew (and home winemaking) competitions, having won New England Meadmaker and New England Cidermaker of the year multiple times. He is a National BJCP judge and, on page 28 of this issue, he explains how BJCP judges evaluate beer at a homebrew contest — and how you can evaluate your own beer for yourself at home.

Premium Beer Kits Include
PREMIUM YEAST

Before you buy your next beer kit, make sure it includes genuine Danstar dry yeast. Danstar yeast is true brewing yeast, selected for proven performance and superior flavor. Every batch of Danstar yeast is tested to insure it meets the most stringent standards of quality and purity, giving brewers the unmatched consistency and ease-of-use that only dry yeast can provide.

Bring out the best in your beer. Visit us at Danstar.com for the complete line of Danstar brewing products.

Get *The Dry Yeast Advantage* with Danstar.

www.DANSTAR®.com

FAST, EASY, SIMPLY THE BEST.

Only the Coopers Brewery offers you
The ability to make a true lager with a beer kit.

A Perfect Pair

Also available in Traditional Draught, Australian Bitter and Sparkling Ale. Each Thomas Coopers Series beer kit is packaged with stylistically appropriate yeast.

NEW TO BREWING?

Then you'll want to read "Exploding the Orthodoxy." Learn how to make the great beer you like, easily, from the brewmasters at Coopers.

Visit
www.cascadiabrew.com

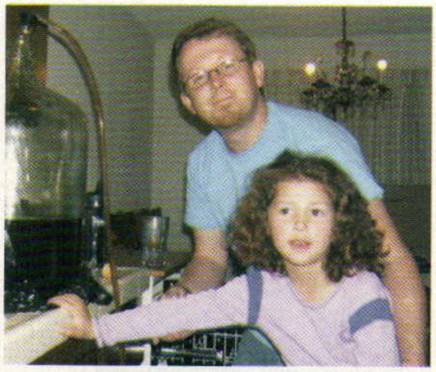
Coopers

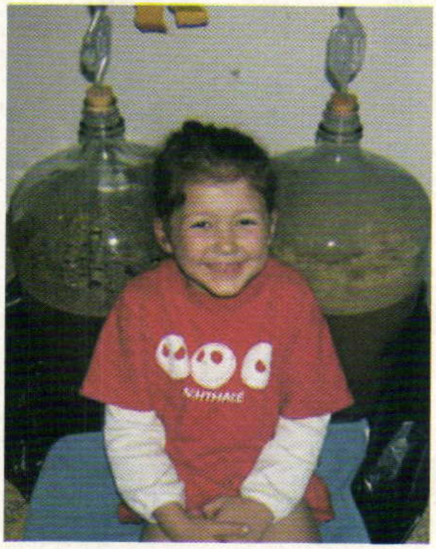
www.cascadiabrew.com

homebrew NATION

homebrew PROFILE

Dean Evans • La Habra, California





Dean Evans is a stand up comic, homebrewer and family man. His daughter (above) helps in the brewing process by writing designated letters on the bottle caps of homebrews. This helps Dean with the bottling, and gives her a chance to work on her penmanship.

There are two things I care about more than anything in the world: My family and my homebrew. (I won't say which one is first.) I know it's not hip to be a happy family man, but I don't care — I love my life!

Commercials show guys drinking cold beer and getting hot women! You go to a bar and the conversations are about the big college football game or a super heavy weight boxing match. Not about school programs or funny stories about gum getting stuck in your daughter's hair.

When I tell people I spent my Friday night watching "Wallace and Gromit" and making 10 gallons (38 L) of homemade pale ale they look at me like I grew a third eye. I love my family and I love my beer. Over the past year I've found way to incorporate the two. Am I finding a way for my family to bond or am I manipulating free labor? Probably a little of both.

One of my favorite memories was during my wife's pregnancy. She followed the doctors orders of no alcohol. She was eating for two, I was drinking for five! As her pregnancy rounded up (get it? rounded up!), we went to the beer store where I let her pick the next two batches of beer. I timed it so the day she was able to drink again the beer she wanted was ready. They say beer helps breast feeding women produce more milk. And looking at my adorable, gigantic baby, it shows I made some great beer!

The one thing that has made me the most proud is my six-year-old daughter. She's writing more and more so I decided it's time to put her to work (What? She's not making wallets!) I fill the bottles, my wife caps the bottles and then we put them in the boxes. Then it's time for the kid to shine!

With a Sharpie pen she writes a letter on each and every bottle. I can tell my beers apart and she works on writing her letters. It's win win! Literacy and beer!

I have learned that the family who brews together knows to stay out of daddy's way when he's drinking! No, seriously, my family joins me in the kitchen and helps me with my other love and in turn I help them with theirs. It's a fair trade!

My daughter's learning about science and cooking and I've learned that when a six-year-old works the bottling wand that I better have a mop handy . . . along with more beer and a lot of patience.

Homebrew CALENDAR

January 13
Doug King Memorial Lager and Speciality Beer Competition
Woodland Hills, California

Entries for this year's competition are due between January 2 and January 13. The fee for entries is $5 and should be shipped or dropped off at The Home Wine, Beer and Cheese Making Shop at 22836 Ventura Blvd in Woodland Hills, California 91364. Judging and awards ceremony will take place at the same location on January 20. New to this year's competition is Class 28 — Imperial Anything. The only rule is that the original gravity must be 1.080 or above (base "inspiration" style must be specified). For more information, visit www.maltosefalcons.com/comps/2007DKM.

January 13
2007 Upper Mississippi Mash-Out!
Saint Paul, Minnesota

Entries for the 2007 Upper Mississippi Mash-Out are due between January 1 and January 13. Entries fees are $7 by mail, $6 if paid online. Entries can be shipped to Northern Brewer, c/o 2007 UMMO, 1945 West Co Rd C2, Roseville, Minnesota 55113. For more info visit www.mnbrewers.com/mashout or call 800-681-2739.

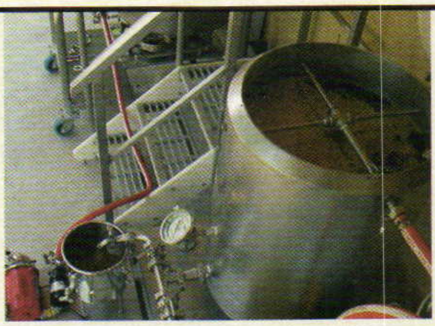
February 10
War of the Worts XII
North Wales, Pennsylvania

Entries for the twelfth annual War of the Worts are due February 10. The fee for entries is $6 for the first entry, $5 for subsequent entries. For more information, contact Vince Galet at 484-744-3161, or visit the Keystone Hops Homebrew Club Website at www.keystonehops.org.

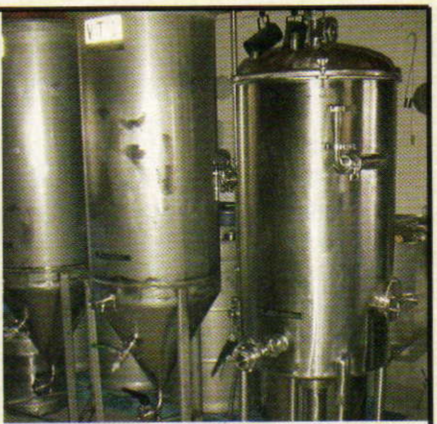
homebrew systems that make you DROOL

Jim Bieberman • Albuquerque, New Mexico

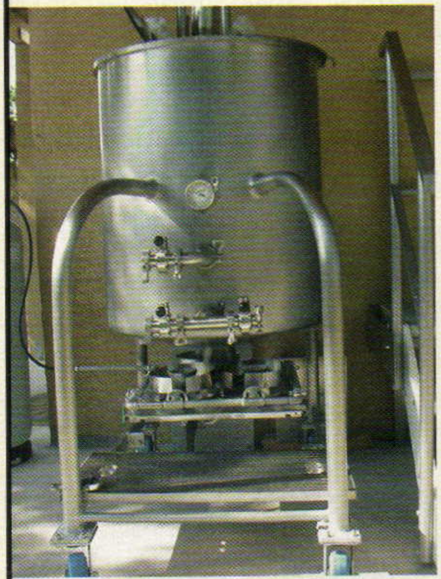
Jim calls his homebrew system Valverde Brewing and Winery. It is housed inside, and on the porch of a 20' x 30' temperature-controlled building in his backyard and has a 3-barrel brewing copacity.



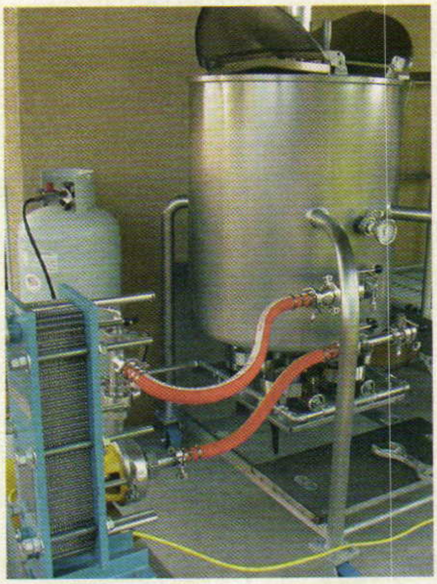
As you can see, nearly all of the components of the system are stainless steel. Here the sparging of the mash is underway, and the wort is being pumped from the grant over to the kettle.



Two home-built 108-gallon (410-L) conical fermenters are used to store chill water, and a 90-gallon (342-L) fermenter is where the beer is made.



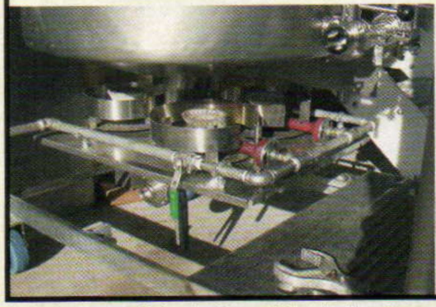
This is the 110-gallon, stainless steel kettle. The kettle includes a thermometer, a whirlpool inlet, butterfly connectors, and a step and railing setup allowing for the brewer to look inside.



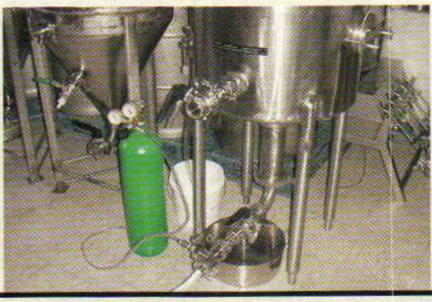
The brew kettle is hooked up to the whirlpool pump and a Mueller AT4-C20 heat exchanger. The heat exchanger uses 60 °F (16 °C) chill water from the conical storage containers in the building.

This portable clean-in-place station is used to clean and sanitize everything in the brewery.

Jim has two lagering boxes, each with an 18-Cornelius keg capacity.



A close up of the bottom of the kettle shows three 170,000 BTU burners, for a total BTU of 510,000. Each burner has a heat shield and a stainless steel propane manifold.



After the boil, the wort is cooled and pumped from the kettle to the fermenter, where it is injected with oxygen, preparing it for immediate fermentation. A sight glass allows Jim to monitor the activity.

The draft box holds 10 kegs and has 3 tap handles on its left facing wall. There is gas supply for up to 6 kegs and plenty of room for various bottles and supplies. Jim hopes his guests are thirsty!

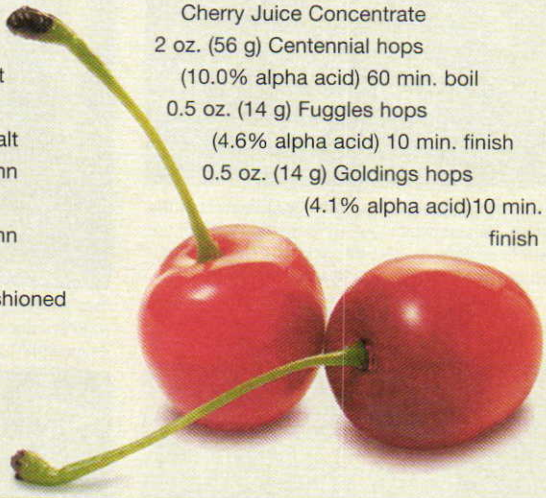
reader RECIPE

Joe Formanek • Chicago, Illinois

Hannah's Cherry Stout
5 gallons (19 L)

Ingredients:

1.5 lbs. lbs. (0.68 kg) Crisp Maris Otter 2 row malt
2 lbs. (0.9 kg) Cargill Special Pale malt
1.5 lbs. (0.68 kg) English roast barley malt
1 lb. (0.45 kg) DMC biscuit malt
1 lb. (0.45 kg) Mich Weyermann Light Munich malt
1 lb. (0.45 kg) Mich Weyermann Wheat malt
1 lb. (0.45 kg) Quaker Old Fashioned Oats
0.5 lb. (0.23 kg) Caramunich® malt
0.5 lb. (0.23 kg) Caravienne® malt
0.5 lb. (0.23 kg) Chocolate malt
0.5 lb. (0.23 kg) Black Patent malt
0.25 lb. (0.13 kg) Aromatic malt
0.13 lb. (0.07 kg) Special B malt
1.5 qt. (54 oz.) Michigan Montmorency Cherry Juice Concentrate
2 oz. (56 g) Centennial hops (10.0% alpha acid) 60 min. boil
0.5 oz. (14 g) Fuggles hops (4.6% alpha acid) 10 min. finish
0.5 oz. (14 g) Goldings hops (4.1% alpha acid)10 min. finish
1 pkg. White Labs WLP002 English Ale
1 tsp Irish Moss



Step by Step:

Cook Oatmeal in 6 cups water. Add cool water to bring to 128 °F (53 °C), add 1 lb. (0.45 kg) base malt, hold 15 min. and then heat to 156 °F (69 °C). Add remainder of grain and water to the base mash and hold at 156 °F (69 °C) for 60 min. until converted. Mash out at 170 °F (77 °C) with sparge.

Boil 75 min with Irish moss and hop additions, then add 1 qt. (~1 L) cherry concentrate at strike (SG – 1.110).

Note: Add 0.5 quart (~0.5 L) cherry concentrate in secondary before bottling. Enjoy!

www.kegkits.com
Your homebrew kegging and draft beer keg source

Hardware
Bulk HOPS
Pony Pumps
CO2 Regulators
Temp Controllers
Refurbished Cornelius Kegs
All Metal Beer Towers
New Cornelius Kegs
Briess Malt Extract
Kegging Supplies
CO2 Tanks
Keg Coolers
Kegerator Kits
Draft Beer Taps
White Labs Yeast

1-866-KEGKITS (1-866-534-5487)

THE Good Brewer
Home Brew & Wine Making Supplies

The Good Brewer
Home Brew & Wine Supplies

We specialize in high quality supplies so you brew a high quality beer!

Whole & Pellet Hops
Bulk Grains–Full Sack Pricing!
Fresh Grain–No Cracking Fees!
Wyeast Activator Packs–100 Billion Cells
Briess Liquid & Dry Malt Extracts

Located at: 2960 Pacific Ave, Livermore CA 94550
(925) 373-0333 e-mail: info@goodbrewer.com
www.goodbrewer.com

replicator

by **Marc Martin**

Dear Replicator,

On a recent business trip to Portland, Oregon, in addition to stopping by several "big name" microbreweries, I had the opportunity to check out the Salmon Creek Brewery and Pub, a relatively small, unknown brewpub across the river in Vancouver, Washington. What a great find! By far, my favorite beer was a Belgian style called "Brother Larry's Belgian." If not *the* best, definitely *one* of the best microbrews I have ever tried. I would recommend this to all. Other than growlers to take home I do not believe they sell their beer outside of the establishment. I would really appreciate your assistance in cloning this outstanding beer.

Brian Schaeffer
Boise, Idaho

Thanks for the easy assignment. This is a brewpub that is only 7 miles from my home and I have known the owner and brewer, Larry Pratt, for over 10 years. For your cloning details, I just stopped by the brewery, met with Larry and sampled this beer while we discussed its profile.

In April of 1994, Larry decided to try his hand at homebrewing. After a few successful batches he toured some of the well known microbreweries in Portland and declared "I can do this." He found used equipment to piece together a 3 barrel system, and in the fall of 1994 began operation in a rented industrial building in Woodland, Washington. Having a full time job with United Airlines, brewing became his evening labor of love.

Since that time the little brewery experienced steady growth. A few years ago it was moved to downtown Vancouver, Washington and has become a successful brewpub. Now Larry maintains five or more of his beers on tap and supplies some local keg accounts. These are produced on a much more modern 7 barrel system, just installed this spring. His wife, Ana, presides over the pub with old world German charm.

Brother Larry's Belgian beer has proved to be one of his best and was awarded gold at the Portland Spring Beerfest in 2005. It is a Belgian Dubbel style that is dark garnet in color with a creamy white head. The flavor profile is clean and somewhat roasty with a sweet, crisp finish. Noble hops provide the balance but allow for a malty nose. I find this beer is very similar to New Belgium's Abbey Ale — an excellent choice for those cold winter days in Boise!

For further information, visit their Site at www.salmoncreekbrewpub.com or call them at 360-993-1827.

Salmon Creek Brewing Brother Larry's Belgian

(5 gallons/ 19 L, extract-with-grain)
OG = 1.082 FG = 1.018
IBU = 26 SRM = 27 ABV = 8.3 %

Ingredients

6.6 lbs. (3.0 kg) Coopers light, unhopped malt extract
23 oz. (0.64 kg) Munich malt
23 oz. (0.64 kg) aromatic malt
23 oz. (0.64 kg) special B malt
21 oz. (0.6 kg) biscuit malt
14 oz. (0.4 kg) dark Belgian candy sugar
9 oz. (0.25 kg) Carapils® dextrin malt
0.5 tsp. yeast nutrient (15 min.)
4.25 AAU Northern Brewer hop pellets (60 min.) (0.5 oz./14 g of 8.5% alpha acid)
1.2 AAU Hallertauer hop pellets (60 min.) (0.3 oz./8.5 g of 4.0% alpha acid)
1 AAU Hallertauer hop pellets (30 min.) (0.25 oz./7 g of 4.0% alpha acid)
1.2 AAU U.S. Goldings hop pellets (10 min.) (.25 oz./7 g of 4.75 alpha acid)
White Labs WLP 530 (Belgian Abbey) or Wyeast 1762 (Belgian Abbey II)
0.75 cup (150g) of corn sugar for priming (if bottling)

Step by Step

Steep the crushed grain in 3 gallons (11.4 L) of water at 156 °F (69 °C) for 30 minutes. Remove grains from the wort, add the liquid extract and bring to a boil. While boiling, add the hops as per the hopping schedule. During the boil, use this time to thoroughly sanitize a fermenter. Add the yeast nutrient after 45 minutes of boiling. Now add the wort to 2 gallons (7.6 L) of cold water in the sanitized fermenter and top off with cold water up to 5 gallons (19 L).

Cool the wort to 75 °F (24 °C). Pitch your yeast and aerate the wort heavily. Allow the beer to cool to 68 °F (20 °C). Hold at that temperature until fermentation is complete. Transfer to a carboy, avoiding any splashing to prevent aerating the beer. Let the beer condition for 1 week and then bottle or keg. Allow to carbonate and condition for 4 additional weeks and enjoy your Belgian Dubbel!

All-grain option:

This is a single step infusion mash. Replace the malt syrup with 10 lbs. (4.5 kg) Pilsener malt grain. The other grains remain the same. Mix the crushed grain with 4 gallons (15.2 L) of 172 °F (77 °C) water to stabilize at 156 °F (69 °C) for 60 minutes. Sparge slowly with 175 °F (79 °C) water. Collect approximately 6 gallons (23 L) of wort runoff to boil for 60 minutes. The remainder of this recipe is the same as the extract-with-grain recipe.

Wheat Beers

Barley's not the only malt for brewing

by Garrett Heaney

While malted barley is by far the most commonly used grain in brewing beer, wheat has also been a popular brewing grain in Europe for centuries, and in America since the microbrew revival of the 80s and 90s. Traditionally, the two most common styles of wheat beer have been the weissbiers of Germany and the wit beers from Belgium. The popularity of microbreweries in the United States has led to a popular American wheat style, that is different than either of its predecessors. And, of course, there are the many other European styles that incorporate wheat: dunkelweizen, Berliner weiss, lambic, bieré blanche, weizenbock, sometimes Kölsch, etc.


Wheat is a popular brewing grain in Europe and has been adapted well into American microbreweries.

Malted wheat

While a handful of beer styles use raw, unmalted wheat (or "wheat berries"), the form of wheat most often used in homebrewing is malted wheat. Wheat differs from barley in several ways. Whereas barley has a husk, the wheat kernel is naked, or husk-less. This allows the malted wheat to absorb water faster.

However, wheat is also a larger and harder grain than barley. Crushing the grains can be more labor intensive if you're using a hand mill.

Wheat contains more protein and is more glutenous than barley — about 13–20% more. This has its advantages and its drawbacks. On the positive side, wheat produces a thicker head than barley. On the negative, some brewers run into problems during lautering. Gluten is sticky stuff and with less husk material from a full barley mash, maintaing a grain bed porous enough to drain easily can be difficult. Because of this, some brewers add rice hulls to the mash. When it comes to sparging, if you keep your grain bed temperature up and collect at a reasonable pace — as you should for any beer — everything should work out fine.

Wheat extracts

There are several wheat extracts on the market for homebrewers who wish to use wheat, but aren't set up for mashing. A survey of the market finds a range of wheat malt extracts with varying ratios of wheat to barley: Coopers offers a 50% wheat/50% barley liquid malt extract (50:50), Muntons offers a 55:45 liquid and dry malt extract, John Bull offers a 55:45 liquid extract, Alexander's offers a 60:40 liquid malt extract, and Weyermann offers a Bavarian Hefe-weizen liquid extract with a 70:30 makeup.

Flavor, yeast and filtration

As mentioned earlier, each style of wheat beer has its own distinct flavor profile. While wheat itself doesn't typically carry that much flavor of its own, it lends more of a clean slate to other flavor contributing ingredients — mainly yeast. Due to the high protein content of wheat, the beer also has a unique, turbid appearance . . . unless filtered. The German weissbiers can be filtered or unfiltered, but the unfiltered versions have gained the most popularity (hefeweizen or hefeweissbier — meaning "yeast wheat" — for instance has gained popularity in North America over the past decade).

Weissbiers have little to no hop flavor or aroma and get the majority of flavor from the yeast strain used. The profile of Weissbier includes phenolic flavors, fruitiness and notes of banana, clove and nutmeg.

The Belgian wit beers have similar flavor profiles, with estery, unfiltered and fruity flavors. The most common and universally accepted flavor descriptors for wits are orange peel and coriander. These beers are almost never filtered and have an almost opaque turbidity that increases with bottle conditioning.

Bottle conditioning also helps produce the high effervescence and carbonation that wit beer brewers demand. Both the German and Belgian wheat varieties benefit from proper yeast choice, and there are several examples available on the market. See the wheat section of *BYO*'s yeast chart in the January–February 2006 issue or at byo.com for over a dozen examples.

The American wheat beer veers away from its European counterparts and has a flavor profile all of its own. American wheat beers purposely avoid the spicy and phenolic nature of weissbier and wit beer. This is accomplished in two ways. First, a cleaner, more conventional ale yeast is selected. Second, it is filtered out. An American wheat should have no yeast character in the final bottle, but may still have some estery and fruity flavor, albeit in much lower levels than the European wheat beers. Being filtered, American wheat beers also have a clear appearance, unlike the cloudy wits and weisses.

Garrett Heaney is Associate Editor of Brew Your Own.

Brewing Wheat Beers

Learn the tricks to brew with this glutenous grain

by Garrett Heaney

While barley is by far the most popular grain when it comes to brewing, many craft and microbreweries are turning to wheat to produce Bavarian-style wheat beers and Belgian-style wits. While these styles originated in Europe, American brewers have used this lighter grain to produce their own examples of the styles mentioned, as well as original American wheat ales. Take a few tips from these professionals of wheat brewing!

Kris Kalav is the head brewer at Minhas Craft Brewery in Monroe, Wisconsin. He graduated from the University of Illinois-Chicago with degrees in biology and chemistry before accepting a position with the University of Chicago in the Department of Molecular Genetics and Cellular Biology. In 1996 he was recruited by the Joseph Huber Brewing Co. to serve as Quality Assurance Manager. In 1997 he added the responsibilities of Assistant Brewmaster and in 2002 became Director of Brewing. In 2006, he continues the tradition with the new owner of the brewery, Ravinder Minhas, and the Minhas Craft Brewery.

I make two wheat beers under the Berghoff label, Berghoff Hefe-Weizen and Berghoff Solstice Wit. The hefe-weizen is a classically Bavarian hefe, with notes of banana and clove, and carrying vitamin rich weissbier yeast. The Solstice is a Belgian style wit beer, with notes of orange curaçao and coriander. Both are light, refreshing summer brews that pair well with summer foods — fresh fruits, vegetables, grilled meats, etc.

On average, the wheat beers contain 40–48% malted wheat, with the rest of the grain bill composed of barley malts. With this ratio of wheat-to-barley, lautering is not difficult at all for us. The most important aspect to remember is that the husk integrity (of the barley) must be maintained to keep the grain bed from compacting during mashing.

I use a Weihenstephan weissbier strain of yeast and ferment in the 68 °F (20 °C) range. This yeast provides all the flavors just in its very nature . . . it ferments wheat sugars and produces the classic banana flavors on its own. We brewers don't produce the magic . . . the yeast does — but it is up to us to choose the right yeast when deciding on a flavor profile.

I prefer my wheat beers unfiltered, but it is a matter of personal choice. There are some excellent crystal weizens (filtered) out there, but I like mine with the yeast still in it. Not too much yeast — 1 to 3 million cells per mL is just fine. I don't want a weisse that is so cloudy that it looks like pale white mud, because at that point, the yeast can interfere with the flavor of the beer. The main advantage to not filtering is time and money savings — that, and obviously the flavors the yeast provides.

Using a portion of wheat in any beer will increase the quality of the head. Even as much as 5% in lagers will help. However, a well balanced recipe shouldn't necessarily need a boost from wheat. Foam science (yes, it exists!) has progressed rapidly in the past few years. There are many factors in brewing that lead to foam quality, and wheat is but one tool.

BYO.COM bonus:
Full information on all these strains and more in *BYO*'s online yeast chart

Yeast Strains For Wheat Beers

Bavarian weiss and hefeweizen:

- Siebel Institute Bavarian Weizen BRY235 (liquid)
- White Labs Hefeweizen Ale WLP300 (liquid)
- White Labs Bavarian Weizen Ale WLP351 (liquid)
- White Labs Hefeweizen IV Ale WLP380 (liquid)
- Wyeast Bavarian Wheat 3056 (liquid)
- Wyeast Weihenstephan Weizen 3068 (liquid)
- Wyeast German Wheat 3333 (liquid)
- Wyeast Bavarian Wheat 3638 (liquid)

Belgian wits and wheats:

- Brewferm Blanche (dry)
- White Labs Belgian Wit Ale WLP400 (liquid)
- White Labs Belgian Wit II Ale WLP410 (liquid)
- Wyeast Belgian Ardennes 3522 (liquid)
- Wyeast Belgian Wheat 3942 (liquid)
- Wyeast Belgian Witbier 3944 (liquid)

American wheat and hefeweizen:

- White Labs American Hefeweizen Ale WLP320 (liquid)
- Wyeast American Wheat 1010 (liquid)

Matt Brophy began his professional career 10 years ago working with Flying Fish Brewing Co. in New Jersey. In 1998 he attended the Siebel Institute, and then moved to Denver where he spent five years working with Great Divide Brewing Co. He has been Head Brewer at Flying Dog Brewery for three years.

We consider our In-Heat Wheat to be a German-style hefeweizen. Our hefe has a unique aroma profile featuring a clove-like and a highly banana-accented aroma that is commonly found in classic examples of the style.

Our hefeweizen has a grist comprised of about 45% wheat malt and 55% barley malt. We are fortunate enough to work with equipment that performs well with this much malted wheat. We take extra care with our lauter to ensure that we are getting the extract and clarity that we are seeking. We run our lauter and sparge slower to maintain the integrity of the mash bed and pay close attention to wort clarity.

We pay careful attention to our proprietary yeast strain to produce a fermentation that leaves us with our desired flavor profile. We take into consideration factors such as pitching rate, dissolved oxygen levels, and fermentation temperature, just to name a few. We ferment our hefeweizen at 64 °F (18 °C). For a pitching rate we go with 2.25 million cells per mL which is slightly less than our other worts. We also keep the dissolved oxygen level lower than the other worts to help enhance our aroma profile (banana esters).

To be true to the hefeweizen style you must leave the beer unfiltered. Keeping the yeast also contributes to a more rounded creamy flavor as well as contributing to the maturation of the beer once in the bottle. Yeast also has health benefits, so I would argue an unfiltered beer is better for you than a filtered beer any day of the week.

Due to its increased protein content, wheat malt can improve a beer's head and head retention. Our In-Heat Wheat pours with a white creamy head that exudes the spicy and banana aromas.

Garrett Heaney is Associate Editor of Brew Your Own.

WEYERMANN

Weyermann : Superb German Malts

Weyermann is Germany's oldest and finest maltster, producing a wide range of barley, wheat and rye malts to optimize every beer!

- **Superb quality Pilsner, Pale Ale, Vienna and Munich base malts**
- **Specialty malts to match just about any recipe**
- Weyermann crystal and roast malts are produced in rotary roasting drums rather than in the usual flatbed kilns, producing a more consistent, high quality end product
- **NEW** authentic Bavarian Pilsner malt
- **SINAMAR®** Liquid All-Malt beer coloring extract now available in 4 oz. bottles for the homebrewer!

Distributed in the United States by Crosby & Baker, from wholesale (strictly!) warehouses in:

- **Westport, Massachusetts**
- **Atlanta, Georgia**
- **Salt Lake City, Utah**
- **Baltimore, Maryland**
- **Sacramento, California**

Websites for more information Specs & other great stuff:

www.WeyermannMalt.com www.Crosby-Baker.com Email: Info@Crosby-Baker.com

CROSBY & BAKER LTD

Call us for great products and prices: 1.800.999.2440

A Cylindroconical Query

House flavor and a mixed gas dilemma

by Ashton Lewis

Conical conduct

I moved away from the use of the glass carboys and moved to a conical fermenter. I have brewed good beer with glass, but now with the conical fermenter, I'm not sure exactly what to do. For instance, I would normally rack my beer to the second fermenter and begin to lager the beer. Now with the conical fermenter, I do the same thing but instead of racking the beer into a secondary carboy I dump the yeast and keep it in the same conical fermenter. In the past when I used the glass carboys, I would transfer my beer into a keg and have great beer. Now when I transfer my beer from the conical fermenter to a keg, there is a lot of sediment at the bottom of the conical fermenter (that I did not have with the glass carboys). Will this remaining yeast and trub at the bottom of the fermenter have a significant effect on the flavor and clarity on my beer, or do I have to do a second dump of this remaining yeast mid way through the lagering of my beer? Or . . . is this stuff at the bottom of the fermenter important in order to condition my beer?

Walter Avalon
Diamond Bar, California

Most small cylindroconical tanks have two ports on the bottom; one on the side of the cone and one on the bottom. The upper port is used to rack beer out of the tank above the sediment layer. Some racking ports have a curved arm that can be rotated to change the location of the arm inside of the tank making it flexible for batches with more or less yeast and trub in the bottom of the tank. I am assuming that your fermenter does not have this second fitting, otherwise you would not be asking this question.

The reason for getting rid of yeast and trub after primary is two fold. Too much yeast carried into aging can cause flavor problems if aging lasts more than a couple of weeks. This is especially important if the beer is aged warm and the yeast begins to autolyze or decay. This can lend some unpleasant yeasty, meaty, broth-like flavors to beer. Trub is good to get rid of because it too can contribute unpleasant flavors. The other benefit of removing yeast and trub is that it improves beer clarity, especially if you put the beer in a keg. There is nothing more aggravating than getting a pint full of yeast from a keg!

If you bottle your beer you want to make sure you have enough yeast for conditioning and it is possible to produce very clear beer with very little yeast given enough time. This is true of aging in general and you may want to add a very small dose of yeast at the time of bottling if you fear there may be insufficient yeast in your beer.

Most larger commercial conical fermenters do not have racking ports because they are hard to clean if not removed from the tank. This works well for smaller breweries, but when cellars are hard-piped and hooked into automated cleaning systems, such devices are difficult to deal with. These breweries have a single port on the bottom of the tank and wort, yeast and beer all flow in and out of this common port.

Brewers with this style of fermenter will remove most of the yeast from the bottom of the tank before pumping the beer out. Some of this yeast is discarded because it contains trub and much of the yeast will be saved for future use. Some brewers periodically "blow the cone" after yeast has been cropped for re-use and the beer is aging. The idea behind this practice is that the yeast that falls to the tank during aging may autolyze and this will release lots of yummy food for bacteria to feed on if there are any present. It also helps to eliminate autolyzed yeast flavors.

Again, this is done after most of the yeast intended for re-use has been cropped and the cone is blown every day or so. I know of one commercial brewer who has practiced this for years and they now do this automatically and limit the cone blows to a certain volume to minimize beer loss. If you do this you will have very little sediment when it comes time to rack the beer.

Another possibility if cone blowing is not appealing is to build a little probe of sorts that attaches to the bottom of the tank and extends straight up into the cone. This will allow sediment to fall below the tank outlet and will allow you to rack clear beer. In order to clean the tank out you will need to remove this probe, and when you do, it will be kind of messy. A fancier version of this is to have a fitting that connects to the bottom of the tank with two connections. One connection serves as the low point outlet and the second connection as a probe extending upwards. This can be a little tricky to make, but it can be done and they work well. Just like a racking arm this device should be removed from the tank for cleaning.

Conical fermenters are a bit different than using a separate primary and secondary fermenter, but once you get your technique dialed in they are much easier to use. I like that only one tank is required for fermentation and aging because that means less cleaning and also reduces the risk of contamination during transfers because there are fewer required.

House flavor

I enjoyed your answer to Rich Servatius in the November 2006 issue about yeast propagation. While Rich seemed intent on building a lab, I am not. I am more interested in drinking my beer than culturing my beer. But all that talk of slants, streaking, dry media, pressure cookers and the like got me thinking about my house flavor. Every brewery, big

or small, eventually comes to realize they have a house flavor — whether it is a result of yeast mutations or from sanitation. So I was wondering if there might be a company out there that might send me a slant — I could expose it to the "open environment " of my brew house (i.e., my basement), send this slant to a lab and they could tell me what my house flavor is. Maybe a wild yeast strain floating near my windows, or a bug picked up from some non-sterile water. I am curious as to what my house flavor is, because it has changed due to changes in the location where I brew. The same recipe has resulted in very different beers based on whether I brew a 2.5-gallon (9.5-L) batch in my kitchen or the 5-gallon (19-L) brews that start in my garage and end up in my basement.

Steven Oatley
via email

Thanks for the interesting question. I agree that many breweries, from the very small home brewery to very large commercial breweries, have a distinct house character. The term house character is by no means an official brewing science term with a strict definition. This loose term can be interpreted to mean that special twang that a particular brewery always seems to have in their beers resulting from the consistent and rather unfortunate collision of poor sanitation and a particular microorganism that is resident to the brewery. I consider this type of flavor to be more of the hallmark of failure and not a house character. Spontaneously fermented beers from Belgium are different and their house character is certainly related to the surroundings, but these beers are meant to reflect the environment and are not the result of sloppy technique.

Another interpretation of house flavor refers to the special flavor imparted by the brewing yeast. Certain brewing yeast strains always leave a distinct fingerprint behind in the finished beer and a brewery's chosen strain is one of the most common sources of house character. And, as you point out in your question, yeast do change or mutate over time. This can even be true if the yeast is periodically re-cultured from plates in the lab because plates are often grown using yeast from the brewery, and over time, changes in the yeast DNA will occur. Large breweries and yeast labs use a variety of techniques including cryogenics and lyophilization (freeze drying) to store the "original" genetic code for long-term keeping to prevent this drift from occurring over time.

Homebrewers and craft brewers often times use many different yeast strains and the thought of a house flavor coming from yeast strain can seem foreign. But in larger breweries, having more than one or two yeast strains floating around, so to speak, is a risky proposition. If all the beer brewed uses the same yeast strain and that strain produces a certain identifiable array of flavors, then you have a classic case of house character. In this example, the term "house" may refer to a company with multiple breweries. Anheuser Busch has twelve breweries in the United States and their lager strain has a distinct flavor profile that can be detected in all of their lagers and, by this definition, is a part of their house character.

Water also influences flavor and a brewery or brewing region can have assertive flavors resulting from water. The practice of adding Burton salts to brewing water is a prime example of attempting to reproduce a flavor profile associated with an area by altering the water. Although, most "Burtonizing" salt additions are really used to make slight calcium adjustments to water and do not add enough minerals nor the required minerals (specifically magnesium salts) to impart the flavor of Burton ales.

Of course the traditional Burton ales were fermented in Burton Unions and this technique of fermentation attributes a whole other set of conditions that influence flavor. The effect that technique has on flavor begins with malting and travels through every step of the brewing process, making brewing technique in general another big contributor to house flavor. Mashing, brew kettle design, special hopping techniques, wort clarification methods, fermenter design and methods used for aging can all attribute special flavors that show-up in most beers of a particular brewery.

I could give more examples of how region, ingredients and techniques impart distinct flavors to beer that could be termed "house flavors" but I think I have made my point. Just as forensic detectives search for clues to solve a crime, brewers must dissect their methods, ingredients and sometimes environment to elucidate the source of certain flavors. This is not easy and there rarely is a simple lab method that will magically return a smoking gun result like many of the fantastical methods used in the labs of television detectives wearing green and red tinted safety glasses . . . what's up with that?

"The effect that technique has on flavor begins with malting and travels through every step of the brewing process . . . "

In your case, your move could have resulted in a change in water. Brewing the same recipe by no means insures consistency and some of the variability between batches is to be expected at home. Brewing a partial batch on the stove versus a full batch in the garage using an outdoor cooker is a change in technique. Wild yeast contamination from the air in most cases is something to avoid and is typically viewed as a mistake as opposed to the more noble sounding term "house character". You can pay labs a big chunk of change to isolate the microorganisms floating around in the air of your home and neighborhood, but this will probably not give much useful data since there is all sorts of stuff in air that does not grow in beer. I know that I have not come close to solving your mystery but hopefully I have shed some light on where you may look for clues!

Nitro in the bottle?

My brew club recently brewed a dry stout (Guinness clone), while using the recipe in the May–June 2005 issue of

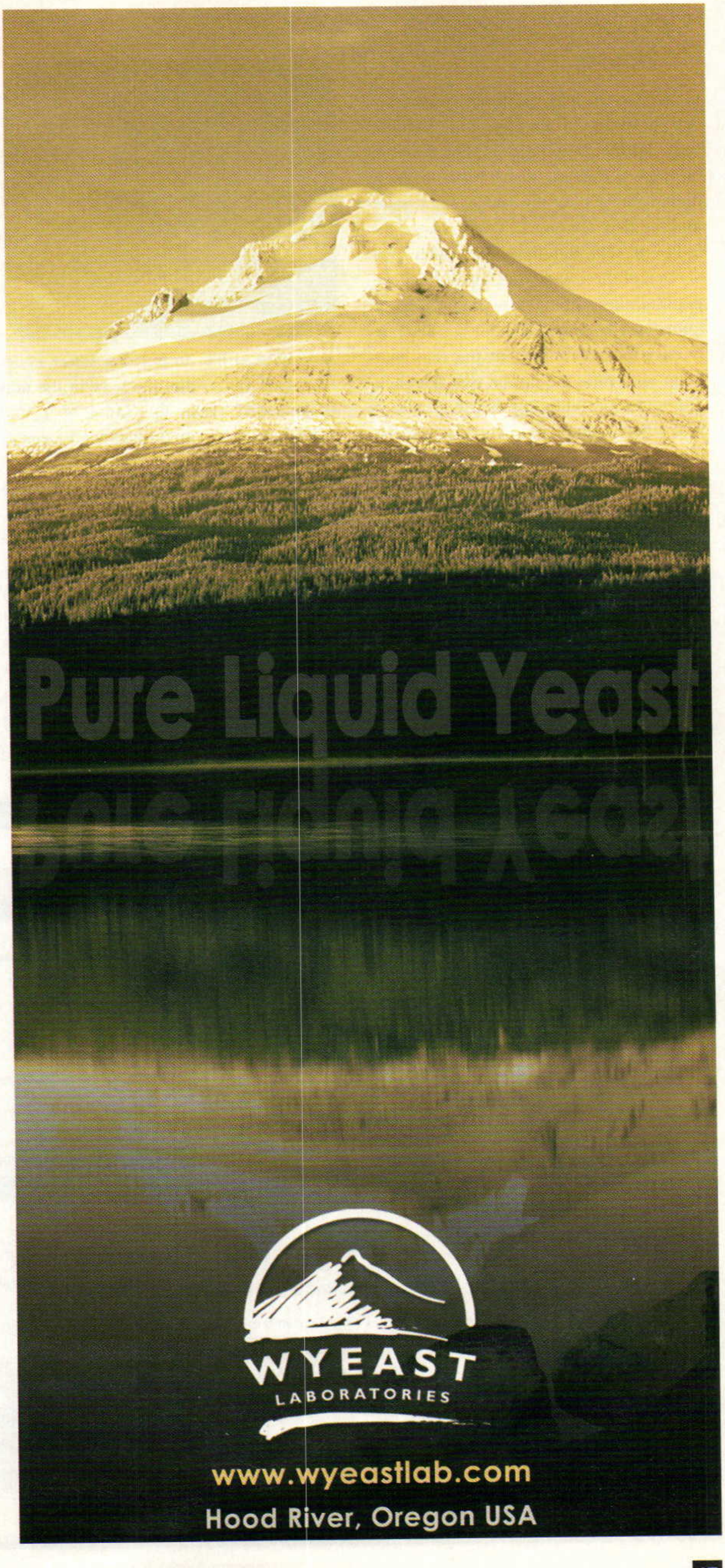
***BYO*. It came out very close to target and is now on tap with "beer mix" gas (CO_2/N_2) and a proper stout faucet. In fact, it came out well enough that we would like to enter this in a local competition, but we're not sure how best to bottle this without losing the nitrogen generated smoothness. Since the little Guinness "draught" bottle and can widgets are not available to homebrewers, is it possible to achieve the same effect another way? We have a counter-pressure filler, but do we use straight CO_2 to fill, or should we use the beer mix gas? If it's not possible to achieve the nitrogen effect, how do people properly enter a dry stout such as this in a competition? Thanks for the help!**

Chris Whitlock
Pompano Beach, Florida

I have never shied away from taking pot shots at competitions. I brew beer to please myself and if by chance I get lucky and win a medal in a competition, great! If not, I don't get too upset. The problem with competitions, in my opinion, is that their very nature forces beer to conform to something. The Great American Beer Festival is run by the same folks who have AHA sponsored events and they have successfully added enough categories that most beers can be entered into some category. And if the beer is totally wacky there are now special wacky categories like "Experimental Beer" and "Vegetable and Herb Beer." However, draft beers sadly do not have a home at these competitions.

It's probably that most brewers would not want to ship a whole keg of beer to simply pour a few samples for the judges and the nature of blind panels does not allow judges to walk around to booths with you and your buddies pouring your beer. Whatever the excuse for not having draft beer categories in beer competitions, I don't like the fact that they are omitted! Techniques to properly nitrogenate a beer are tricky and the skill required to transform flat beer into the mesmerizing elixir that flows from a stout faucet is worthy of judging. I mean . . . there are even barista competitions for the folk who pour espresso drinks at cafes!

I am sad to say that there is no method that I know of that allows



homebrewers and small scale commercial brewers to package nitrogenated beers so that they pour as they do when on tap. Guinness spent boat loads of money developing the widget for canned and bottled Guinness. Other breweries followed suit and developed their own version of the widget and some, I believe, paid Guinness a fee to use the technology. Conceptually, these little devices are fairly easy to understand but the real challenge is getting the device into the package and then filling the bottle or can so that when opened and poured it behaves like draft beer.

Some things in life are just not fair and this is one example of true injustice. Brewers who enter beer into dry stout categories use Plan B; they carbonate their stouts. I hate this option because beer brewed to be dispensed using mixed gas tastes totally different when carbonated. When I formulate beer for mixed gas dispense, I typically increase bitterness and down play the character from special malts like crystal that give sweetness. I like to put dry, bitter beers on mixed gas so that the beer in the pint is balanced. Take the same beer and carbonate it — an unbalanced beer is the result.

> "Beer brewed to be dispensed using mixed gas tastes totally different when carbonated."

I don't have much sage advice to offer other than to be your own judge. Judge your beer against some of your favorite draft stouts in your area. How does your beer pour? Is the foam too thin or thick after pouring or is it just right? Does the roast barley flavor come across burnt and acrid or is it assertive yet pleasant? Does the beer have a nice rich mouthfeel or is it watery? By comparing various attributes of your stout to commercial examples like Guinness and Murphy's you will know whether you have a winner or not. We brew an excellent dry stout at Springfield Brewing Company, but I have no outside affirmation of this. It'd be nice to have some bling to hang on the wall, but at the end of the day I don't care because I know it's good, our customers know it's good and no medal is going to change that fact!

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

American Pilsner

It's all about the flavors. (All none of them.)

by Chris Colby

American Pilsner beers are not a favorite among homebrewers, although many who know how difficult it is to brew a lightly-flavored, delicately-balanced beer acknowledge the high level of technical expertise required to brew this style to the consistency of the major breweries. As Editor of *Brew Your Own*, I've received quite a bit of mail asking how to brew beers like this, often with the explanation that the brewer wants to brew this beer for a party, family member or friend. Whether you're interested in brewing a beer for ice fishing with Uncle Bob, learning techniques you could potentially adapt to other beers styles or are a homebrewer who actually enjoys the style, this article is an overview of the ingredients and — most importantly — the techniques used to make American Pilsner lager beer.

photo by Jim Witmer

In August of this year, I was invited on a press tour of Anheuser-Busch's Elk Mountain hop farm in northern Idaho. During the tour, I had the chance to talk with a few Anheuser-Busch brewmasters and learn more about brewing this style of beer and light lagers in general. Of course, big commercial breweries use some techniques that are beyond the reach of homebrewers, so — although I'll briefly mention some strictly commercial practices — I'll focus on how to brew this style at home.

Basic ingredients and process

The basic ingredients for an American Pilsner are barley malt, adjunct (corn or rice), hops, water and yeast. Given the light overall flavor profile of the style, your ingredients need to be fresh and of high quality. Any stale flavors from your malt or adjunct or cheesy flavors from your hops will show right through. Likewise, when brewing an American Pilsner, you need to pay attention to anything in your brewing process that can cause off flavors or aromas.

Six-row and two-row malt

The malt bill for an American Pilsner may be composed of 6-row barley malt or a blend of 6-row and 2-row pale malts. The malt should be lightly kilned, with a color around 1.6-1.8 °L, as the target color for the beer is very light — generally 2–5 SRM.

(story continued on page 21)

RECIPE

Red, White and Brew

(7.5 gallons/28 L, all-grain with adjunct)

OG = 1.044 FG = 1.005
IBU = 12 SRM = 4 ABV = 5.0%

This is a modern American Pilsner, though not an attempt to clone any particular brand. It is brewed like a 5-gallon (19-L) batch, but after the addition of the kräusen beer and dilution water, you end up with 7.5 gallons (28 L) of beer. Your base beer (and kräusen beer) will have a gravity just over 14 °Plato (1.056) and have 16 IBUs.

Ingredients

5 lb. 14 oz. (2.7 kg) 2-row pale malt
3 lb. 14 oz. (1.8 kg) 6-row pale malt
4 lb. 2.0 oz. (1.9 kg) corn grits
1/4 tsp calcium chloride
(90 minutes)
1 tsp. Irish moss (15 mins)
4.5 AAU Magnum hops
(0.28 oz./8.0 g
of 16% alpha acids)
0.5 AAU Saaz hops
(30 mins in kräusen beer)
(1/8 oz./3.5 g
of 3.5 % alpha acids)
0.5 AAU Hallertau hops
(30 mins in kräusen beer)
(1/8 oz./3.5 g
of 3.5 % alpha acids)
Wyeast 2007 (Pilsen Lager) or
White Labs WLP 840 (North American Lager) yeast
(3.5 qt./~3.5 L yeast starter)

Step by Step

Reserve a handful of 6-row malt. Mash in remaining barley malts by combining crushed malts with 4.5 gallons (17 L) of water at 133 °F (56 °C) in your kettle and begin mashing at 122 °F (50 °C). Combine corn grits and handful of 6-row malt with 1.5 gallons (5.7 L) of water in a large kitchen pot and begin heating cereal mash to 158 °F (70 °C). Rest cereal mash at 158 °F (70 °C) for 5 minutes, then bring to a boil. Boil for 30 minutes. (The cereal mash will need to be stirred almost constantly while being heated and boiled.) After boiling the cereal mash for about 5 minutes, begin heating the main mash to 140 °F (60 °C) at a rate of about 2 °F (~1 °C) per minute. Hold main mash at 140 °F (60 °C), once

recipe continued on page 20

recipe continued from page 19

that temperature is reached. Stir main mash while heating to prevent scorching. When cereal mash is done boiling, combine with main mash (at 140 °F/60 °C) and adjust temperature — if needed — to 153 °F (67 °C). Keep mash at 153 °F (67 °C) for 20 minutes, then begin performing an iodine test every 5 minutes. When iodine test is negative (no color change to blue or purple), begin heating mash to 168 °F (76 °C). Transfer mash to lauter tun, let mash settle for 5 minutes, then recirculate wort for 20 minutes (or until substantially clear). Sparge with water hot enough to keep grain bed at 170 °F (77 °C) and collect about 5 gallons (19 L) of wort, add 2.5 gallons (9.5 L) of water and bring to a rolling boil.

Once wort comes to a boil, stir in ¼ tsp of calcium chloride and then remove 1 gallon (3.8 L) of wort and place it in a covered pot to cool. This will be your kräusen wort you will use later. Once wort cools, siphon to a 1.0-gallon (3.8 L) jug and refrigerate until needed.

Boil the remaining 6.5 gallons (25 L) of wort down to 5.0 gallons (19 L) over 90 minutes, adding single hop addition at 60 minutes left in boil. Add Irish moss with 15 minutes left in boil. Cool wort down to 48 °F (8.8 °C) and transfer wort to fermenter, leaving behind as much trub as you reasonably can. Aerate wort with a 60-second shot of oxygen and pitch all but about two tablespoons of yeast sediment from yeast starter. Refrigerate remaining yeast sediment in an air-tight container (like a White Labs yeast tube).

Ferment beer at 52 °F (11 °C). When fermentation slows greatly, prepare kräusen beer. To do this, take the 1.0 gallon (3.8 L) of wort you reserved, add the kräusen hops and boil for 30 minutes, shooting for 0.75 gallons (2.8 L) of post-boil wort. Cool kräusen wort to 52 °F (11 °C), siphon to sanitized 1.0-gallon (3.8-L) jug, aerate and pitch with remaining yeast. Let kräusen beer begin fermenting and come to high kräusen. Add kräusen beer to main batch of beer and let fermentation finish at 52 °F (11 °C).

After the fermentation is finished, separate beer from yeast and cool to 40 °F (4.4 °C). Allow to cold condition (lager) for 5–6 weeks. When you are ready to keg the beer, boil 2 gallons (7.6 L) of water down to 1.75 gallons (6.6 L) and cool rapidly. Add two-thirds of the dilution water — a little over 4.5 quarts, or 4.4 L — to a 5-gallon (19-L) Corny keg and the remaining third of the water to a second Corny keg. (Use a 3.0-gallon (11-L) keg, if you have one, for the second keg.) Transfer beer to first keg until it is full, then transfer remaining beer to second keg. Seal kegs, purge their headspaces and force carbonate to 2.6 volumes of CO_2.

(Option: You can choose not to dilute the beer going to the second keg and have about 1.9 gallons (7.3 L) of strong beer or "malt liquor.")

The Schizlitz

(1970's-style American Pilsner)
(5 gallons/19 L, all-grain)
OG = 1.045 FG = 1.006
IBU = 13 SRM = 4 ABV = 5.0%

This is a beer formulated with some information I received about how Schlitz was brewed back in 1975. I simplified this formulation by using flaked maize and specifiying that the beer be fermented at working strength, rather than using high gravity brewing.

Ingredients
4.0 lbs. (1.8 kg) 2-row pale malt
2 lb. 10 oz. (1.2 kg) 6-row pale malt
2 lb. 14 oz. (1.3 kg) flaked maize
¼ tsp calcium chloride
(90 minutes)
1 tsp. Irish moss (15 mins)
1.75 AAU Cluster hops (60 mins)
(0.55 oz./16 g of 7% alpha acids)
1.75 AAU US Fuggles hops (60 mins)
(1.1 oz./32 g of 7% alpha acids)
Wyeast 2035 (American Lager) yeast
(3 qt./~3 L yeast starter)
1 cup corn sugar (for priming)

Step by Step

In kettle, mash in to 113 °F (45 °C) with 3.5 gallons (13 L) of water. Immediately begin heating mash to 145 °F (63 °C). Stir mash while heating. Rest for 15 minutes at 145 °F (63 °C), then heat mash to 154 °F (68 °C) and rest for 30 minutes (or until iodine test shows negative). Heat to 167 °F (75 °C) and transfer to lauter tun. Let mash sit for 5 minutes, then recirculate for 20 minutes (or until clear).

Sparge with 170 °F (77 °C) water and collect roughly 5 gallons (19 L) of wort, add 1.5 gallons (5.7 L) of water and ¼ tsp. of calcium chloride and bring to a boil. Boil for 90 minutes, adding all hops with 60 minutes left in boil. Add Irish moss with 15 minutes left.

Cool wort to 55 °F (13 °C), transfer to fermenter, aerate thoroughly and pitch yeast. Let ferment at 55 °F (13 °C) until fermentation slows, then allow temperature to rise to 60 °F (16 °C). After three days (or after sampling the beer and detecting no diacetyl), separate beer from yeast, cool beer to 40 °F (4.4 °C) and begin lagering. Allow to lager for 6 weeks, then keg and force carbonate to 2.6 volumes of CO_2.

The Schizlitz

(1970's-style American Pilsner)
(5 gallons/19 L,
countertop partial mash)
OG = 1.045 FG = 1.006
IBU = 13 SRM = 4 ABV = 5.0%

Ingredients
1 lb. 2 oz. (0.51 kg) 6-row pale malt
1 lb. 11 oz. (0.77 kg) 2-row pale malt
1 lb. 3 oz. (0.54 kg) flaked maize
3.0 lbs. (1.4) Briess light liquid malt extract
14 oz. (0.4 kg) corn sugar
1 tsp. Irish moss (15 mins)
1.75 AAU Cluster hops (60 mins)
(0.55 oz./16 g of 7% alpha acids)
1.75 AAU US Fuggles hops (60 mins)
(1.1 oz./32 g of 7% alpha acids)
Wyeast 2035 (American Lager) yeast
(3 qt./~3 L yeast starter)
1 cup corn sugar (for priming)

Step by Step

Heat 5.5 qts. (5.2 L) of water to 164 °F (73 °C) and pour into a 2-gallon (7.6-L) beverage cooler. Place crushed grains and flaked maize in a large steeping bag and submerge in cooler water. Open bag and poke around with a spoon to ensure grains and water are thoroughly mixed. Let partial mash rest, starting at 153 °F (67 °C), for 45 minutes. While the partial mash is resting, heat 1.0 gallon (3.8 L) of water to a boil in your brewpot and heat 5.5 qts. (5.2 L) of water to 180 °F (82 °C) in a large soup pot.

Recirculate about 2 qts. (~2 L) of wort, then run off first wort and add to boiling water in brewpot. Add the 180 °F (82 °C) water to the cooler until liquid level is the same as before. Stir grains, let rest 5 minutes, then recirculate and run off wort as before.

Add corn sugar and bring wort to a boil. Once hot break forms, add hops and boil for 60 minutes. Add Irish moss with 15 minutes left in boil. After boil, stir in liquid malt extract and let steep for 15 minutes before cooling wort.

Cool brewpot in sink or with immersion chiller. Transfer wort to fermenter and top up to 5 gallons (19 L) with cold water. Aerate wort, pitch yeast and follow fermenting and lagering instructions in all-grain recipe.

Doughboy Draught

(Late WWI American Pilsner)
(5 gallons/19 L, all-grain)
OG = 1.032 FG = 1.006
IBU = 20 SRM = 4 ABV = 3.4%

American Pilsners were bigger and hoppier in the past, right? Well, not always. In 1917 — near the end of World War I — Congress passed the Food and Fuel Control Act (also known as the Lever Act), which gave President Wilson the power to set prices on and direct the distribution of food and coal. Wilson shut distilleries, limited the amount of coal breweries could use and capped the alcohol percentage in beer to 2.75% by *weight (about 3.4% by volume). Here is a classic American Pilsner an American infantryman (or doughboy) might have drank during training, before being shipped off to the trenches in Europe.*

Ingredients
3.0 lbs. (1.4 kg) 6-row pale malt
2 lb. 2 oz. (0.96 kg) 2-row pale malt
1 lb. 12 oz. (0.79 kg) flaked maize
5.0 AAU Cluster hops (60 mins)
(0.71 oz./20 g of 7% alpha acids)
0.25 oz. (7.1 g) Saaz hops (10 mins)
½ tsp calcium chloride (75 mins)
1 tsp Irish moss (15 mins)
Wyeast 2007 (Pilsen Lager) or White Labs WLP 840 (North American Lager) yeast (2 qt./~2 L yeast starter)
5.5 oz. (142 g) corn sugar (for priming)

Step by Step
Use 3.0 gallons (11 L) of mash water. Step mash grains and flaked maize with a 10-minute rest at 122 °F (50 °C), a 10-minute rest at 144 °F (62 °C) and a 40-minute rest at 156 °F (69 °C). Heat mash to 168 °F (76 °C) for mashout. Recirculate and runoff wort. Sparge with 170 °F (77 °C) water and collect about 3.5 gallons (13 L) of wort. Add 2.75 gallons (10 L) of water and bring to a boil. Add calcium chloride and boil for 75 minutes, adding hops and Irish moss at times indicated in recipe list. Cool wort, aerate and pitch yeast sediment from starter.

Ferment beer at 56 °F (13 °C). Lager for 4 weeks at 40 °F (4.4 °C). Bottle with corn sugar or keg and force carbonate to 2.8 volumes of CO_2.

Doughboy Draught
(5 gallons/19 L, extract with grains)
OG = 1.032 FG = 1.006
IBU = 20 SRM = 4 ABV = 3.4%

Ingredients
13 oz. (0.37 kg) 2-row pale malt
1.25 lbs. (0.57 kg) 6-row pale malt
14 oz. (0.40 kg) corn sugar
1.0 lb. (0.45 kg) Briess light dried malt extract
1.0 lb. (0.45 kg) Briess light liquid malt extract
5.0 AAU Cluster hops (60 mins)
(0.71 oz./20 g of 7% alpha acids))
0.25 oz. (7.1 g) Saaz hops (10 mins)
Wyeast 2007 (Pilsen Lager) or White Labs WLP 840 (North American Lager) yeast (2 qt./~2 L yeast starter)
5.5 oz. (142 g) corn sugar (for priming)

Step by Step
Steep grains at 150 °F (66 °C). Add dried extract and sugar and boil for 60 minutes, adding hops at times indicated. Add liquid extract at end of boil and let steep for 15 minutes. Follow remaining instructions from recipe above.

(story continued from page 19)

The amount of protein varies in different types of malted barley. Generally, 6-row barley malt contains around 13% protein, while domestic 2-row malts contain around 12%. (For comparison, wheat malt often contains around 14% protein.) Since it contains more protein, 6-row pale malt has correspondingly more diastatic power (DP) than domestic 2-row malts. Six-row malts are usually rated around 160 DP compared to 2-row malts, which are usually rated around 120 DP. This "extra" enzymatic power is needed to convert to starches from the adjunct.

Six-row malts also have smaller kernels than 2-row malts and have correspondingly more husk material per unit weight. As such, 6-row malt yields a more "grainy" flavored beer than 2-row, but the flavor difference is subtle.

Barley malt occupies around 60–70% of the total grain bill of an American Pilsner, with the remaining 30–40% being adjunct. At home, German Pilsner malts can be substituted for the 2-row portion of your grain bill, but don't use 2-row pale ale malts from the UK for an American Pilsner. With a color rating around 3 °L and a diastatic power around 45 DP, they are too dark and do not have enough enzymatic power to make this style of beer. No crystal malts, "cara" malts (such as CaraPils®, CaraFoam®, etc.) or other specialty malts are used.

Corn or rice adjunct

Corn is the most common adjunct in American Pilsners, although some — including, Budweiser and Coors — are made with rice. (Interestingly, potatoes were used briefly by the Lucky Brewery during World War II, due to rationing of foods.) Corn and rice supply starch to the mash, which is degraded into sugars by the enzymes from the grain. Corn and rice yield very little color and their flavor is nearly neutral.

Corn and rice are also low in protein compared to malt, with corn grits usually containing around 9% protein and rice grits containing 5–8%. The combination of low protein adjunct and high-protein 6-row barley malt yields a wort with protein levels comparable to that of a beer made from only 2-row malt.

The corn or rice used in American Pilsners is not malted, so it contributes no starch-degrading enzymes to the mash. The corn or rice starch is degraded by amylase enzymes from the malt or, in the case of very high adjunct rates — as when making a malt liquor — by enzyme preparations added to the mash.

At home, you have some options when it comes to the adjunct you use. If you are making a corn lager, you can use either flaked maize, corn grits or brewers corn syrup. Flaked maize (or flaked corn) is "pre-gelatinized" and can simply be stirred into your mash. If you use grits, you need to do a cereal mash. Brewers corn syrup is a kettle adjunct; just add it for the last 15 minutes of the boil. If you choose rice, your choices are similar — flaked rice, rice grits or rice syrup.

Commercially, American Pilsners are brewed as strong beers, then diluted to working strength prior to packaging. The initial wort may be as thick as 16 °Plato (OG 1.064) prior to fermentation and is then diluted so that the "virtual OG" is 10–11.5 °Plato (OG 1.040–1.046). To give one example, Bud is brewed at 14.5 °Plato (OG 1.058), but diluted with water to virtual OG of around 11.25 °Plato (OG 1.045). As a homebrewer, it is much easier to brew this style at working strength.

Neutral hop blend

The hopping rate for American Pilsners is very low, with IBU levels generally around 10–14. Most any hop variety that is relatively neutral, or a blend of hop varieties that is relatively neutral, will work. For many years, the variety Cluster was popular among American brewers. Noble hops are also a good choice.

Anheuser-Busch (A-B) grows Saaz and Hallertau hops in Idaho and buys domestic Cascade and Willamette hops. They also import Strisselspalt and Spalt Select hops. They also own a hop farm in Bavaria, Germany. Miller uses tetrahydroisohumulones, added after the boil. These bittering compounds are extracted from a hop variety high in beta acids, likely Newport. Coors is known to buy a lot of Sterling hops, although they probably use other varieties as well.

Lager yeast

American Pilsners are brewed with lager yeasts and most lager strains will do a decent job. Your best choice, however, may be Wyeast 2007 (Pilsen Lager) or White Labs WLP840 (American Lager). Yeast companies don't generally give the origins of their yeast strains, but the above offerings are rumored to be Budweiser's strain. Wyeast 2035 (American Lager), which may come from Minnesota's Schell Brewery, is another good choice. Wyeast 2042 (Danish Lager), White Labs WLP850 (Copenhagen Lager) or White Labs WLP940 (Mexican Lager) yeast are also good choices.

Commercial practice is to pitch about one million cells per milliliter per degree Plato. For 5 gallons (19 L) of wort at a specific gravity of 1.044 (11 °Plato), that means around 210 billion cells. To raise this number of cells, a 3-quart (~3 L) yeast starter should be made. Make the starter by boiling 0.5 lb. (0.23 kg) of dried malt extract and a pinch (<¹⁄₁₆ tsp) of yeast nutrients in water to yield 3 qts. (~3 L) of starter wort at around SG 1.030. Cool the starter wort and oxygenate it with a 60 second shot of oxygen (or 5–10 minutes of air). Pitch the yeast and let the starter ferment at room temperature. Just after high kräusen, refrigerate the yeast starter to crash out the yeast. Use the yeast within the next couple of days.

Soft water

Water quality is crucial when making an American Pilsner. First and foremost, your water should taste good. If your brewing water has off flavors, your beer will have the same off flavors.

For the best results, your brewing water should have less than 50 ppm carbonates and around 50–75 ppm calcium ions. If you have high carbonate water, dilute it with distilled or RO water until the carbonate level is less than 50 ppm. If needed, add back calcium ions by adding calcium chloride ($CaCl_2 \cdot 2H_2O$) or gypsum ($CaSO_4 \cdot 2H_2O$). For 15 gallons (58 L) of distilled water or water purified by reverse osmosis (RO), adding 3.0–4.5 teaspoons of calcium chloride or gypsum will get you in the target range.

Treat your brewing water to remove any chloramines. The easiest, most effective way to do this is to add one Campden tablet (potassium metabisulfite) tablet per 20 gallons (76 L) of brewing water. Prepare your water the night before you brew, add the Campden tablet and let your water sit, loosely covered, overnight. The chloramines in your water will be neutralized virtually instantly and the sulfur dioxide (SO_2) gas released by the tablets will diffuse out of your water overnight. Residual chloramines in your water will yield a band aid-like character to your beer.

If your brewing water has off flavors, your beer will have the same off flavors.

AMERICAN PILSNER by the numbers

OG	1.040–1.046 (10–11.5 °Plato)
FG	1.004–1.007 (2–3.5 °Plato)
SRM	2–5
IBU	10–14
ABV	around 5%

...And still more water

If you plan to brew a strong beer and dilute it, you will need to prepare your dilution water the day you package your beer. Your major concern in doing so will be minimizing dissolved oxygen in the dilution water. If you boil your water strongly, and perhaps bubble CO_2 through it when it cools, you will reduce the amount of gaseous oxygen (O_2) in the water to less than 1 ppm. However, this is still enough to promote early staling. Unless you plan to drink the beer in the few weeks after packaging it, it is probably better to just brew the beer at working strength. (If you do want to try the dilution technique, called high gravity brewing, see the January-February 2004 issue of *BYO*.)

Mash for high fermentability

How you mash will depend on your choice of adjunct. If you use a pre-gelatinized adjunct such as flaked corn or rice syrup solids, or a kettle adjunct, you can use either a single infusion mash or a stepped infusion mash. For a single infusion mash, a rest at 148–150 °F (64–66 °C) will work fairly well, although the wort may not be as fermentable as it should be for the style. A step mash with a 15-minutes rest at 122 °F (50 °C), a 30-minute rest at 140 °F (60 °C) and a saccharification rest at 150–152 °F (66–67 °C) would work better. The length of time you spend at 140 °F (60 °C) will influence how dry your beer is. (Bud Light has a long (2-hour) rest at this temperature and big breweries will adjust the length of this rest based on the DP of the combined malts.) Whether you do a single infusion or step mash, mash out with a final rest of around 5 minutes at 168 °F (76 °C) before lautering. Use a mash thickness of around 4:1 (1.9 qts./lb. or 4 L/kg), which is thinner than a typical infusion mash.

If you use corn grits or rice grits, you will need to perform a cereal (or double) mash. In a cereal mash you begin by heating a mash of your adjunct and small amount of your 6-row malt to 158–160 °F (70–71 °C) and holding there for about 5 minutes. Then you heat the mixture to a boil, boil for 30 minutes, and return the cereal mash to the main mash. The bulk of your barley malt can be mashed in at 122 °F (50 °C), then heated to 140 °F (60 °C). When the boiled cereal mash is added to the main mash, the temperature moves into the saccharification range. Cereal mashing requires a nearly constant stirring of the mash. Using flaked maize is much simpler. However, if you'd like to try cereal mashing, see the March-April 2005 issue of *BYO*.

Lautering

After the mash, recirculate until the wort clears substantially, which usually takes at least 20 minutes. Next, shoot for collecting the wort over about 90 minutes. Keep your sparge water hot enough to keep the grain bed around, but not over, 168 °F (76 °C). When the specific gravity of your late runnings drops to 1.008 — or the pH climbs above 5.8 — stop sparging.

If you are brewing the high-gravity version, you will probably have roughly the right amount of wort for your boil. If you are going to brew your American Pilsner at working strength, add water so you have a wort volume large enough for a 90-minute boil.

Boiling and DMS

The equipment and procedures for wort boiling vary quite a bit among big breweries, and a review of all the methods currently in use would take an article unto itself. For homebrewers making an American Pilsner, the main thing to focus on is achieving a good hard boil.

As with the boil for any beer style, you want to sanitize the wort, isomerize the alpha acids in your hops and produce a good hot break. In addition, with American Pilsners, volatilizing dimethyl sulfide (DMS) is of special concern.

DMS is a molecule that causes beer to have a cooked corn-like flavor and aroma. During malting, the precursor to DMS (s-methyl methionine or SMM) is formed as the barley is germinating. SMM is converted to DMS when heated. In the darker base malts — including Munich malt, Vienna malt and pale ale malt — the heat of kilning converts SMM to DMS. And, since DMS is very volatile, the heat also drives it off. In lightly-kilned malts — such as 2-row pale malt and especially 6-row pale malt — SMM is still present in the malt and must be converted to DMS and driven off during the boil. A good 90 minute rolling boil, evaporating about 10% of your wort volume per hour, should achieve this.

Many homebrewers contemplating making their first light lager beer may wonder if such a long boil is really a good idea, preferring instead to minimize color development by employing a short boil. In reality, a 90-minute boil should not darken a very light wort much unless the evaporation rate is excessively high or heat from your burner is focused onto "hot spots" under your kettle.

When boiling, a small addition of calcium is very helpful. Calcium helps drop the pH of the boiling wort to the proper level and lowers color pickup during the boil. For a 5-gallon (19-L) batch, about $1/4$–$1/2$ tsp of calcium chloride or gypsum during the boil is sufficient. When the wort first comes to a boil, skim the dark brown "crud" in the foam.

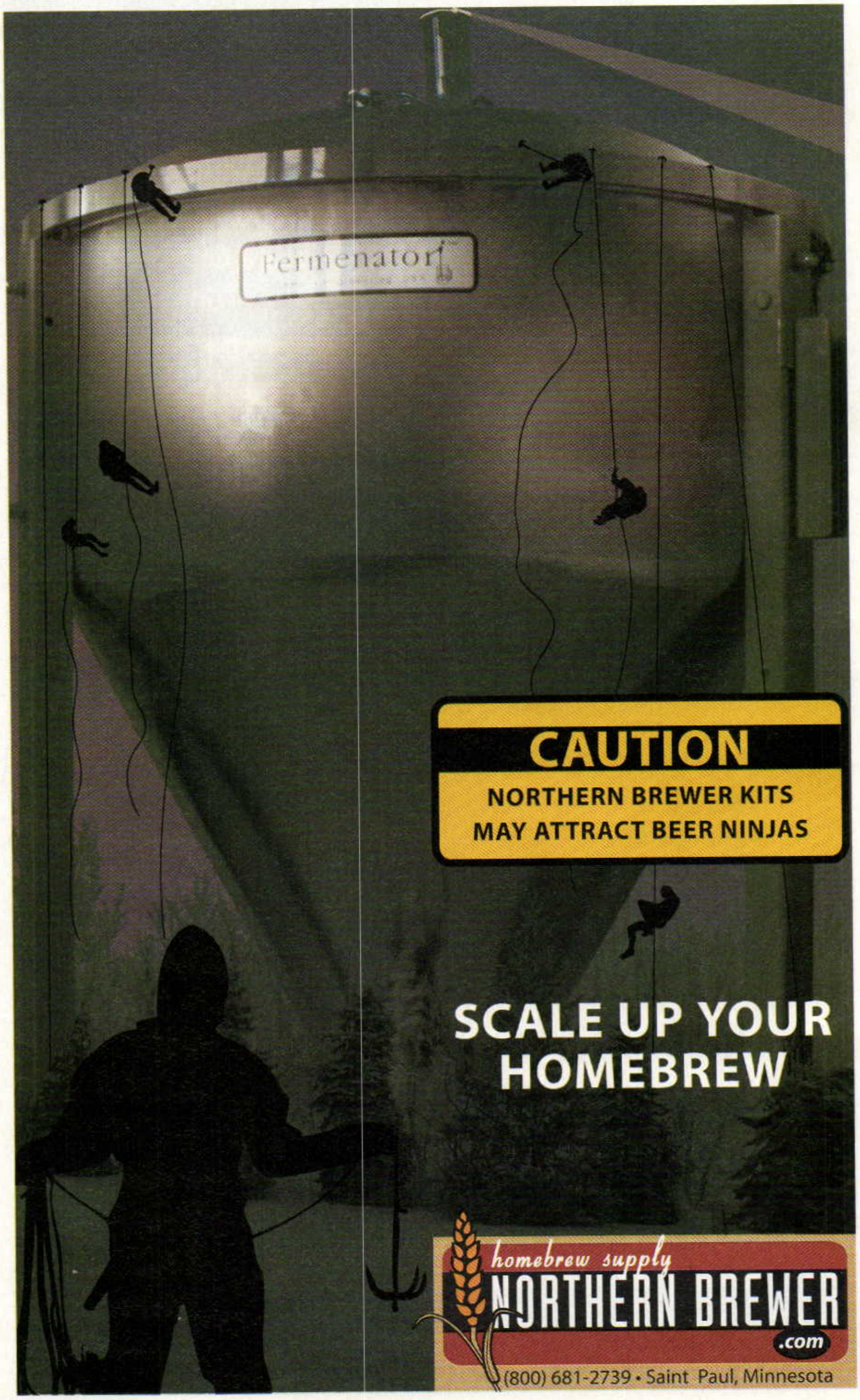
After the boil, cool the wort as quickly as is feasible. Even after a good boil, some SMM will be left in the wort. If you cool too slowly, it will get converted to DMS, but not evaporate out of the wort.

Cooling with either a copper immersion chiller or counter-flow wort chiller will work fine. You don't need to cool the wort blindingly quickly, but letting the wort cool overnight, as some homebrewers do for their ales, is a bad idea.

Some commercial breweries have additional, or alternate, ways of dealing with DMS. Anheuser-Busch employs a relatively short boil and "wort stripper" — a set-up that blows air through a stream of hot wort after the boil.

Fermentation and VDKs

For the best results, cool your wort all the way down to fermentation temperature. A temperature in the mid-point of



your yeast's recommended range will work fine.

You will want to separate as much break material from the wort as you reasonably can when you send it to the fermenter. If you use an immersion chiller, let the wort settle for 15–30 minutes after cooling, then rack the wort to your fermenter. If you use a counterflow chiller, run the cold wort into a sanitized bucket and let the break material settle before transferring it to your fermenter. Brewers lucky enough to have a cylindro-conical fermenter can just dump the hot break by opening the bottom valve. There is no need to worry about leaving behind every last bit of trub. (In fact, a small amount helps with yeast nutrition.) But separating the bulk of the break material from the wort will help minimize off flavors.

Aerate the wort well, with a 60-second shot of oxygen or 10 or more minutes of filtered air from an aquarium pump.

Take the yeast starter out of the fridge while you are cooling the wort and let it warm just a bit, then pitch the yeast sediment from the starter immediately after aeration.

If you ferment in a bucket or cylindro-conical fermenter, open the fermenter up at high kräusen and skim the darkest, resiny bits of hop "gunk" from the kräusen with a sanitized spoon. This removes some of the harshest bittering compounds and leaves a smoother tasting final product. (It also lowers your IBU level slightly.)

If you ferment in a carboy, try to ferment enough volume such that the kräusen will just hit the top of the glass. This will cause some of that material to stick. At Anheuser-Busch, they use fermenters with false ceilings for this.

One character that is considered a flaw in American Pilsners is the presence of vicinal diketones (VDKs) — such as 2,3 pentanedione and, especially, diacetyl.

Like all brewers yeast strains, lager yeast secretes the precursor of diacetyl (α-acetolactic acid) into wort. In the wort, outside of the yeast cells, diacetyl is formed. The formation rate is increased by the presence of oxygen. Later on in the fermentation, the yeast absorbs the diacetyl. As such, you need to ensure that any diacetyl is cleaned up before separating your beer from its yeast.

The simplest way to ensure that the yeast absorb the diacetyl is to perform a diacetyl rest. As fermentation slows, and the specific gravity of the beer falls to a couple points above its predicted final gravity, let the temperature rise to around 60 °F (16 °C). Hold it there until sampling reveals no detectable diacetyl. This usually only takes a couple days, but many homebrewers simply let diacetyl rests go for three or four days, without taking any samples, before they start cooling their beer.

Kräusening is another option for dealing with diacetyl. Finished Budweiser is a mixture of their base fermented beer, a different beer brewed especially for kräusening and the final dilution water. (See the November 2006 issue of *BYO* for more on kräusening.) If you do kräusen, retaining the CO_2 produced for naturally carbonated beer is an option. See page 54 for how to build a spunding valve and accomplish this.

Once the diacetyl in your beer has been reduced, and it has reached its final gravity (usually 1.004–1.006, if you brewed the beer at working strength), it is best to separate the beer from the spent yeast. (If you are going to kräusen, you can do this earlier by racking from primary to a Corny keg.) Either rack the beer to secondary or dump the yeast from the bottom of your cyclindro-conical fermenter. Cool the beer to lagering temperatures — refrigerator temperature (40 °F/4.4 °C) is a convenient option — and let it cold condition (lager).

At commercial breweries, lagering time is usually around 3 weeks. However, filtering and sometimes other techniques (such as A-B's beechwood aging) will speed the lagering time compared to beer sitting in a bulk tank (such as a Corny keg). As such, it's best to lager a little longer at home — 5 weeks should be adequate, but let your taste buds be your guide.

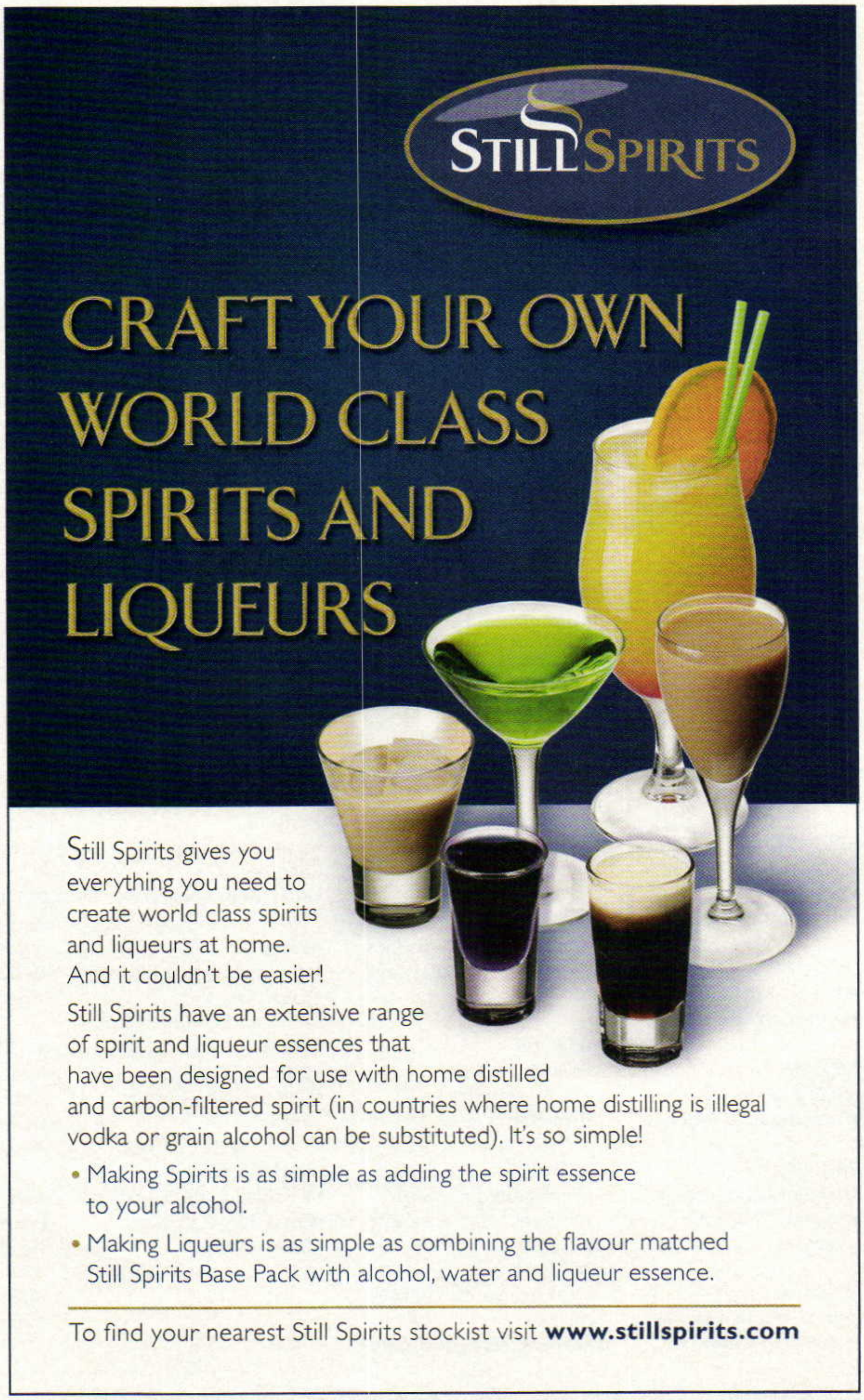
Once the beer is conditioned, you can either fine the beer or filter it for clarity. Stirring in 2 tsp of Polyclar AT, dissolved in hot water, per 5 gallons (19 L) of beer the night before you rack the beer to your keg or bottling bucket is a good option for homebrewers without a filtration system (i.e. most of us). In the keg or bottle, shoot for a carbonation level of 2.5–2.8 volumes of CO_2. Serve the beer ice cold.

Success or failure

American Pilsner is one of the hardest styles to brew at home. You do not have any room for off flavors or aromas to hide. As such, you need to pay attention to every stage of brewing — from ingredient selection, to hot side procedures to fermentation and conditioning.

For many homebrewers, their first stab at the style occurs when they brew a batch for a party. If you do this, I strongly recommend brewing a test batch first and identifying anything in your ingredients or methods that may yield off flavors or aromas.

Chris Colby is the editor of Brew Your Own. *In the next issue, we will unveil our new Style Profile columnist.*



BYO BACK ISSUE SALE!

Buy 5 Issues...Get 5 More Issues FREE!

We are offering readers a very special deal on our limited quantities of back issues. Buy any 5 issues for $25 (plus $10 shipping) and receive 5 more issues for FREE! Buy 5 and get 5 FREE! Choose from these collectible classics still in stock from 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004 and 2005.

HURRY! SUPPLIES ARE LIMITED! NOW AVAILABLE ONLINE AT WWW.BREWYOUROWNSTORE.COM

DEC. 95
- Controlling Beer Color
- Winter Brew Recipes

APR. 96
- Apartment Brewing
- Lager & Kegs

MAY 96
- Lautering Tips
- Troubleshooting Guide

JUNE 96
- Partial Mash Tips
- 15 Great Extract Recipes

JULY 96
- Big Batch Brewing
- Scotch Ale

FEB. 97
- Lager Tips
- Microwave Mashing

APR. 97
- Low-Alcohol Recipes
- American Pale Ale Recipes

AUG.97
- Make Your Own Malt
- Dry Hopping Tips

SEPT. 97
- Build a Keg Cleaner
- Tips from Sierra Nevada Brewing

OCT. 97
- Extract Kit Guide
- Decoction Mashing

NOV. 97
- Refining Your Mash
- Brewing with Adjuncts

FEB. 98
- Belgian Lambic Tour
- Belgian Abbey Ale Recipes

MAR. 98
- Super Hoppy Recipes
- Lautering Guide

APR. 98
- Scotch Ale Recipes
- Choosing the Right Yeast

JUNE 98
- Hop Profiles and Tips
- Malt Cooler Recipes

JULY 98
- 15 Clone Recipes
- 3 Beers, 1 Mash

AUG. 98
- Easy Beer Calculations
- Yeast Pitching

OCT. 98
- Great Bock Recipes
- Choose the Right Kit

NOV. 98
- Kegging Techniques
- Using Liquid Yeast

DEC. 98
- Cask Conditioning Tips
- Convert Freezer to Beer Chest

JAN. 99
- Aging in Wood
- Figuring Hop Bitterness

FEB. 99
- Malta Yeast Starter
- Organic Homebrewing

MAR. 99
- Imported Clone Recipes
- Build an Electric Brew Stove

APR. 99
- Kegging Guide
- Understanding Brewing Water

MAY 99
- Perfecting Pale Ales
- Nitrogen Homebrews

JUNE 99
- Nut Brown Ale, Pilsner Recipes
- Experimenting w/ Grains

JULY 99
- Summer Homebrew Recipes
- Hempen Ale Recipe

AUG. 99
- Wit, Kölsch Recipes
- American Lager Clones

SEPT. 99
- Build a $50 Mash Tun
- Lager Techniques

OCT. 99
- Homebrewing Soda Pop
- Doppelbock Recipes

NOV. 99
- Hop Flavor Chart
- Easy Partial Mashing

DEC. 99
- Cutting Edge Equipment
- Increasing Batch Size

JAN. 00
- 7 Czech Beer Recipes
- Your First Brew

FEB. 00
- High-Gravity Brewing
- Foreign Clone Recipes

MAR. 00
- Master Beer Conditioning
- Beer Tasting Lessons

APR. 00
- Making Smoked Beers
- Your First Keg

MAY 00
- Your First Mash
- Understanding Your Water

SUMMER 00
- 4 British Clone Recipes
- Put a Spigot in Your Brew Kettle

OCT. 00
- 20 Autumn Extract Recipes
- Build a Counterflow Wort Chiller

NOV. 00
- 6 Belgian Clone Recipes
- Expert Belgian Brewing Tips

DEC. 00
- Brewing Lagers
- Homebrew Lab Gizmos

JAN. 01
- Brew Indigenous Beers From 4 Continents
- Making Root Beer

FEB. 01
- 5 German Clone Recipes
- Decoction Step-by-Step

MAR. 01
- Growing Yeast Strains at Home
- Brew Low-Carb Beer with Beano®

APR. 01
- Grow Your Own Hops
- Strong Ales

MAY 01
- 20 Extract Recipes for Spring
- Build a Counter PressureBottle Filler

SUMMER 01
- 5 Clone Recipes for Summer
- Build a Big-Batch Mash Tun

SEPT. 01
- Learn to Brew with No-Boil Kits, Extract with Grains, Partial Mash, Single-Infusion Mash and Step Mash

OCT. 01
- 15 Classic Extract Recipes for Different Beer Styles
- Build a Hopback

NOV. 01
- Using and Building With Stainless Steel
- Build a Draft Jockey Box

DEC. 01
- Brewing Scotland's Classic Beers
- Build an Easy RIMS

JAN./FEB. 02
- 8 Ski Town Clone Recipes
- Thomas Jefferson's Homebrew

MAR./APR. 02
- Understanding Malt
- Computer Brewing Software

MAY/JUNE 02
- Faster Brewing Tips
- Big Batch Brews

JULY/AUG. 02
- 21 Regional U.S. Recipes
- Brewing with Fruit

SEPT. 02
- Homebrew Trouble shooting Guide
- Build a Draft Beer Fridge

OCT. 02
- Better Extract Techniques
- One Batch, Two Beers

NOV. 02
- 4 Dream Homebrew Set-ups
- Indoor Brewing Systems

BUY 5 ISSUES...GET 5 MORE ISSUES FREE!

DEC. 02
- Monster Holiday Beer Recipes
- Oatmeal Stout, Coffee Beer

JAN./FEB. 03
- Brewing Porter
- Cleaning & Sanitation Made Easy

MAR./APR. 03
- Selecting Hops to Style
- Introduction to Kegging

MAY/JUNE 03
- How to Control the Color of Your Beer
- Adding Oak to Beer

JULY/AUG. 03
- Light Beer Recipes
- Tips for Entering Homebrew Competitions

SEPT. 03
- Pale Ale Recipes
- Yeast Pointers

OCT. 03
- 17 Foolproof Extract Recipes
- Trappist Ale Tips & Recipes

NOV. 03
- Choosing and Using Homebrew Pumps
- Steeping vs. Partial Mashing

DEC. 03
- High-Gravity Beers
- Brewing with Spices

JAN./FEB. 04
- Brewing Milk Stout
- 3 Mardi Gras Clone Recipes

MAR./APR. 04
- Brewing Sugars & How to use Them
- Yeast: Choose the Right Strain for your Beer

MAY/JUNE 04
- Making Low-Carb Homebrew
- Beer Barbecue Recipes

JULY/AUG. 04
- Brewing Bocks -American & German
- Water Tips for Extract Beer

SEPT. 04
- 13 Commercial Hoppy Beers Cloned
- Brewing Old Ales

OCT. 04
- Extract Experiments
- Lambic Brewing

NOV. 04
- 4 Homebrew Projects
- Hard Cider Made Easy

JAN./FEB. 05
- Kegging: Nitros, Beer Engines, Refurbishing
- Stout Clones

MAR./APR. 05
- New Hop Varieties
- Grow Your Own Hops

MAY/JUNE 05
- 10 Classic Clones: Anchor Steam, Fuller's ESB, Guinness, Sierra Nevada Pale Ale, Orval, Duvel, Paulaner Hefe-Weizen, Pilsner Urquell, Celebrator, Warsteiner

JULY/AUG. 05
- Brewing Heineken and International Lagers
- Belgian Saison

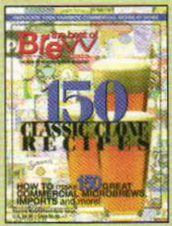
SEPT. 05
- 10th Anniversary Issue: 10 Best Wizard Questions
- 10 Dark Beer Clones

OCT. 05
- 10 Keys to Better Extract Beers
- Brewing Beers with Brettanomyces

NOV. 05
- Build a 3-Tier System
- Converting a Keg to Kettle

DEC. 05
- Pacific Northwest Clones
- 10 Hardest Beer Styles

BEGINNER'S GUIDE
- How to brew with kits, extracts & all-grain
- Also provides introduction to winemaking!



BEST OF BYO 150 CLASSIC CLONE RECIPES
- How to clone commercial beers
- 150 recipes provided for all-grain and exract brewers

DON'T FORGET TO ORDER MAGAZINE BINDERS!

Brew YOUR OWN

BUY 5 GET 5 FREE

Mark your 10 choices below.

Qty.	Issue	Qty.	Issue
____	December 95 (ltd. quantities)	____	January 01
____	April 96	____	February 01
____	May 96	____	March 01
____	June 96	____	April 01
____	July 96	____	May 01
____	February 97	____	Summer 01
____	March 97	____	September 01
____	April 97	____	October 01
____	August 97	____	November 01
____	September 97	____	December 01
____	October 97	____	Jan./Feb. 02
____	November 97	____	Mar./April 02
____	February 98	____	May/June 02
____	March 98	____	July/Aug. 02
____	April 98	____	September 02
____	June 98	____	October 02
____	July 98	____	November 02
____	August 98	____	December 02
____	October 98	____	Jan./Feb. 03
____	November 98	____	Mar./April 03
____	December 98	____	May/June 03
____	January 99	____	July/Aug 03
____	February 99	____	September 03
____	March 99	____	October 03
____	April 99	____	November 03
____	May 99	____	December 03
____	June 99	____	Jan./Feb. 04
____	July 99	____	Mar./April 04
____	August 99	____	May/June 04
____	September 99	____	July/Aug. 04
____	October 99	____	September 04
____	November 99	____	October 04
____	December 99	____	November 04
____	January 00	____	Jan./Feb. 05
____	February 00	____	Mar. /April 05
____	March 00	____	May/June 05
____	April 00	____	July/Aug. 05
____	May 00	____	September 05
____	Summer 00	____	October 05
____	October 00	____	November 05
____	November 00	____	December 05
____	December 00		

* issues not listed are sold out

5 copies ....$25 $________

5 BONUS copies ....FREE $ FREE

Shipping/Handling ....$10 $________

Orders outside the U.S. please call or e-mail for shipping quote.

Beginner's Guide _____ x $6 each = $________

Best of BYO 150 Classic Clone Recipes____x $6 each= $________

BYO Binders _____ x $15 each = $________

(Binders hold 12 issues each)

Total $________

Name ____________________

Address ____________________

City ____________ State ____ Zip ____________

E-mail ____________________

❑ Check Enclosed ❑ MasterCard ❑Visa

Card# ____________________

Exp. Date ____________

Signature ____________________

MAIL ORDER FORM TO:
BYO Back Issues
5053 Main St., Suite A
Manchester Center, VT 05255

FAX FORM TO:
802-362-2377
or CALL:
802-362-3981

order online: www.brewyourownstore.com

courtesy of the Bavarian Brewers Federation, Munich, Germany

HERE COMES the judge

HOW HOMEBREW CONTEST JUDGES EVALUATE YOUR BEER

by **Paul Zocco**

Some of us really love beer. Any kind of beer. And most of us don't care if the flavors conform to anyone's style parameters or fit any set of style guidelines. If the beer in our hand is good, we like it. Well, I'd say that's a good way to evaluate a beer, that is, by personal preferences. But if one must evaluate a brew with regards to classic style characteristics — for example, if a homebrew is entered in a BJCP sanctioned homebrew contest — well, that's another story.

The Beer Judge Certification Program (BJCP) has developed detailed guidelines describing the world's major beer styles, and quite a few minor ones. Currently there are twenty-three distinct beer categories in the BJCP's "Style Guidelines for Beer, Mead and Cider" (available online at www.bjcp.org). Every category has many sub-categories contained within and the guidelines are growing. In the revised 2004 version of the guidelines, newly-added styles included Irish red ale, Baltic porter and imperial IPA. When you submit a beer to a BJCP-sanctioned homebrew contest, it is evaluated versus the characteristics of the beer's style, as outlined in the style guidelines. In other words, if you submit an American pale ale, it is evaluated with regards to how well it matches the characteristics of an American pale ale.

I will discuss one category in this article for purposes of showing the reader how this evaluation system works. If you ever wondered what happened to your beer when you sent it off to a contest, this should help you understand. Likewise, if you are interested in becoming a judge or just learning the mechanics to evaluate your own beer at home, this article should help. These parameters were developed to be used by certified BJCP judges in amateur beer competitions, but they also can be used by the homebrewer and professional brewer to describe classical style characteristics. They're also a great aid in designing your next classic style-inspired homebrew. For the purposes of this article, I'll discuss how an American pale ale would be judged at a BJCP contest. American pale ale is a popular beer that homebrewers love to brew, so most readers should have some familiarity with the style. Using the revised 2004 BJCP style guidelines the following is an explanation of the important characteristics this style of beer should have.

Preliminaries

Before any beers get tasted during the judging, there are a lot of preliminaries. Judges will write their names and the upcoming entry number on their scoresheets. They will also write entry numbers on their plastic glasses. (For light beers, it's best to write the numbers as low on the glass as possible, so the aroma of marker pen doesn't reach the judge's nose. For dark beers, the numbers should be written just above the likely liquid level. (If the numbers are written below the liquid level, the judge would have to tilt the glass to read them.) Judges also usually read the style guidelines for the style they are about to judge, to refresh their memory.

At a homebrew contest, beers are served in flights, grouped by category. If there are many entries in a category, as is usually the case with American pale ales, there may be several flights, each judged by a different panel of judges. The steward will bring the beers to the judging table and the head judge will check to see if all the beers in the flight are present.

Opening the Bottle

Before the crown cap on the bottle is popped, the judges will inspect it and its fill level. If the bottle has a short or high fill, this may be noted on the scoresheet, although no points are given or taken away for abnormal fill levels. If there is a ring around the inside neck of the bottle, the judges will be aware that the beer may be contaminated — and take care not to get a beer shower when they open it. Some judges write down the type of bottle and color of the cap on the scoresheet. This can assure the entrant that the judges actually judged the bottle he sent in.

Aroma [12 points]

The first criteria on the BJCP scoresheet is aroma. A brewer can score up to 12 points for his beer's aroma. It makes good sense to evaluate aroma first. When a beer is first opened and poured, its carbonation is at its maximum. Bubbles are pushing aroma up out of the glass and bubbles in the beer's foam are bursting, releasing little bursts of aroma.

Individual judges have different styles of judging, but one way to get a good whiff of the aroma of a beer is to cup your hand over most of the top of the glass, put your nose right down in the glass and inhale. If you inhale slowly, the air will warm in your nose and you will get a good sense of the aroma. (Of course, you need to make sure your hands don't smell.) You can swirl beer to release more aroma and sniff it again, if needed. A judge will be looking for off aromas as well as the aromas from malt, hops and yeast fermentation products, as appropriate for the style.

In the case of American pale ale, judges will be expecting the citrusy aroma from American hops. In this style, you should also expect low to medium malt aromas, with crystal malt notes; enough to support the aroma from the hops. Balance is key in this style, as it is in most classic beer styles. Fruity esters in low amounts are common yeast byproducts produced when using American ale yeast varieties, but the beer should not show English ale style fruitiness. Dry hopping adds a pronounced hop aroma, and maybe a hint of grassiness. Judges will also be looking for flaws, such as the cardboard-like aroma of oxidation.

There are no set amount of points assigned for each little detail — presence or absence of hop aroma, quality of hop aroma, presence or absence of faults, etc. — the judge simply decides where the beer's aroma ranks on a scale of 0 to 12. He should also write descriptive comments explaining the aroma score. For example,

TERMS USED IN JUDGING BEERS

Here are some terms you may encounter on score sheets from homebrew contests:

Acetaldehyde — a "green apple" aroma; acetaldehyde is produced by yeast during fermentation or can come from the oxidation of ethyl alcohol.

Acetic — aroma and flavors reminiscent of vinegar; most likely caused by contaminating microorganisms, especially Acetobacter

Alcohol — a product of fermentation, a beer with too much alcohol (for the style) may be labeled "hot" (although sometimes this refers to fusel alcohols)

Astringent — a puckering mouthfeel, reminiscent of tannin-rich tea; sometimes confused with bitterness; the most common cause is oversparging grains

Diacetyl — a buttery or butterscotch aroma and flavor; considered a fault in most beer styles, but allowed in some; most common cause is early separation from yeast

DMS — a cooked corn like aroma; can be caused by lack of boil vigor

Estery — fruity aromas, which are a part of the characteristics of many ales, but considered a fault in most lagers; ester production is increased with increasing fermentation temperatures, higher original gravities and inadequate aeration.

Fusel Oils — solvent-like aromas reminiscent of acetone; fusel oil production is increased in high-temperature fermentations and high-gravity fermentations

Grassy — a grass-like aroma, almost always from dry hopping; small levels may be acceptable in some styles

Hoppy — may refer to bitterness, flavor or aroma of hops (or a combination of these elements); some hop presence is required in almost every beer style

Malty — husk-derived, melanoidin-rich flavor from malted grains, especially barley; malty is not synonymous with sweet

Oxidized — oxidation may produce cardboard-like aromas and flavors in beer; these are always considered a fault; in strong beers, it may also cause sherry-like aromas and flavors; in some styles, sherry-like characteristics are expected; the most common cause is exposure to air after fermentation

Phenolic — a wide variety of aromas and flavors including Band-Aid-like, Chloraseptic-like, smoky, plastic-like or clove-like; often a result of contamination

Sour — tart aroma and flavor reminiscent of lemons or vinegar; usually a result of contamination, especially by *Lactobacillus* or *Pediococcus*; may also result in fruit beers from some ingredients, including raspberries or cranberries.

Spicy — a nebulous term that may refer to the use of actual spices, certain characteristics found in some hop varieties or characteristics produced by some yeast strains (especially Belgian strains); context should suggest the intended meaning

Sweet — the taste of simple sugars such as glucose, sucrose or fructose; sweet and malty are not the same thing although the two flavors often appear together in beers

4-Vinyl-Guaiacol — the prominent yeast-derived character in German wheat beers; can also be the result of yeast mutation or contamination

Worty — reminiscent of the flavor of wort or the sugar maltose; usually the result of incomplete fermentation

"Nice American hop aroma, but I detect a little hint of diacetyl (a beer fault)."

Appearance [3 points]

The next section on the scoresheet is appearance, which is worth 3 points. When the beer is poured, a good head should form and lively carbonation should persist. Some foamy head should remain throughout the beer's consumption, though its retention slowly dissipates. (The judge may assess the aroma first, but he should make a mental note of how big the head was and how fast it collapsed.) A judge may also comment on the fineness of the bubbles and if the foam leaves lacing on the glass.

The color of the beer is compared to the range of colors allowed for a given style. Some judges even have "color cards" — transparencies that show the entire color range found in beers with associated SRM numbers. For American pale ale, the style guidelines list 5–14 SRM as the appropriate range.

Clarity is also important for most styles. One measure of clarity is to see if you can read the words on a pencil through beer. (The beer needs to be light-colored, obviously.) Or, a judge can also shine a flashlight through beer and look for light scattering.

It's usually pretty clear by this stage of examination if the beer has major defects. Problematic beers may have low or no head on pouring, or they may foam or gush. If a beer is a gusher and has off aromas, it is most likely contaminated. And, if a beer is contaminated, the beer may be set aside to sample at the end of the flight, so the judge's palate isn't negatively affected.

Per the BJCP style guide, the color of an American Pale Ale can range from pale golden, drifting towards amber. The beer should be clear, but some haziness from dry hopping is acceptable. It should also have a nice white head, as one would expect in most average-strength ales.

Again, there are no specific amount of "subpoints" for foam, color and clarity; the judge simply assigns a score between 0 and 3, based on his overall impression of the beer's appearance. For the judge, this is a section of the scoresheet for which it is relatively easy to provide good feedback for the entrant. The color and clarity of the beer can easily be described, along with the characteristics of the head. (A good description here can also reassure the entrant that the scoresheet he is reading actually pertains to his beer.)

Flavor [20 points]

The most important parameter, of course, is the beer's flavor, and this is worth 20 points at a BJCP contest. And typically, the description of a beer's flavor in the style guidelines is longer than the description of any other element.

One thing to keep in mind when evaluating a beer's flavor is that flavor intensifies with temperature. At homebrew contests, beers are served chilled, but usually not ice cold.

As with the judging of aroma, judging styles differ among judges. One way to get a good sample of a beer's flavor is to take a small sip and let the beer warm in your mouth briefly before swallowing. You may want to swirl it around to coat your tongue. If a judge thinks he detects on off flavor, but isn't sure, he may let the beer warm up (perhaps cupping the glass in his hands) before taking another sip. Many minor beer faults can "hide" in cold beer, but "pop out" at higher temperatures. If you think a beer might have a fault, let it warm up and taste it again.

For both aroma and flavor, a judge may use "beer terms" (like diacetyl) or "food/cooking terms" (like butterscotch) to describe various aspects of the beer. Without a shared vocabulary, it would be impossible for beer judges to communicate with brewers. See the chart on page 30 for some beer terms you may see used on beer scoresheets.

Beyond a familiarity with the terms used to describe beer aromas and flavors in general, the judge should be familiar with the beer style itself. Reading the style descriptions are one thing; actually having tasted classic examples of the style is another. (Even at larger contests, it can sometimes be a challenge finding judges who are sufficiently familiar with some of the more obscure styles.) For every beer substyle, the style guidelines list notable beers. In the case of American pale ale, nine beers are listed, including Sierra Nevada Pale Ale, Stone Pale Ale and Full Sail Pale Ale.

A good judge will try to describe the beer in each section, and just declare it "to style" or "not to style." There is only one way (or maybe a few ways) for a beer to be "to style," but an infinite number of ways a beer can be "not to style." If a beer, or some element of it, is judged to be "not to style," the judge should help the entrant out by specifying why it is not to style. Entrants can become very frustrated if their beer scores poorly and they are not given any guidance with regards to how to improve it.

You are no doubt aware that beer contains alcohol, and this can affect how beers are judged. The more beers a judge samples in a flight and the more flights he judges during a day, the more alcohol is likely to impair his judgement. One way for a judge to guard against this is to keep his sampling to a minimum. To do this, the judge needs to be very focused, only

Try our quality dried brewing yeast

BREWFERM® BLANCHE
Top fermenting brewers yeast, Saccharomyces cerevisiae, selected for its formation of typical wheat beer aromas. Very suitable for production of wit beers, wheat beers etc.
Flocculation: low.
Final density: low.
Fermentation temperature: 18-23°C.
Dosage: 5-8 g/10 l.

BREWFERM® LAGER
Specially selected strain of Saccharomyces uvarum (Carlsbergensis). A sturdy lager brewing yeast, delivering a consistent neutral fermentation with little or no Sulphur components or other undesirable by-products. Flocculation: high.
Final density: low.
Fermentation temperature: 12-15°C.
Dosage: 3-6 g/10 l.

Available at fine homebrew stores
Distributed by L.D. CARLSON www.ldcarlson.com

BREWFERM PRODUCTS
Korspelsesteenweg 86, B-3581 Beverlo – Belgium
www.brewferm.be info@brewferm.be

resampling a beer when there is a reason. Alcohol is not the only character that can impair a judge's abilities. Any strong flavor — including hop bitterness, darkly roasted grains or smoke — can make it difficult to detect more subtle amounts of that flavor in later beers.

When wine judges judge wine, they spit the wine out after each sip. In contrast, beer judges swallow. This practice is based on the old (and discredited) idea that bitter-detecting taste buds are more prominent at the back of the tongue, but shows no signs of changing. Many contests put bread on the tables so judges can take a bite between beers to cleanse their palate. This can be especially important if a beer has a serious off-flavor.

American pale ales should have moderate to high hop flavors featuring American hops. Cascade and Amarillo hops are very popular in this style, but many different varieties of hops may be used. The malt presence should be in balance with the hops, and may have caramel, bready, toasty or even biscuity characteristics. The basic malt bill for an American pale ale is 2-row pale malt and medium crystal malt, but other malts may be used in small amounts to add complexity. The crystal or caramel malt component should be fairly low, certainly not as strong as in some English pale ales. An entry that shows a lot of crystal malt or caramel flavors may be better off entered as an American amber ale, and judges frequently tell entrants if their beer would have scored better in another category. The balance in American pale ales leans toward hops and hop bitterness, but the malts should not be hidden. A small amount of grassy flavor may be detected in dry hopped beers, but this flavor should not be strong.

Mouthfeel [5 points]

Mouthfeel is related to flavor and includes body, carbonation and things like astringency and the detection of creaminess or silkiness. One way to judge mouthfeel is to let the beer sit on your tongue for a second, then slowly swallow the beer. A beer with full body means that it has sort of a full feeling in your mouth. A good description is that we can say fuller bodied beers seem thicker, fuller and more viscous than lighter bodied beers.

American pale ales fall into a medium light to medium body class. And, they should have moderate to high levels of carbonation. The finish should be smooth without any harsh astringency (mouth puckering) that could be the result of the increased hop bitterness level.

Lack of body and carbonation and the presence of astringency are commonly encountered faults at homebrew contests. In this or any section of the score sheets, if the judge notes a beer fault, he may also explain the likely cause. For example, astringency is usually from oversparging, but may also be associated with high hopping rates. If you receive a scoresheet that mentions a fault, but not the cause of that fault, consult the troubleshooting section of your homebrew text (or see the troubleshooting chart at

ANNAPOLIS HOME BREW

Great Beer Recipes!

We specialize in tested & proven beer recipes. Using the finest ingredients, each recipe kit is measured and packaged by our brewmasters.

Visit our website to see what makes our beer recipe kits so good. Over 50 beers available in malt extract, partial mash, or all-grain!

Premium Malt Extract
Crushed & Sealed Grains
Grain Steeping Bag
UV & Oxygen Sealed Hops
Live Yeast Culture
Bottling Sugar & Caps
Step-by-Step Instructions
Some include fruit, honey, etc.

We're open 7 days a week!

Everyone on our staff is an experienced home brewer!

800-279-7556

Secure Online Ordering

www.annapolishomebrew.com

byo.com.) Many beginning brewers enter homebrew contests not so much to have a shot at winning medals, but more to receive feedback to improve their brewing skills.

Overall Impression [10 points]

The final, and some would say most important section of the scoresheet, is the section pertaining to overall impression. It's here that the judge can express his personal opinions about the beer being judged, and if it fits the parameters of the category. Here, the judge may express whatever he wishes, but I think he should do so in a way that presents positive feedback and constructive criticism. It's here that the judge may suggest that the brewer attempt to modify his recipe or brewing technique, if he wants to meet the style parameters in the future.

Judges should keep in mind that the brewer may not have brewed the beer specifically for the contest, so a failure to be "to style" may not really be a failure on the entrant's part. The brewer may simply have submitted a "house beer" in the closest reasonable category in the hopes of getting general feedback. As such, comments regarding levels of faults (if any), overall balance (irrespective of style) and general drinkability may be greatly appreciated by the entrant. The beer's score, of course, needs to the reflect how well it matches the characteristic of the appropriate style.

Total [50 points]

Finally, the scores from each individual section and a final score is given. At the end of the flight, the two judges will give the beer a combined score. This is usually simply the average of the two judges' scores, but doesn't need to be.

Reading Your Scoresheets

When you read your scoresheets, you will want to take note of your score (obviously), the criticisms and suggestions for improvement. Never get too dejected (or elated) over the comments of a single judge. If you submit your beer to several contests, you should see a pattern emerge in the criticisms.

Paul Zocco has the rank of National BJCP judge.

MIDWEST
HOMEBREWING AND WINEMAKING SUPPLIES

Midwest has a huge selection of Belgian Homebrewing Ingredients.

Call for our FREE — 76 page New Catalog 1-888-449-2739


Midwest's Belgian Triple Recipe Kit

Midwest offers 8 complete award winning Belgian homebrewing recipe kits.

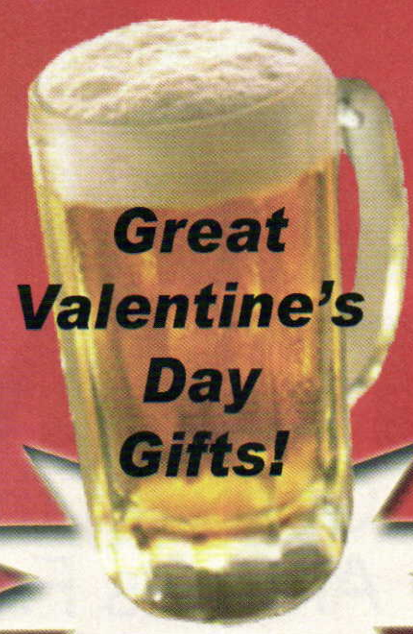
Midwest proudly offers 21 different Belgian Liquid Yeast strains from Wyeast and White Labs.

Midwest 3440 Beltline Blvd. Mpls., MN 55416
FAST SHIPPING — www.midwestsupplies.com

BEERCOLLECTIONS.COM

The Best Source for Beer Related Gifts and Collectibles

GLASSWARE
COASTERS
CROWNS
LABELS
STICKERS
BOTTLE OPENERS
HATS
TAP HANDLES
TACKERS SIGNS
NEON SIGNS
TAP HANDLES



by **Michael Heniff**

YEAST STRAINS

When it comes to making quality homebrew, many factors are important, including sanitation, quality ingredients, proper equipment and techniques. Whatever styles of beer you brew, yeast selection and fermentation management are critical. However, when brewing strong Belgian style ales, yeast selection and fermentation management are paramount since the signature flavors of all Belgian styles are derived from the yeast. To make matters even more complex, there are a large number of yeast strains available to the homebrewer (Wyeast and White Labs offer over a combined 20 Belgian strains), where each one is quite different from the next. But, with a little guidance and a little experimentation, the satisfying quality and complexity of an excellent homebrewed Belgian style strong ale can be enjoyed by each and every homebrewer.

FOR BEL

STRONG ALES

Coaxing the Best Flavors and Aromas From Your Yeast

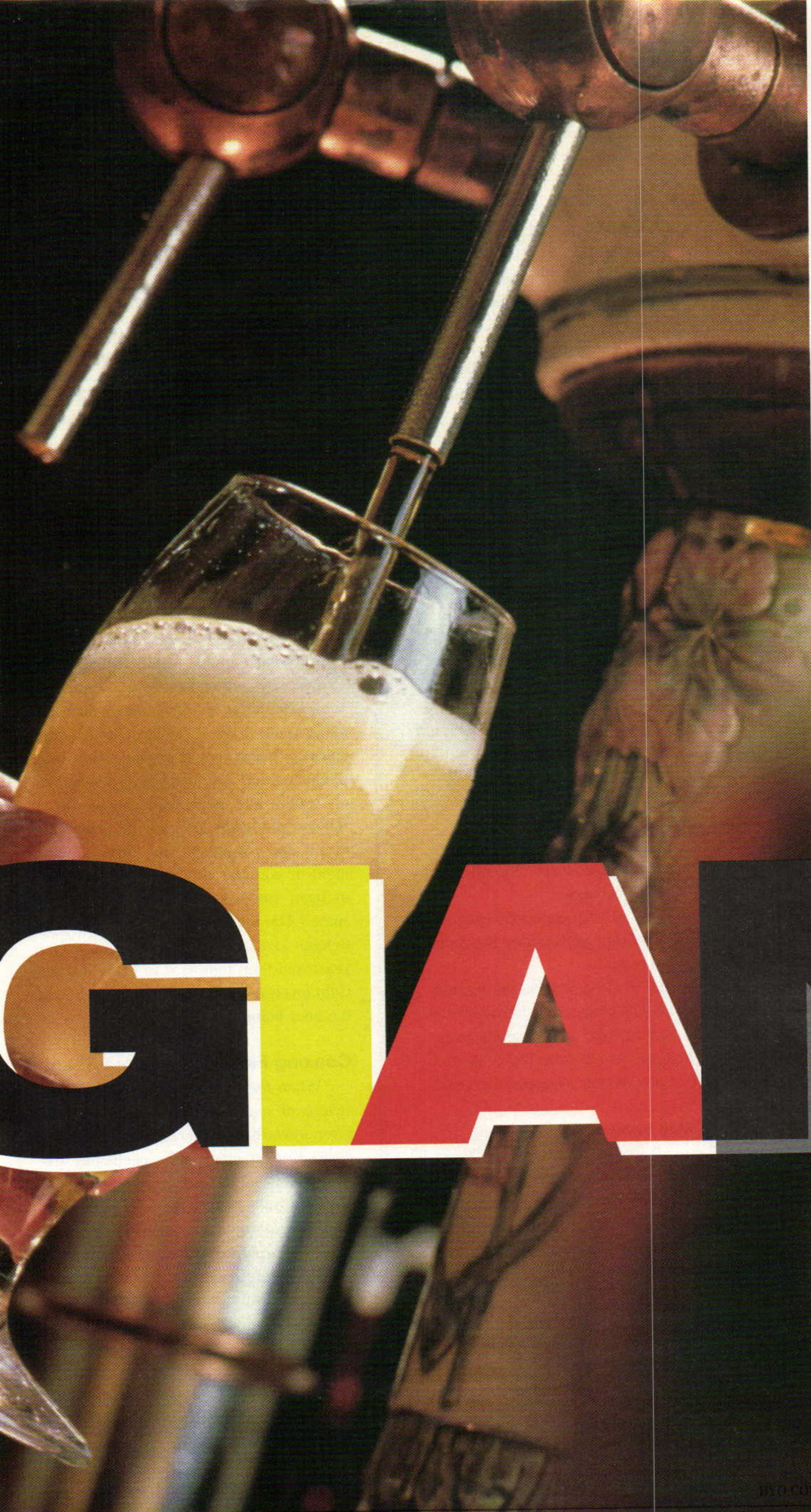


photo courtesy of belgium tourist board

GIAN

Yeast selection and fermentation management are important when brewing a Belgian strong ale.

Pitching rate, oxygenation and fermentation temperature are your main "control knobs" on yeast performance.

RECIPES

Mike's "Devilish" Belgian Strong Golden (Batch #121)

(5 gallons/19 L, all-grain)
OG = 1.080 FG = 1.015
IBU = 40 SRM = 3–5 ABV = 8.6%

Ingredients

14.7 lbs. (6.7 kg) Belgian Pilsner malt (1.4–1.8 °L)
0.35 lbs. (0.16 kg) CaraPils® malt (6–9 °L)
1.3 lbs. (0.6 kg) granulated corn sugar (15 mins)
7.8 AAU German Perle hops (60 min) (1.0 oz./28 g of 7.8% alpha acids)
2.3 AAU Czech Saaz hops (10 min) (0.75 oz./21 g of 3.0% alpha acids)
1.5 AAU Czech Saaz hops (0 min) (0.5 oz./14 g of 3.0% alpha acids)
Wyeast 1388 (Belgian Strong Ale) or White Labs WLP570 (Belgian Golden Ale) yeast

Step by Step

Mash grains at 150 °F (66 °C) for 90 minutes. Boil wort for 75 minutes adding hops and corn sugar per scheduled times. Cool wort to room temperature and drain or rack the wort off of the trub. Aerate the cool wort and oxygenate. Ferment at 68 °F (19 °C) for 10 days in the primary and 2 weeks in the secondary.

Extract with grains option

Replace Pilsner malt with 3.0 lbs. (1.4 kg) of light dried malt extract, 5.0 lbs. (2.3) light liquid malt extract and 1.65 lbs. (0.75 kg) Pilsner malt. Steep crushed grains at 150 °F (66 °C) in 3.0 qts. (2.8 L) of water. Boil at least 2.5 gallons (9.5 L) and add the liquid malt extract late in the boil.

Dixie Cup Boardwalk Belgian Quadrupel

by Jeff Reilly and Scott DeWalt
(5 gallons/19 L, all grain)
OG = 1.090 FG = 1.020
IBU = 30 SRM = 15–17 ABV = 9.3%

This was the beer that was given to each of the attendees of this year's Houston Foam Ranger's Dixie Cup Homebrew Competition. The theme was Fredopoly, based on the board game Monopoly and in honor of our annual speaker and homebrew pioneer, Fred Eckhardt.

Ingredients

12.5 lbs. (5.7 kg) Belgian Pilsner malt (1.4-1.8 °L)
0.25 lbs. (0.1 kg) aromatic malt (17–21 °L)
0.5 lbs. (0.25 kg) dark Munich malt (8–10 °L)
0.75 lbs. (0.33 kg) CaraMunich® malt (80–100 °L)
0.25 lbs. (0.1 kg) special B malt (140–155 °L)
1.0 oz. (28 g) chocolate malt (340 °L)
1.0 lb. (0.45 kg) Belgian dark candi sugar
0.5 lbs. (0.25 kg) turbinado sugar
0.5 g coarsely crushed grains of paradise
0.25 oz. (7 g) coarsely crushed Indian coriander
0.25 lbs. (0.1 kg) chopped raisins
4.5 AAU German Northern Brewer hops (60 min) (0.5 oz./14 g of 9.0% alpha acids)
3.9 AAU German Perle hops (60 min) (0.5 oz./14 g of 7.8% alpha acids)
Wyeast 1214 (Belgian Ale) or White Labs WLP500 (Trappist Ale) yeast

Step by Step

Mash grains at 152 °F (67 °C) for 90 minutes. Boil wort for 90 minutes adding hops per scheduled times and adding spices and sugars at end of boil. Cool wort to room temperature and drain or rack the wort off of the trub. Aerate the cool wort and oxygenate. Ferment at 72 °F (22 °C) for 21 days in the primary and 1 week in the secondary.

The Belgian Yeast Character

Most of the beers indigenous to Belgium are well known for their unique character, most often imparted by the yeast or bacteria used in their fermentation. Only the Belgian ales brewed using strains of brewer yeast, *Saccharomyces cerevisiae*, will be discussed here. Beers brewed with wild yeasts and bacteria employ a host of much different strains, fermentation schedules and fermentation characteristics. Also, only the strongest of the Belgian ales will be discussed, those with original gravities exceeding 1.070 including strong golden, tripel, dubbel and strong dark (including a few Trappist ales).

Belgian ale yeasts are noted for the plethora of aromas and flavors that they produce. The two signature chemical families produced by Belgian ale yeasts are esters and phenolics. Esters are noted for their fruity character, often reminiscent of pears, plums, citrus fruits, roses, strawberries, other berries and bananas. Yeast phenolics are often called spicy and many times have the character like the spices of black pepper or clove. However, phenolics that are medicinal, plastic-like or smoky are never appropriate in a Belgian ale. Depending on the style, the esters and phenolics can either compliment or contrast the other flavors found in beer, such as malt, hops and added spices. The biggest trick of the brewer of Belgian style ales is selecting the proper yeast and then taming it to bring out the right levels of each yeast character to suit the beer being brewed.

Coaxing Flavors from your Yeast

When fermenting beers with Belgian strains of yeast, special thought must be given towards many factors to achieve the desired yeast character, specifically the type and level of esters, phenolics and alcohols. Factors such as yeast pitch rate, cool wort oxygenation, fermentation temperature, original gravity, nutrient level and simple sugar content all influence the type and levels of yeast characteristics that each Belgian ale yeast strain will deliver.

Choosing the right fermentation parameters is a balancing act to subtly stress the yeast to give the proper levels of yeast characteristics without going overboard and creating a monster of fusel alcohols and solvent-like characters. Generally, the original gravity of the beer and simple sugar content are fixed for the desired style being brewed. As always, using proper nutrients, such as Servomyces from White Labs, is highly recommended for any style of beer. Therefore, yeast pitch rate, oxygenation level and temperature are the biggest "control knobs" for creating the right yeast character.

Late homebrew author George Fix in his book, "An Analysis of Brewing Techniques" (1997, Brewers Publications), recommended a yeast pitch rate of around 0.75 to 1 million cells per degree Plato and milliliter of wort for ales. One yeast supplier recommends this same rule-of-thumb for Belgian style ales while another suggests slightly less, between 0.5 to 0.75 million cells per degree Plato. To translate that pitch rate to 5-gallon (19-L) batches means that between 165 and 400 billion cells of yeast are needed for 5 gallons (19 L) of Belgian ales at typical original gravities. The table on page 39 can be used to determine the pitch rate and starter size at a compromise between the two main suppliers. For example, for a Belgian ale with an original gravity of 1.080, 284 billion cells are required which can be achieved by making a 0.75 gallon (2.8 L) starter with one Wyeast Activator XL pack or one White Labs tube.

Too low a pitch rate will result in elevated ester levels and which, when too high, can lead to a solvent-like character. Also, low pitch rates can result in high fusel alcohol levels, which are well known for their harsh character, often solvent-like with a burning sensation. Low pitch rates can also lead to slow, stalled, or incomplete fermentations as well as numerous other yeast derived off-flavors such as "green apple" from acetaldehyde or "butterscotch" from diacetyl.

Oxygen is critical for yeast growth. During this phase the yeast will rapidly grow, uptaking oxygen to form sterols, a critical nutrient for the proper development of the yeast's cell membrane. When oxygen is lacking during this phase, yeast growth is slowed and the cell membrane does not develop the proper permeability. Low oxygen levels can lead to a slow and unhealthy fermentation with an increased level of yeast by-products, such as esters and fusel alcohols. As can be surmised, proper oxygenation is critical when making your yeast starter as well.

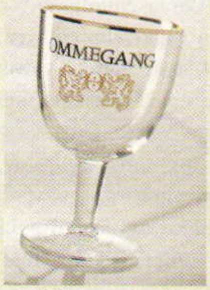
Greg Doss, a microbiologist and brewer with Wyeast, recommends that "brewers should use 8–15 ppm of oxygen for healthy fermentations," but with Belgian ales "12–15 ppm oxygen is recommended." When brewing strong Belgian ales, two factors impede oxygen dissolving into the cool wort: temperature and specific gravity. Oxygen dissolves more readily at cooler temperatures. Since ales inherently are brewed at higher temperatures, the maximum possible dissolved oxygen is lower than that for

belgian glasses

In Belgium, every brewery issues its own glassware. And many Belgian-inspired breweries around the world have followed suit, offering their own glassware for their Belgian-style beers. Many Trappist or abbey-style breweries prefer that people drink their beer from a **goblet**, or **chalice**. (See the Ommegang glass in the upper right.) Some lambic breweries want their beer served in a long, thin **flute**. (See the glass from Brouwerij Boon at right.) **Thistle glasses** and **tulip glasses** are both round-bottomed, with a constricted neck. Breweries making strong ales frequently have thistle or tulip glasses. (See the Douglas Scotch Ale and Duvel ale glasses for examples of this type of glass.) Hoegaarden wishes its witbier to be served in a thick **tumbler**. (See bottom left.)

Belgian breweries are also particular about how their beer is poured, with pouring instructions appearing on the side of many beer bottles. Different glass styles are mostly an aesthetic choice (and another way for breweries to get their name in front of their customers), but they can also influence the presentation of the beer.

Duvel glasses, for example, are etched on the inside bottom, to serve as a nucleation site for bubbles to form. The constricted top traps the resulting foam.



goblet or chalice


flute


thistle

tulip


tumbler

Yeast Starter Volumes for 5 gallons (19 L) of Belgian Beers

OG	cells/mL	cells/19 L	Packs/Tubes	Volume
1.050	9 million	178 billion	1	0-0.25 gallon (0-0.95 L)
1.070	13 million	248 billion	1	0.50 gallon (1.9 L)
1.080	15 million	284 billion	1	0.75 gallon (2.8 L)
1.090	17 million	320 billion	1	1 gallon (3.8 L)
1.100	19 million	355 billion	1-2	1 gallon (3.8 L)

lagers. Also, oxygen is less soluble in high gravity worts, making this another barrier for getting proper dissolved oxygen levels in a strong Belgian ale wort. Therefore, it is highly recommended that pure oxygen be used for oxygenating the cool wort for a strong Belgian ale. Doss goes on to recommend that "splashing and shaking the carboy, a traditional homebrew method, only reached 8 ppm of dissolved oxygen where 15 ppm can be reached with pure oxygen and a stone in 80 seconds."

Controlling the fermentation temperature is necessary for fermenting Belgian ales. The fermentation process is exothermic, meaning that heat is generated by the activity of the yeast. If the temperature of the fermentation is not controlled, the temperature of the fermenter will rise well above the surrounding air by as much as 8.0 °F (4.4 °C). Homebrew yeast suppliers list a recommended temperature range for each of their ale yeasts. But, with a few exceptions, the general recommended starting fermentation range is 68–72 °F (20–22 °C). When fermentation temperatures are elevated, the amount of esters and harsh fusel alcohols produced are increased. For all of the factors that increase esters, controlling fermentation temperature is usually the easiest and most effective. But, if the pitch rate is high (higher than the chart indicates), then the fermentation temperature can be safely elevated, up to the maximum temperature in the yeast's range. One method that Dr. Chris White of White Labs describes to bring out the character in the yeast is one where "breweries let the temperature free rise which lets the yeast ferment out quickly and creates the flavors that the brewers are looking for."

Belgian Styles and Their Yeasts

To start, the phrase "Belgian style" is somewhat of an oxymoron since most Belgians do not brew beers to "fit" any particular style; the Belgian brewers mainly focus on brewing what they like and usually it is up to marketing or the consumer to determine what the "style" should be. But, for simplicity of discussion, we must use "styles." Common style categorizations similar to that of the Beer Judge Certification Program (BJCP, www.bjcp.org) will be used.

Typical of Belgian brewers, any of the

STRAIN SOURCES

White Labs and Wyeast don't officially list the source of their yeast strains. This is because strains change over time and, unless the brewer closely follows the fermentation profile of the brewery — including pitching rates, aeration levels, fermentation temperatures and conditioning practices — he or she will not necessarily get the same profile from the yeast as the commercial brewer did. However, because homebrewers are curious, they have provided some information.

Achouffe — Wyeast 3522 (Belgian Ardennes) and White Labs WLP550 (Belgian Ale)

Chimay — Wyeast 1214 (Belgian Ale) and White Labs WLP500 (Trappist Ale)

Du Bocq (Corsendonk) — Wyeast 3538 (Leuven Pale Ale)

Duvel Moortgat — Wyeast1388 (Belgian Strong Ale) and White Labs WLP570 (Belgian Golden Ale)

Rochefort — Wyeast 1762 (Belgian Abbey II) and White Labs WLP540 (Belgian Abbey IV)

Orval — White Labs WLP510 (Bastogne Belgain Ale)

Unibroue — Wyeast 3864 (Canadian/Belgian)

Westmalle — Wyeast 3787 (Trappist High Gravity) and White Labs WLP530 (Abbey Ale)

yeasts provided by the homebrew yeast suppliers will make a very good Belgian ale if fermented properly. So, feel free to use any type of yeast to make a beer in the true Belgian "non-style." But, for those homebrewers that want to brew Belgian ales very similar to those classic examples, match the BJCP guidelines or achieve a world-class balance of flavors then this section is for them.

For almost each origin of yeast, one of each strain from the two main homebrew yeast suppliers (Wyeast and White Labs) is listed. Although the reputed origins of a strain from each supplier may be the same, the exact results from each supplier may vary. Each supplier most likely received the strain at different times leading to slight differences between the yeasts. Regardless, based on my experience, the strains for similar origins are much closer to each other than to many of the other strains from each company.

Strong Goldens are known for their strength, usually topping 8.0% ABV (alcohol by volume) as well as for their ease of drink — strong but deceptively so, still light in body and refreshing. The prototypical commercial example is Duvel, but there are many other excellent examples such as Lucifer, Delirium Tremens, Brigand, Avery Salvation and North Coast PranQster. The yeast profile in this style focuses on a marriage of spicy and peppery phenolics with a spicy floral hop character. The ester level is moderate but usually simple, often reminiscent of lemons and oranges, but in a complimenting role.

The primary yeast strains for fermenting a strong golden are Wyeast 1388 (Belgian Strong Ale) and White Labs WLP570 (Belgian Golden Ale) with a probable origin of Duvel Moortgat. These strains produce a strong peppery phenolic with a balanced orange and lemon-like ester. This strain attenuates well but has been known to be slow to ferment and flocculate. At temperatures in the high end of its suggested range, the yeast character can become very estery with a banana character.

Good alternate yeast strains for a strong golden are Wyeast 3522 (Belgian Ardennes) and White Labs WLP550 (Belgian Ale), which are likely from Achouffe. These strains develop a primarily spicy phenolic character with an ester level that stays well in check but with a profile that is more complex than that usually found in a strong golden. This strain can be fermented at higher than normal ale temperatures, around 74–76 °F (23–24 °C), without the esters overtaking the yeast character provided that the proper pitch rate is followed.

Tripels are similar in strength and color to strong goldens but have more of a balance between the fruitiness and phenolic spiciness and with the fruitiness being quite a bit more complex. The malt usually comes through more in the aroma and flavor with more of a body than the strong golden, the difference mainly due to the malt bill and not simple sugar level or attenuation. Excellent commercial examples include Westmalle Tripel, Chimay White (also called Cinq Cents), Affligem Tripel, New Belgium Trippel, Victory Golden Monkey and Unibroue La Fin du Monde.

A few different strains ferment out excellent tripels. First, Wyeast 3787 (Trappist High Gravity) and White Labs WLP530 (Abbey Ale), both reputedly from Westmalle, are excellent choices. Both yeasts produce a predominant ester character, complex and reminiscent of pears, bubblegum, plums and citrus fruits. The peppery spicy phenolic character melds well behind the esters. At higher temperatures, these yeasts can contribute some banana into the ester profile. At low temperatures, lower than 66 °F (19 °C), this yeast can go into a permanent hibernation.

Wyeast 1214 (Belgian Ale) and White Labs WLP500 (Trappist Ale), both possibly from Chimay, also produce very nice tripels. These yeasts produce intense and complex esters, almost indescribable in character due to the complexity. The malt character comes through well and the phenolic spiciness is subdued. Both strains are somewhat slow to start, but attenuate well when given a slightly longer fermentation time. When fermented higher in the recommended temperature range, around 72–76 °F (22–25 °C), the ester character doesn't significantly change or overpower the yeast character as much as some strains.

Also good for a tripel are Wyeast 3522 and White Labs WLP550, the ester profile is not quite as complex but still quite acceptable. One yeast, relatively new to the homebrew market that would be interesting to experiment with for a tripel would be Wyeast 3864 (Canadian/Belgian) yeast, the reputed source is from Unibroue in Canada.

A **Dubbel**, unlike the tripel and strong golden, is a dark beer focused on rich caramel and plum-like maltiness with a complimenting complex ester character and a slight contrast of spicy phenolics. The dubbel is not quite a big as a tripel or strong golden at 6–7% ABV but is still big enough to pack a punch. Excellent examples include Chimay Red (also called Premiere), St. Bernardus Prior 8, Westmalle Dubbel, De Koningshoeven Dubbel, Corsendonk Brown Ale, Allagash Dubbel and New Belgium Abbey.

The best yeast strains to produce an ester character powerful enough to balance the dark malts in a dubbel are the Chimay strains: Wyeast 1214 and White Labs WLP500. The complex esters complement the rich caramel malts (especially from special B) to develop a plum and currant-like character without citrus or banana esters.

One family of Belgian ales, termed **Strong Dark** by the BJCP, includes a myriad of commercial examples with a range of flavors, all having their dark color and high strength (usually 8–10+% ABV) in common. Strong darks are almost always malty with caramel and toasty characters, but can have any combination of ester and phenolic balance. This style includes the strongest examples of many of the Trappist monasteries. Excellent examples include St. Bernardus Abt 12, Westvleteren 12 (yellow cap), Chimay Blue (also called Grande Reserve), Rochefort 10 (blue), Delirium Nocturnum and Avery The Reverend.

To best replicate the Trappist beers, use a yeast strain that is most likely from the same source as theirs. For replicating the malty and estery Westvleteren and Achel beers, use the Westmalle strains: Wyeast 3787 and White Labs WLP530. Both abbeys received assistance from Westmalle when they began brewing and continue to receive yeast from them on brew day. For malty strong darks with a big complex ester profile, similar to those from the Chimay abbey, use Wyeast 1214 or White Labs WLP500.

For replicating the unique Trappist ales from Rochefort, use Wyeast 1762 (Belgian Abbey II), which reportedly hails from the abbey. This yeast provides a strong spicy phenolic character with a moderate but complex ester profile and a moderate amount of higher alcohols, all very similar in character to the Rochefort beers. But, beers brewed using this yeast benefit from a few months of aging. Other yeasts that are particularly well suited for fermenting a strong dark include the Achouffe strains (Wyeast 3522 and White Labs WLP550).

Brew and Experiment

Once again, these yeast strains are recommended to best produce a beer like the traditional commercial examples or to fall in the guidelines set by the BJCP. In the Belgian tradition, feel free to experiment not only with different strains but with the "control knobs" of yeast pitch rate, oxygen levels, and fermentation temperatures. The suggested starting point is with the pitch rate in the supplied table, 12 ppm dissolved oxygen and a fermentation temperature of 68 °F (20 °C) then adjust as needed to tune your recipe.

In my personal brewing experiences, I tend to slightly underpitch and overoxygenate. Stan Hieronymus, in his book "Brew Like a Monk," tells of the method of Tomme Arthur (of Pizza Port in Solana Beach, California) where he states that he tends to overpitch and underoxygenate to bring out the flavors in his Belgian influenced ales. So pick your method and tweak it to get your desired results. Split your batches and try a number of different yeasts side-by-side. Consider blending yeasts, as with White Labs WLP575 (Belgian Yeast Blend), which contains two Trappist strains and a additional Belgian strain for ease of use and complexity. Or try some of the newer yeasts out on the market, including Wyeast 3864 (Canadian/Belgian Style), Wyeast 3538 (Leuven Pale Ale) and White Labs WLP510 (Belgian Bastogne). As Chris White says, "be creative and unique, think about what you want first and then build a recipe and fermentation program."

Mike Heniff is a member of Houston's Foam Rangers homebrew club.

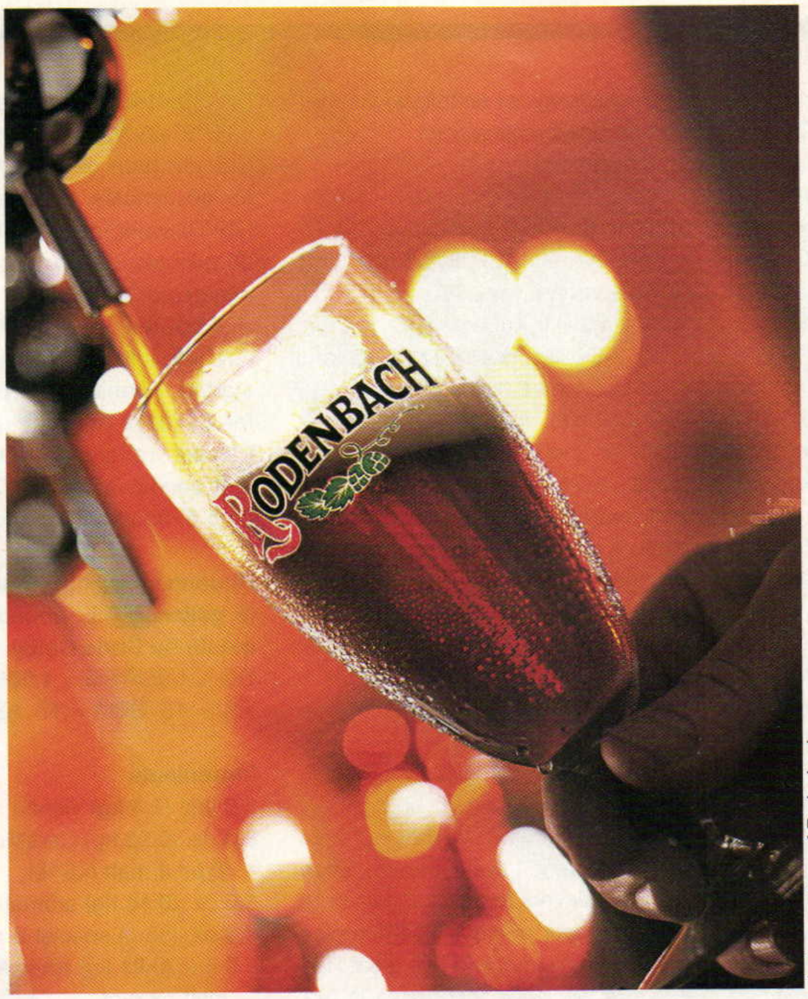
FLANDERS RED

The historic kingdom of Flanders encompasses much of the northern part of Belgium. For centuries, the traditional beer of Flanders was a dark, sourish ale aged in oak casks at the brewery. Made from predominantly Pils or moderately kilned malts and some form of corn, with low hopping levels, many of the current examples exhibit a reddish hue. The name Flanders red ale or, more descriptively, Flanders acid ale denotes a beer that ferments with many more microorganisms than traditional brewers yeast. The most widely recognized example of the style is made by Brouwerij Rodenbach, in the town of Roeselare.

Unlike most other beers, the byproducts of microorganisms that many brewers scrupulously avoid — including *Lactobacillus*, *Pediococcus*, *Brettanomyces* and *Acetobacter* — define the flavor and aroma of Flanders acid ales. Aged for up to three years in oak barrels, resident microorganisms produce acids and esters far different than traditional brewer's yeast. Alone or in large concentration, these byproducts are not terribly appealing, but in the correct blend, they can compose a truly sublime beer.

A FINE BURGUNDY

Often called the "Burgundies of Belgium," largely due to the deep reddish-brown to burgundy color resembling a red wine, some of the typical, traditional flavors and aromas are



photos courtesy of Rodenbach

reminiscent more of the grape than of the grain. A fruitiness resembling the flavors of black cherries, plums and red currants are typical, sometimes complemented by the spicy, vanilla character associated with oak. Tannins from the wood add a crisp, tart astringency and full mouthfeel. A characteristic tartness in both the flavor and aroma, due to both lactic and acetic acid, defines Flanders acid ales as reminiscent of red wine.

Long aging with "wild" microorganisms leads to a beer of considerable acidity and attenuation. While not traditional, many of today's Flanders style beers are pasteurized and blended with sugar or aspartame to restore sweetness and body. New Belgium Brewing (Fort Collins, Colorado) guards the body of their acid ale, La Folie, by centrifuging the beer before bottling. Alcohol levels hover around 6–6.5% alcohol by volume (ABV). Consistency in both alcohol, body and character is achieved by blending batches aged in multiple barrels.

(story continued on page 46)

ACID ALE RECIPES

West Flanders Red Ale
by Jeff Sparrow
(5-gallons/19 L, all-grain)
OG = 1.057 FG = 1.002–1.012
IBU = 11 SRM = 22 ABV = 6.5%

Ingredients

5 lbs. 5 oz. (2.4 kg) Vienna malt
2 lbs. 8 oz. (1.1 kg) Pils malt
15 oz. (0.43 kg) aromatic malt
15 oz. (0.43 kg) CaraVienne malt
2 lbs. 2 oz. (0.96 kg) raw wheat
5.0 oz. (0.14 kg) special B malt
3 AAU Hallertau hops (60 mins) (0.75 oz./21 g of 4.0% alpha acids)
2.0 oz. (57 g) oak cubes (medium toast)
Wyeast 3763 (Roeselare Blend) or White Labs WLP655 (Belgian Sour Mix)

Step by Step

Use 1.33 quarts of water per pound of grain (2.8 L/kg). Dough-in 90% of the malted grains to hit 122 °F (50 °C), and hold for 20 minutes. Mash the unmalted wheat and remaining 10% of the malted grain at 145 °F (63 °C) and hold for 15 minutes, then add the adjunct mash to the main mash. Traditionally, brewers use a multi-step mash schedule: Raise to 145 °F (63 °C) and hold for 40 minutes, then raise to 162 °F (72 °C) and hold for 30 minutes. Recently, I've been experimenting with a single step of about 158 °F (70 °C), to promote the formation of "unfermentable sugar" to make

(recipes continued on next page)

by **Jeff Sparrow**

ALE

traditional acid ales of Flanders

(recipes continued from page 43)
the yeast and bacteria work a little harder. Raise to 169 °F (76 °C), and hold for 10 minutes. When finished, sparge with 176 °F (80 °C) water.

Boil for 2 hours at a rolling boil. Cool the beer to 70 °F (21 °C) and pitch it with your yeast blend into a carboy. The Roeselare culture is a complete blend of all of the yeasts and bacteria necessary for fermentation. Ferment at 70 °F (21 °C). Once visible signs of fermentation have finished, rack with the equivalent of 2.0 oz. (57 g) of oak cubes for 5 gallons (19 L) into a second carboy. Put it in a corner at ambient temperature and wait (and wait). With time, a thin white film (pellicle) will form on the top of the beer. Eventually, you will sample the beer and determine that it is ready. Bottle with new yeast and your desired amount of priming sugar. As always, save me a bottle.

Flemish Red Ale
by Paul Zocco
(5-gallons/19 L, all-grain)
OG = 1.062 FG = 1.012
IBU = 20 SRM = 30 ABV = 6.4%

Ingredients
7.0 lbs. (3.2 kg) pale malt
1.5 lbs. (0.68 kg) flaked maize
1.0 lb. (0.45 kg) Vienna malt
1.4 lbs. (0.64 kg) CaraMunich® malt
3.0 oz. (85 g) chocolate malt
8.0 oz. (0.23 kg) biscuit malt
10 oz. (0.28 kg) acidulated malt
2.0 oz. (57 g) special B malt
12 oz. (0.34 kg) wheat malt
1.0 lb. (0.45 kg) rice hulls (in mash)
2 AAU Styrian Goldings hops (60 mins) (0.5 oz./14 g at 4.0% alpha acids)
4.6 AAU Northern Brewer hops (30 mins) (0.5oz./14 g of 9.1% alpha acids)
2 AAU Styrian Goldings hops (5 mins) (0.5 oz./14 g of 4.0% alpha acids)
Wyeast 1028 (London Ale) yeast and Wyeast 3278 (Lambic Blend)
Wyeast 5526 (*Brettanomyces lambicus*) or White Labs WLP653 (*Brettanomyces lambicus*) yeast
1¼ cup dried malt extract (for priming)

Step by Step
Mashed at 150 °F (66 °C) for 1 hour. Sparged with 170 °F (77 °C) water until I collected 6 gallons (23 L). Boiled down to 5 gallons (19 L). Pitched both Wyeast 1028 (London ale) and Wyeast Lambic Blend at the same time. I used a 1.6-qt. (1.5-L) starter made with dried malt extract. Primary fermentation lasted 4 weeks. Secondary around 6 months. I added a package of Wyeast *Brettanomyces lambicus* culture to the secondary at around 6 months I left it in secondary for 2 more months Bottled it with 1¼ cup dried malt extract.

Since I brewed the above Flemish Red, I've made 2 more, both in fermentation right now. I will not put them into secondary. I want the oxidation and yeast flavors to develop. I want to make the sour character as complex as I can. I am expecting two great Red ales, but will leave them both in fermentation for at least 2 years.

DewBrew Flanders Red
by Dan and Joelle Dewberry
(5-gallons/19 L, all-grain)
OG = 1.056 FG = 1.011
IBU = 12 SRM = 16 ABV = 5.9%

Inspired by Rodenbach Grand Cru, New Belgium La Folie and Love, plus Pizza Port Le Woody. Formulated with help from professional brewers in America and Belgium that have experience with this style.

Ingredients
6 lb. 10 oz. (3.0 kg) 2-row malt
2 lb. 6 oz. (1.1 kg) Vienna malt
2 lb. 6 oz. (1.1 kg) flaked maize
0.50 lb. (0.23 kg) special B malt
3.3 AAU Fuggles hops (60 mins) (0.73 oz./21 g fo 4.5% alpha acids)
Wyeast 3763 (Roeselare Blend)

Step by Step
Step mash with a rest at 122 °F (55 °C) for 20 minutes, a rest at 145 °F (63 °C) for 40 minutes and a saccrification rest at 162 °F (72 °C) for 40 minutes. Sparge with 168 °F (76 °C) water for an hour. Boil wort for 90 minutes, adding hops for final 60 minutes of boil.

Pitch the yeast and bacteria pack straight into the cooled wort (no starter). Ferment in a plastic bucket for 27 days at 70 °F (21 °C), then transfer to another plastic bucket and condition beer at 70 °F (21 °C) for 5.5 months. Keg beer.

Rhodan's Back (Amber Acid Ale)
(5 gallons/19 L, countertop partial mash) by Chris Colby
OG = 1.053 FG = 1.006
IBU = 15 SRM = 17 ABV = 5.4%

Ingredients
3.0 lbs. (1.4 kg) Vienna malt
8.0 oz. (0.23 kg) CaraMunich® Type II malt (45 °L)
5.0 oz. (0.14 kg) aromatic malt
3.0 oz. (85 g) special B malt
2.0 lbs. (0.91 kg) wheat dried malt extract
3.0 lbs. (1.8 kg) light liquid malt extract
4 AAU Mt. Hood hops (60 mins) (1.o oz./28 g of 5%alpha acids)
1.0 oz. (28 g) oak cubes (medium toast)
Two (11 g) packs Danstar Nottingham dried yeast
Wyeast 5335 (*Lactobacillus delbrücki*) or White Labs WLP677 (*Lactobacillus*) bacteria
Wyeast 5733 (*Pediococcus cerevisiae*) bacteria
Wyeast 5526 (*Brettanomyces lambicus*) or White Labs WLP653 (*Brettanomyces lambicus*) yeast

Step by Step
Heat 5.5 qts. (5.2 L) of water to 165 °F (74 °C) and pour into a 2-gallon (7.6-L) beverage cooler. Place crushed grains in a nylon steeping bag (or disposable paint strainer) and slowly submerge grains in hot water. Use a large brewing spoon to stir

grains and water thoroughly. Mash, starting at 154 °F (68 °C), for 45 minutes. (The temperature will drop — perhaps as low as 149 °F (65 °C) — over this time period. This is fine.) Note the liquid level in the cooler. Towards the end of the mash period, heat 0.5 gallon (1.9 L) of water to a boil in your brewpot. In addition, in a large soup pot, heat 5.5 qts. (5.2 L) of water to 180 °F (82 °C).

When the mash is finished, recirculate 3.0 qts. (2.8 L) of wort, then run off all of the wort. Add wort to the boiling water in your brewpot. Add 180 °F (82 °C) water to cooler until liquid is at the previous level. Stir grains, let them sit for 5 minutes, then recirculate and run off the second wort.

Bring the wort — about 3.0 gallons (11 L) total — to a boil. Upon boiling, turn off the heat and stir in the wheat dried malt extract. Resume heating and return the wort to a boil. Add Mt. Hood hops and boil for 60 minutes.

With 15 minutes remaining in the boil, stir in liquid malt extract. (Stir well to avoid scorching.) After boil, cool brewpot in sink (or with wort chiller) until side of brewpot is cool to the touch. Transfer wort to bucket fermenter and add cool water to make 5 gallons (19 L). Aerate wort and pitch dried yeast. Let ferment at 70 °F (21 °C).

When primary fermentation slows, open bucket and pitch *Lactobacillus* and *Pediococcus* cultures. Let beer condition, in the primary bucket, for 3–4 months at 70–80 °F (21–27 °C).

After this period, add *Brettanomyces* culture and oak cubes, then rack beer to a glass carboy. (Soak oak cubes in beer for 2 weeks prior to adding them. If you happen to have some wine that has turned to vinegar, add a few drops to the soaking beer.) Age for another 6–9 months at 60–70 °F (16–21 °C), then keg and carbonate the beer.

The Grape and Granary
www.grapeandgranary.com

THE GRAPE AND GRANARY

YOUR HOMETOWN HOMEBREW
SHOP ON THE WEB

FEATURING
BEGINNER PACKAGES
EXTENSIVE SELECTION OF INGREDIENTS
MORAVIAN/BELGIAN/ENGLISH MALTS
FAST SHIPPING/ EXPERT ADVICE
WE CATER TO NEW BREWERS!

Visit our online store or call to request a catalog.
You'll be glad you did! 800-695-9870

See your local retailer
NORTHWESTERN
Premium Food & Beverage Ingredients

- Freshest Malts Available
- Award-Winning Malts
- Top-Rated Customer Service
- Prompt Delivery

Want the best. Buy the best.

CALL TODAY! 1-800-466-3034

NORTHWESTERN...
we improve your product mix.™

3590 N. 126th Street, Brookfield, WI 53005
www.nwextract.com • Email: flavors@nwextract.com

(story continued from page 43)

HOW IT'S DONE

Traditional Flanders brewers often produce their beers from moderately kilned malts — especially Vienna and, to a lesser extent, Munich — and low alpha acid continental or British hops. Alternately, some breweries produce a wort made only from Pilsner malt and blend with a dark beer at bottling. Color aside, the pale brews also make for a tasty beer on their own. The traditional breweries guard the exact composition of their grain bill, and the specific malts used are tuned to the specifications of each brewery. What is commercially available must suffice to the homebrewer.

Flanders acid ale brewers toss corn grits — up to 20% — into the mash, first boiled to achieve gelatinization. For homebrewers, flaked maize is a convenient alternative. Corn contributes a smoothness to the wort plus a bit of starch for the eventual microorganisms.

While not common in Flanders, Wyeast Laboratories has found the use of unmalted wheat very beneficial. The starches found in unmalted wheat contribute more complex material than malted barley or corn that will also break down more slowly, providing fuel for the yeast and bacteria over a long period of fermentation. You can use up to 20% unmalted wheat in place of the corn.

Hopping levels must be kept low, under 10 IBUs. An unpleasant combination, bitter and sour/acidic flavors are distasteful together. Additionally, hops have anti-bacterial properties and high hopping rates may inhibit some of the bacterial strains you want to grow in your beer. Continental hop varieties like Hallertauer are common, though American derivatives like Liberty or even Willamette will also suffice. Stay away from the more distinct grapefruity, piney American varieties, as their dominant character is out of place in a traditional Flanders beer. Unlike when brewing a lambic, you do use aged hops.

One popular misconception regards the use of a long boil to darken the color of the brew. While some brewers in Flanders once boiled their worts for up to thirty hours, no current producer chooses to boil for longer than two hours. The marathon boil myth may have been proliferated at the Liefmans brewery. On their old brewing system, boiling the wort did take as long as twelve hours. The boiler was so inefficient, it took twelve hours to achieve what any reasonably modern brew kettle can do in about two.

Flanders acid ales may be fermented with a pure strain of *Saccharomyces* yeast, relying on the resident wild yeasts and bacteria in oak barrels to acidify the beer over a period of up to three years. This will also darken it a bit from exposure to wood and oxygen. A production method best left to the true experts, the rest of us will use the no less traditional method of fermenting with a mixed culture of various yeasts and bacteria.

Ferment the ale at typical ale fermentation temperatures, 68–72 °F (20–22 °C). The long conditioning can occur at cellar temperature. Higher temperatures favor bacterial action.

The characteristics of traditional Flanders red ales develop during long aging in oak barrels, where resident microorganisms contribute more character than any actually derived from wood. Yeast and bacteria with different oxygen requirements all meet their individual nutritional requirements in the porous environment of a wooden barrel.

Blending beers of different ages and colors balances the acidic character and produces a beer of reasonable if not identical consistency. A single batch seldom exhibits the complexity from a blend of multiple batches. The palate of the brewer determines the balance of the blend.

MICROBIOLOGY AT WORK

The cousin of the Flanders acid ale, the lambic, shares a number of the same microorganisms. *Pedicoccus* and *Brettanomyces* play important roles in fermentation. While the lambic brewer attempts to avoid naturally occurring *Lactobacillus* and *Acetobacter*, those microorganisms are very important to the traditional Flanders brewer.

Simply put, *Lactobacillus*, *Pediococcus* and *Acetobacter* produce acids and corresponding esters. Their fermentation byproducts contribute the bulk of the flavor and aroma of a Flanders acid ale. *Brettanomyces* produces esters and a small amount of additional acids and also aids in attenuation. While most of these microorganisms are a part of the mixed culture of yeast and bacteria used for fermentation, *Acetobacter* is present in the environment — think of the smell of an unclean bar. *Acetobacter* will multiply when beer is left exposed to oxygen. Too much, and you will have vinegar, thus the importance of the porous nature of wood. Just the right amount of air passes through the wood to the liquid inside.

Don't have the space for a collection of wooden barrels around the house? Good news: a glass carboy works just fine. A plastic fermenter is actually too porous, while the amount of oxygen that seeps in through the airlock on top of a carboy and during periodic removal for sniffing and sampling is fairly adequate.

Some type of wood in the fermenter is beneficial, be it chips, cubes or staves. *Brettanomyces* is partial to wood and some tannic and even flat out oak charac-

ter is welcome. Be warned, though, a beer aged for years on new oak chips can turn undrinkable. While often used, boiling will not remove enough of the character of the wood. Exposure to alcohol leeches out compounds that water will not. Soak your chips in some neutral beer for a couple weeks before use. Once you have used oak in a Flanders acid ale, though, you can use it over and over, just like a barrel. Use about 1.0–2.0 ounces (28–57 g) of oak cubes per 5.0-gallon (19-L) batch.

Barrels in Flanders contain all of the microorganisms necessary to acidify a beer. Unlike steel or glass, wood can never be completely sterilized, so any type of cleaning only removes the lazy critters on the surface, leaving behind what lives deeper. After a number of uses, a barrel is given a good cleaning and scraping, then aged beer is added to recondition the barrel with the proper microorganisms.

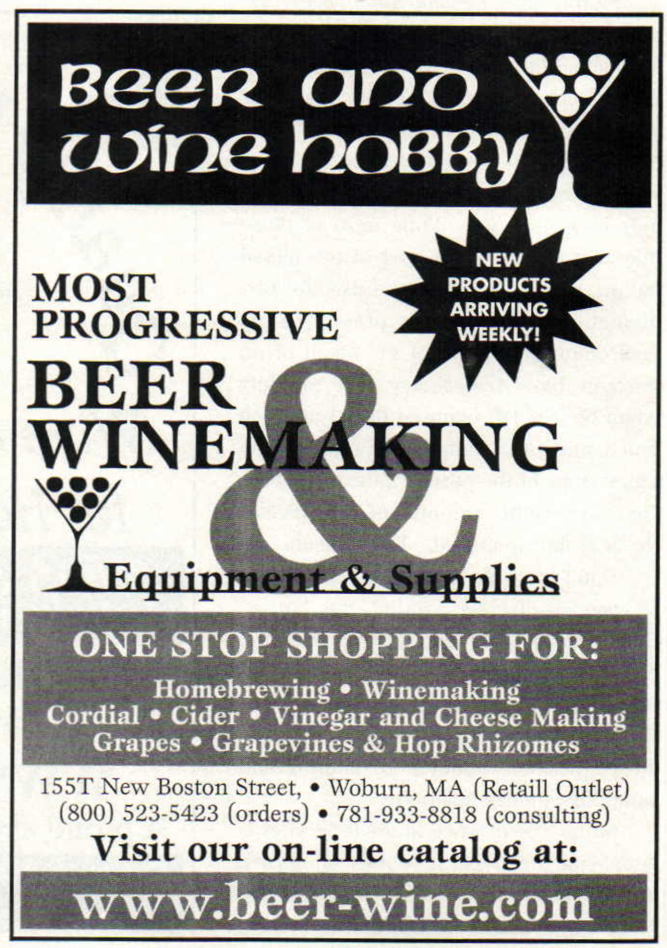
Depending on what might live in the woody dregs of a previous homebrew batch on the bottom of a carboy is not a reliable option, which is why we use a new culture of yeast and bacteria each time we brew. The culture can be repitched, but acidity will increase with each generation until the result becomes oppressive.

A brewer can choose to work with pure cultures of the microorganisms necessary for fermentation; the folks at Wyeast and White Labs offer individual cultures of all the needed microorganisms. My favorite culture, however, is the mixed culture Wyeast 3763 (Roeselare Blend), now a specialty strain not available year-round. While there are many factors, yeast and bacteria will grow in proportion, so adding one of each separately lends no discernable benefit. As commercial examples are either filtered or pasteurized, you won't find any viable microorganisms in a bottle.

FINISHING

A topic among itself, fruit may be added to a Flanders red ale, cherries and raspberries being the common choices. The flavors and aromas contributed by those fruits complement the characteristics of the beer. A beer is generally aged a minimum of six months before fruit is added to the fermenter. The beer must develop its own flavor before adding that of the fruit. Add fruit to your taste, but more than a pound per gallon of beer is common.

Another disadvantage for the homebrewer is the lack of a supply of different aged batches of beer, at least at first. Simply put, a single batch seldom exhibits the complexity of a good blend. In Flanders, some brewers blend a bigger beer (OG 1.052), that has been aged in wood up to 3 years with a smaller beer (OG 1.044), that has only been aged for a couple months in stainless steel. The younger beer supplies some unfermented sugars and body to the blend. Blending does not achieve absolute consistency for a brewery, but most breweries strive to achieve a "signature" character in their beers through blending.



That's not to say, though, that you can't produce an excellent beer in a single fermenter. Blending, too, is an art that takes time to master, so a single batch is more straightforward. Recently, I have taken to using only a portion of a batch and leaving a few gallons behind for the next bottling.

BOTTLING

Bottling a Flanders acid ale presents its own challenges. If you choose to blend, having a vessel big enough to hold parts of two or more batches is a necessity. Don't use the same plastic bucket you may use for bottling other beer. You will likely never get rid of the *Brettanomyces* and lactic acid-producing bacteria from the porous plastic.

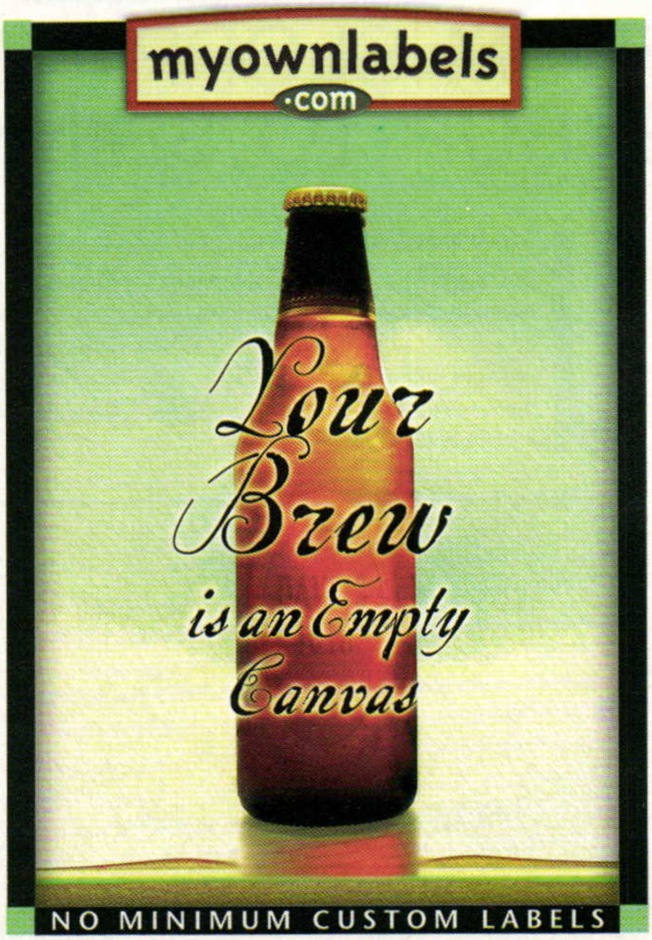
Carbonation is a bigger issue in an acid beer than in your everyday IPA. The microorganisms that ferment the Flanders acid ale, even the ones that produce it, do not actually like acid. The higher the concentration of acid, the harder the microorganisms that produce carbon dioxide (CO_2) must work. After many years of aging, use of a fresh yeast culture is essential. Choose a workhorse, like Wyeast 1007 (German Ale) or White Labs WLP001 (California Ale) yeast. Alternately, you can use a wine yeast that has a greater tolerance to acidity. Vinnie Cilurzo at Russian River Brewing uses a house wine yeast to bottle his wood-aged beers with great success.

Unlike plain old brewers yeast, *Brettanomyces*, *Pediococcus* and *Lactobacillus* can ferment any available sugar, particularly when used in combination. Technically, a beer so fermented could experience a near total degree of apparent attenuation, up to 98%. Final gravities for Flanders red ales are typically in the 1.002 to 1.012 range. The resulting loss of body is one potential problem. Eventual gushing and, on the extreme end exploding bottles, is another. Be certain you have a stable gravity to your beer and enough acid production before bottling. Mouth-filling acids and the contributions of unmalted wheat and moderately kilned malts hopefully make up for the resulting dryness after fermentation.

Most importantly, don't get discouraged if you didn't produce a Rodenbach-esque brew your first (or second) time. Brewing a Flanders acid ale may take some practice. And remember, you don't have the same environment of barrels and resident microorganisms. More a product of the environment (*terroir*) than the actual wort, the character of Flanders acid ales are as different as the breweries themselves. The result of decades of brewing, a Flanders acid ale is unique unto itself, not the result of attempting to hit a style guideline. Ask a brewer from Flanders about the Flanders red style and he may just answer, "What is this thing called style?"

Jeff Sparrow is the author of "Wild Brews: Beer Beyond the Influence of Brewers Yeast" (2005, Brewers Publications) and is a member of the Chicago Beer Society.

CANADIAN HOME BREWING SUPPLIES
www.canadianhomebrewing.ca
Visit Our Online Store Today For Quality Homebrewing Supplies!
Fermenters - Testing Equipment - Wyeast - Beer Kits - Racking & Bottling - Hops - Malt - Specialty Grains
We Ship To The US!
Or call toll free in North America 1-877-568-BREW
info@canadianhomebrewing.ca
Mississauga, Ontario



re BUILDING KEGS

FROM SLOPPY WITH SYRUP TO SHINY AND SANITIZED

Story and Photos by **Ralph Allison**

Used Cornelius style kegs are widely available at reasonable prices. A considerable amount of money can be saved if you buy kegs that have not been worked on in any way and rebuild them yourself. This process requires nothing but a little time, a limited amount of mechanical skills and most of the tools should be in every kegger's tool kit.

> WITH THE RIGHT TOOLS, TECHNIQUES, CLEANERS AND SANITIZERS, YOU CAN TRANSFORM A GRUNGY USED KEG INTO A GREAT BEER VESSEL.

Recently, I rebuilt two used 5-gallon (19-L) Cornelius kegs. Used kegs are not in pristine condition on the outside, however they should be fine on the inside where it counts. They should only have been used for soda syrup, such as that for Pepsi or Coke. (Note that almost all soda fountains have switched to the bag-in-a-box setup. So, if you buy a used keg that still has syrup in it, it may have been there awhile.)

New, Used or Reconditioned?

For those who either do not have the time, or do not want to go to the trouble, new Corny kegs are available. New kegs usually cost more than $100, but they are shiny, dent-free and their rubber gaskets and O-rings don't carry any off flavors or odors. Also, their poppet valves will not need to be replaced for some time. Reconditioned used kegs are also available, with typical prices starting around $35. When comparing prices between vendors, be sure to check on what has been done to the keg to recondition it. At a bare minimum, kegs should be pressure tested. Some sellers will also replace the O-rings and clean the keg. Others will additionally disassemble the keg, clean the dip tube and inspect and replace faulty poppet valves. In practical use, a fully reconditioned keg will work as well as a brand new one.

Cornelius (or "Corny") kegs are the most popular choice for homebrew kegging systems. Kegs decommissioned from the soda industry may be very dirty and require their O-rings (and perhaps their poppet valves) replaced. Once rebuilt, however, they work as good as new.

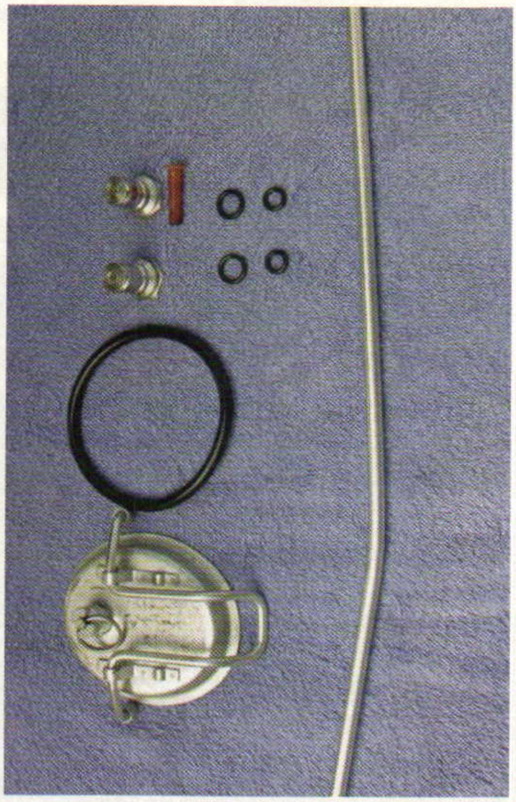
Two lucky Corny kegs after their "extreme" makeover (cleaning and replacing O-rings).

Rebuilt, cleaned and sanitized kegs can be tagged and stored for later use.

A dirty keg (right) and a keg (left) with its exterior cleaned with Bar Keeper's Friend.

Below: A keg rebuilders tool kit, including a blue scrubby, keg lube, a wrench, socket set, screwdrivers and a wooden dowel.

At right: Keg parts. The large O-ring, which fits around the lid, will need to be replaced. So will the small O-rings that fit on the outside of the posts and on the long and short dip tubes. A thin brush can clean the inside of the long dip tube. In some cases, the poppet valves (inside the posts) may also need to be replaced.



BEER & WINE EQUIPMENT & SUPPLIES

SODA POP - LIQUEURS - DISTILATION SUPPLIES

BEER - WINE - MEAD INGREDIENT KITS

Our Belgian Ale Kit
+
Belgian Yeast
=
Liquid Bread

We Carry A Large Assortment Of Belgian Grains & Yeast
For The Monk In All Of Us

Homebrew Heaven

Email: brewheaven@aol.com (800) 850 - BREW (2739)
Email us for your Free Catalog, or download from website

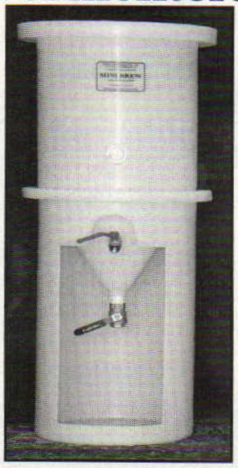
HOMEBREWHEAVEN.COM

Hobby Beverage Equipment

FERMENTERS - MASH TUNS
HOT LIQUOR TANKS - THERMOMETERS

A major medical company and now
a major brewery have purchased
our plastic fermenters

Fermenters



What kind of recommendation do you need?

Box 1387 Temecula CA 92593 - 951-676-2337 – minibrew.com

Cleaning the Outside

The outside of the keg can be cleaned using Bar Keeper's Friend, an oxalic acid based cleanser that is not harmful to stainless steel. It can be purchased in most grocery stores.

Use a soft nylon cleaning pad or sponge and follow the instructions on the can. Do not use steel wool or any other metallic cleaning pads. They will scratch the stainless steel, and sometimes embed small pieces of the steel in the surface, which will cause rust.

The popular heavy duty Scotch-Brite pads (or "green scrubbies") will also leave scratches in stainless steel. (The blue Scotch-Brite scrubbing pads and sponges — the ones that say "No Scratch" on the package — are fine.) Test your scrubbing pad on the outside of the keg first, before cleaning any surface that will contact beer. You can see a comparison of a keg as received and one that has been cleaned on page 51.

Cleaning the outside of the keg is optional, but I prefer all of my equipment to be clean. If you are going to clean the outside, I strongly suggest doing it before disassembly. I also suggest wearing latex or rubber gloves, as it is a dirty process.

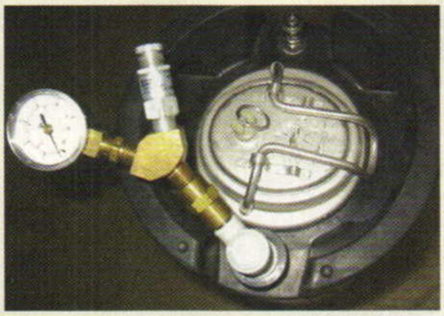
An alternative I have found, which is almost as good as using Bar Keeper's Friend, is to soak the kegs overnight in a mixture of 1.0 oz. of PBW (Powdered Brewery Wash) per gallon (7.5 g/L) of hot water. At this same concentration, a PBW solution heated to 120–160 °F (49–71 °C) will clean almost any stainless surface, without scrubbing, in 30 minutes. If you are cleaning multiple kegs, a 100-qt. (95-L) picnic cooler holds enough liquid to submerge a Corny keg.

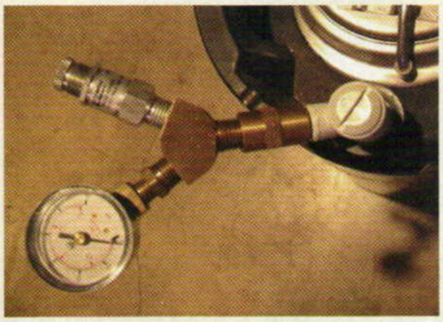
Disassembling the Keg

Before starting disassembly, relieve any pressure in the keg by either lifting the relief valve or depressing the poppet valve on the top of the post with a small tool. I have a small piece of wood dowel that I use, so I am sure not to damage the poppet. Be sure to put a rag or towel over the relief valve or post prior to relieving the pressure, as there will most likely be some syrup remaining in the keg.

Once the pressure is relieved, remove the keg cover by lifting the latching lever, then lowering the cover into the opening

(story continued on page 55)





With a spunding valve, you can retain the carbon dioxide of late fermentation to naturally carbonate your homebrew.

BUILD YOUR OWN SPUNDING VALVE

SPUNDING

Having brewed on some large scale and pilot systems in breweries around the Portland area, I have been able to pick up some tricks that can be readily adapted to homebrewing. One of these techniques is the capping of a bright tank for the retention of carbon dioxide (CO_2) produced late in fermentation. This produces naturally carbonated beer. For homebrewers, the most logical vessel for a sealed secondary fermenter is the Cornelius keg. The challenge becomes how to retain enough carbon dioxide pressure to provide for the right level of natural carbonation, but to vent any excess pressure.

Nine years ago, I sought to solve this problem. The best way I found was to build a version of the valve and gauge system, called a spunding valve, that is used in large commercial systems. An adjustable pressure relief valve and a 0–30 PSI gauge are the main two things needed. To connect these to the inlet side of a Corny keg, I used a brass Y adapter (one MPT "in" side and two FTP "out" sides), a standard ball lock fitting and a brass coupler (FTP on both ends) to connect the ball lock fitting to the Y adapter. All threads use plumbers pipe fitting tape to prevent leakage.

To create your own naturally carbonated homebrew, simply transfer your beer into a sanitized Corny keg when your beer is 2–5 points above your estimated terminal gravity. For example, if your yeast is 80% attenuative and your starting gravity was 1.050, your target final gravity is 1.010. Thus, you should transfer your beer when a reading of about 1.015 is achieved. Place your pressure relief valve and gauge on the inlet tube side of your keg and keep the keg at normal fermentation temperatures. Check it daily and watch the pressure in the keg build.

To calibrate the adjustable pressure relief valve, you only need to monitor the pressure gauge. When it slightly exceeds your desired carbonation pressure (I generally shoot for 14 PSI) turn the top adjuster counter clockwise until pressure just starts to bleed off. Watch the gauge and when 14 PSI is indicated turn the adjuster back in (clockwise) until the pressure stops escaping.

After 4 or 5 days, turn the relief valve adjuster back in (clockwise) 1/2 turn and monitor the gauge for another day. If the pressure does not increase, you know that all secondary fermentation has ceased and the proper carbonation level has been retained.

An added bonus is that you need not transfer your beer again. It is well carbonated and ready to chill. Your secondary fermenter also doubles as your serving tank. Cheers!

Parts List:

- Brass Y adapter and brass coupler
- Pressure relief valve (the one I used is made by the Schrader Bellows Co. in Akron, Ohio. The part number is RV01A1N030SB)
- 0–30 PSI gauge

by **Marc Martin**

(story continued from page 53)

and turning it slightly to align it. Remove and discard the lid O-ring. You will need a 3/8" drive ratchet wrench and either an 11/16" or 7/8" deep socket to remove the posts. I bought both sizes at Home Depot for less than $5 each. Since some posts are eight sided and others twelve sided, I would suggest buying twelve point sockets in both sizes. In the case of my kegs, which are Firestone Challenger VI, I needed the 7/8" for both posts. Unless you are certain what type of socket you need for your keg, it is a good idea to bring the posts, or the whole keg, with you when you go to the hardware store. On one side of each of the handles on top of the keg on the "gas in" side, it will have "in" markings. Take a good look at that post so you are sure to install it in the right place during re-assembly. At a quick glance, they look to be identical, but there are subtle differences, one of which is a small difference in size.

Once the posts have been removed, I use a small jeweler's type screwdriver to get the O-ring on the posts started, then slip a slightly larger screwdriver in beside it and pry the O-ring high enough to be able to slip it off the post. In my experience, this normally prevents damage to the O-ring. It is not critical at this time because you will replace all of the O-rings with new ones, but will be good practice. Discard the O-rings.

Next, remove the dip tubes. You will notice the gas-in dip tube is short, and the liquid-out is long. The liquid-out tube is either straight or curved. Stick your hand through the opening and push up on each tube. They will usually slip out easily, but sometimes it requires a little effort. Once you have both dip tubes removed slip the O-rings off them and discard.

Cleaning Chemicals

It is now time to clean the inside. I like using PBW, however many homebrewers use the unscented version of OxiClean, whose active ingredients are sodium percarbonate and sodium carbonate. (The "oxi" in OxiClean refers to the fact that sodium percarbonate reacts with water to release hydrogen peroxide and sodium carbonate.) Other homebrew cleaners that contain sodium percarbonate include One-Step, B-Brite and Straight-A. PBW's material safety data sheet (MSDS) lists only sodium metasilicate (30%), although their website also claims that it includes sodium carbonate. (It is also widely believed to contain sodium percarbonate.) Another common brewing cleaner is TSP (trisodium phosphate). Because of environmental concerns with the release of phosphate into the environment, many products sold as TSP actually contain up to 90% sodium carbonate.

Cleaning the Inside

Put the cover, posts and dip tubes in the keg. I put the keg in the basement shower and pour my cleaner into the keg, then fill it with household hot water.

I like to run a tubing brush through the dip tubes a couple of times. Let the keg soak overnight, then give it, and the

other parts, a thorough hot water rinse. Turn the keg upside down and let it drain and dry. You will need some food grade lubricant for the O-rings. Only a small film evenly spread on each O-ring is needed. First, lubricate and install the dip tube O-rings, and insert the dip tubes in the proper holes. Next, install the posts and tighten. Lubricate the post O-rings, and install them in the post grooves. Some homebrew shops sell colored O-rings for keg posts and I like to use a red one on the "gas in" post to identify it. Lubricate the large O-ring and fit it onto the lid. Install the lid and latch it.

Testing for Pressure

Now that the keg is clean and rebuilt, it is time to check if it holds pressure. Connect the "gas in" disconnect to the "gas in" port and pressurize the keg to 12 PSI. That should be sufficient to seat the lid gasket. Use a small bowl and add a couple of teaspoons of dishwashing detergent to some tap water. Use a small (about 1 inch) paint brush, or a spray bottle, and liberally apply the detergent mixture to all of the gas fittings, connections and around the keg cover. If there are any leaks, you will see bubbles. If leaks are found, check the connections to make sure they are tight. When there are no leaks, pressurize the keg again to 12 PSI, and let it sit for a day. Use a pressure gauge attached to the "gas in" connector to monitor the pressure. (Some homebrew shops sell these, or build the spunding valve on page 54.) If the keg maintained pressure, you are ready to sanitize it.

Sanitizing the Keg

Mix two gallons of your preferred sanitizer solution and pour it in the keg. Shake and roll the keg to make sure it contacts all surfaces. I use Five Star brand Star San. Star San contains 50% phosphoric acid and 15% dodecylbenzenesulfonic acid. At a concentration of 1.0 fl. oz. per 5 gallons (1.6 mL/L), it provides 300 ppm of the dodecylbenzenesulfonic acid and it only requires 1–2 minutes of contact time to sanitize.

Another popular sanitizer is iodophor. At a concentration of 0.5 fl. oz. per 5 gallons (0.78 mL/L), it provides 12.5 ppm of free iodine, with a required contact time of only 1 minute. Older formulations of iodophor required users to adjust the pH. Newer formulations, such as BTF iodophor, do not. Both Star San and iodophor are no rinse sanitizers. Do not use bleach (sodium hypochlorite xc) or chlorine-based cleaners or sanitizers on kegs as they can pit the stainless steel.

If the sanitizer you use requires a rinse then do so. Some people like to leave the cover off and invert the keg until it is dry. When the sanitizing step is completed the keg is ready for service. If I am not going to use the keg immediately, I hang a string tag from one of the handles with "sanitized" written on it and put a clear plastic bag over the top. When I'm ready to use the keg, I spray the top surface with Star San to sanitize it.

Ralph Allison has been brewing off and on since the mid 1960s.

LISTERMANN'S

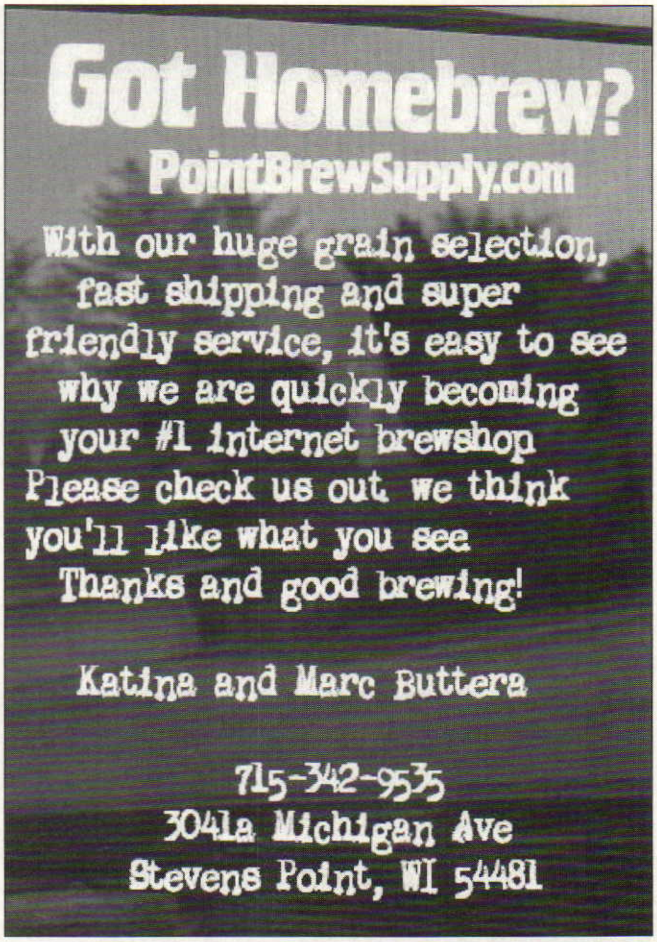
Manufacturers of the PHIL'S line of homebrewing equipment

Wide selection of wine & wine cooler kits available

or try our tasty beer kits made from the personal recipes of our adequately-sober staff.
49 different styles from which to choose.

- FREE SHIPPING -
on e-tail orders over $35
from east of the Mississippi River

Check out our retail website at
LISTERMANN.COM
or call (513) 731-1130



Brew Your Own's 11th Annual Homebrew LABEL Contest

Send us your best homebrew labels and you could win some great brewing prizes from **BYO** advertisers! Enter as often as you like, but you can only win one prize. Winners will see their artwork featured in the July-August issue of the magazine. **Deadline to enter is May 1, 2007.**

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

Brew Your Own — THE HOW-TO HOMEBREW BEER MAGAZINE

Label Contest Entry Form

Name ______________________________

Address ______________________________

City ______________ State/Prov ________ Postal Code ______

E-mail ______________ Phone ______________

Daytime Phone ______________________________

All original artwork? Y or N (circle one)

Send your entry to:
BYO Label Contest
5053 Main St., Suite A
Manchester Center, VT 05255

DEADLINE: May 1, 2007

BLICHMANN™ engineering

The Gear For Beer!

ThruMometer™
In-line Thermometer

- **Set your counterflow chiller to ideal outlet temp.**
- Super easy to sanitize
- **NO internal cavities or threads to trap bacteria**
- Smooth fitting ends won't damage hoses
- Super conductive aluminum responds instantly!
- **Mirror polish interior**
- Saves water!

Great Gift Idea!
On sale through 2006
$22.50

www.BlichmannEngineering.com

BYO BINDERS!

- Gold-stamped logo on front and spine
- Opens flat for easy use
- Leather-grained in royal blue
- Each binder holds 10 issues

ORGANIZE!

Only $15 each (includes shipping)

Vermont residents add 6% sales tax Canadian residents add $1 per binder

YES! I want BYO custom-made binders!

Quantity ________ x Amount $15 = Total ________

❑ Check enclosed ❑ Visa ❑ MC

Name ______________________________

Address ______________________________

City ______________ State ______ Zip ______

Credit Card # ______________________________

Signature ______________ Exp. Date ______

Send your order to:
Brew Your Own
5053 Main Street, Suite A • Manchester Center, VT 05255
or order online at www.brewyourownstore.com
or call (802) 362-3981 • *or* fax (802) 362-2377

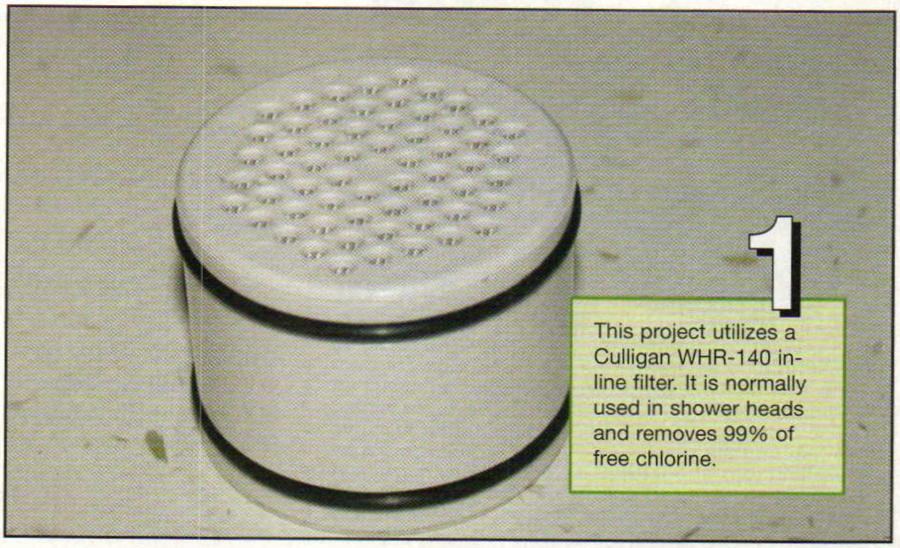
Fast Water Filtration

Why spend a dollar a gallon for bottled water?

Story and photos by Forrest Whitesides

If your tap water isn't quite up to muster for use as brewing water because of heavy chlorine or other off odors and tastes, you are pretty much limited to two options: buy bottled water for brewing or filter what comes out of the tap.

Buying water from your local grocery store or big-box club store is relatively painless, but it does require a trip to the store and hauling the water back to your brewhouse (garage), and then you have to dispose of the plastic containers. Buying water, if you shop around, costs about $1 per gallon.



1 This project utilizes a Culligan WHR-140 in-line filter. It is normally used in shower heads and removes 99% of free chlorine.

Filtration can be quite expensive initially. Whole-home systems can cost more than $1,000. And while countertop filters can be found for starting at about $60, replacement filters cost from $20 each and need to be replaced every 300 gallons or so, on average. Considering the cost of the filter unit and the first filter cartridge, a countertop filter delivers good brewing water for about 30 cents per gallon. Pitcher-based filters, like the popular Brita models, deliver fantastic results as well but are unbearably slow for filtering in quantities needed for brewing, and the cartridges require frequent replacement.

While filtration is cheaper and easier than buying water, it generally requires a bit more upfront investment . . . unless you build one yourself.

The heart of the filter

The core of our system is, of course, a water filter. Specifically, I chose a Culligan WHR-140 in-line filter (Fig. 1) because of its long life and compact size. The WHR-140 is an in-line filter used in Culligan showerheads. It is available most places that sell filtered showerheads, such as Bed Bath & Beyond and other home stores, and it costs about $15. It is also available online. It uses a filter media made by KDF Fluid Treatment Inc., which, according to the manufacturer, removes 99% of free chlorine, reduces water-soluble heavy metals and also eliminates sulfur odor. The performance life of this filter is rated at 10,000 gallons (38,000 L) before replacement is necessary. For technical information on the filter media itself, see the manufacturer's Website at www.kdfft.com.

Considering a total project cost of $40, the cost-per-gallon for this filter is

PARTS LIST

Other than the filter unit itself, you'll need some commonly available items (all can be obtained at your local big-box hardware store):

- (1) 2" 90-degree elbow joint, PVC
- (2) 2" x ½" bushing adapter PVC
- (1) 2" x 3" coupling, PVC
- (1) ½" male thread x ⅝" hose barb, brass
- (1) ½" male thread x ½" hose barb, brass
- (1) Universal dishwasher snap adapter for sink, chrome
- ⅝" vinyl tubing, cut to fit
- Optional: ½" ball valve, brass (instead of ½" hose barb)

You will need to purchase various PVC pieces including an elbow joint, a coupling and two bushing adapters. See the parts list for sizes. 2

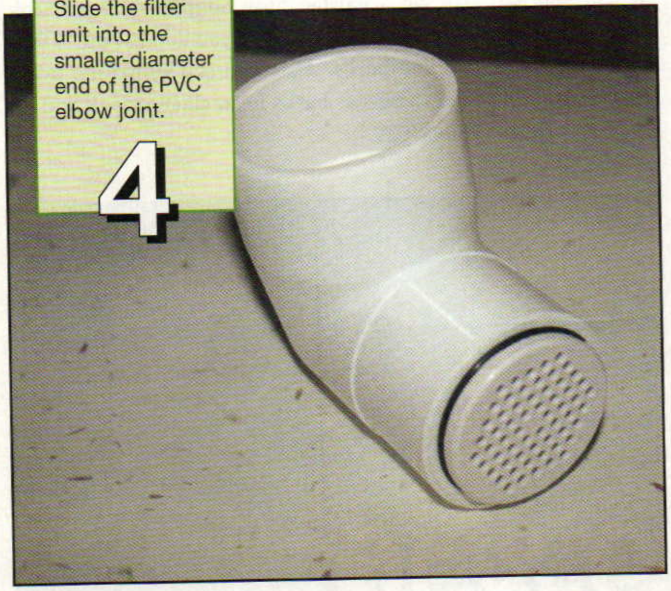
3 The unit will be connected with a ½" male thread x ⅝" hose barb, a ½" male thread x ½" hose barb, and a universal dishwasher snap adapter for sinks.

about one-half of one cent per gallon. For all-grain brewers, this translates to approximately 1,000 batches worth of brewing water, assuming approximately 10 gallons total used to arrive at a final volume of 5 gallons. This depends, of course, on mash thickness, how long you boil and several other factors. Like anything else, your mileage may vary.

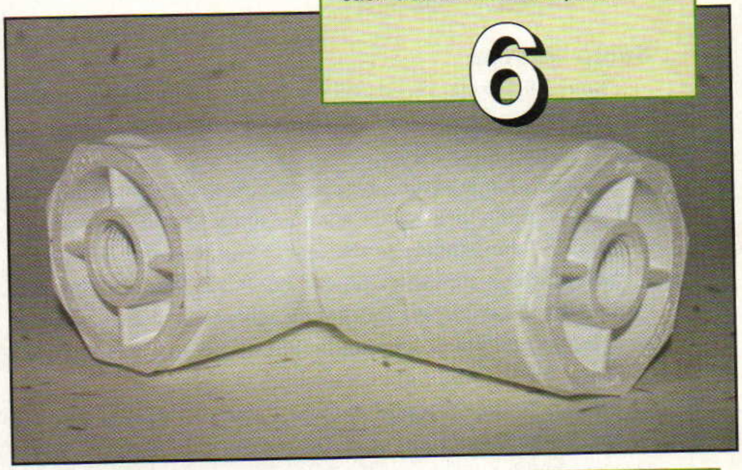
Get it together

Before you get started assembling the filter, wash all the parts (PVC and brass) in warm water with a mild soap. The PVC will likely be dirty from sitting on a shelf in the store and the brass connectors have a thin sheen of oil on them to protect from corrosion. You'll want to wash all that off before you use the filter to clean up your tap water.

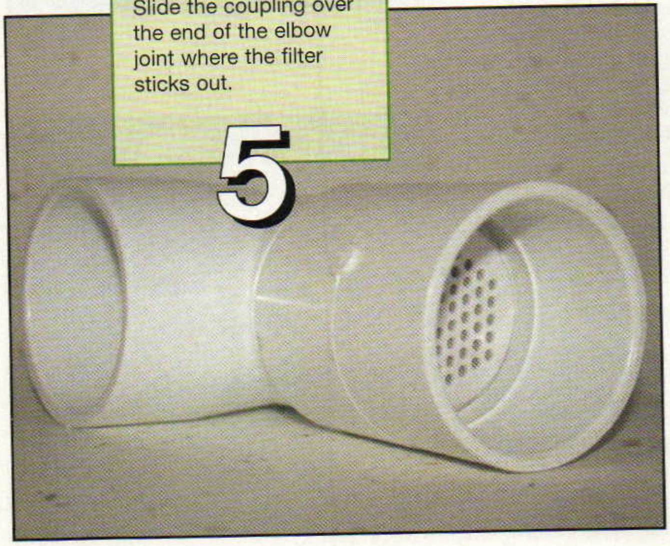
First, slide the filter unit into the smaller-diameter end of the PVC elbow joint until the rubber gasket on the filter is snug against the



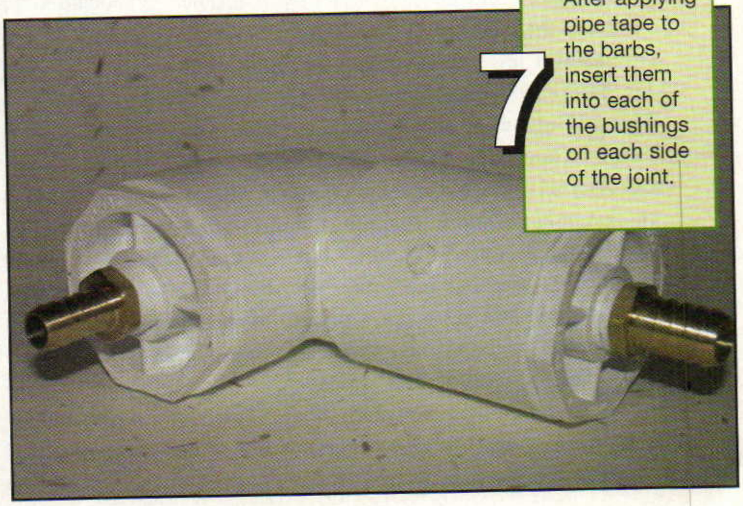
4 Slide the filter unit into the smaller-diameter end of the PVC elbow joint.



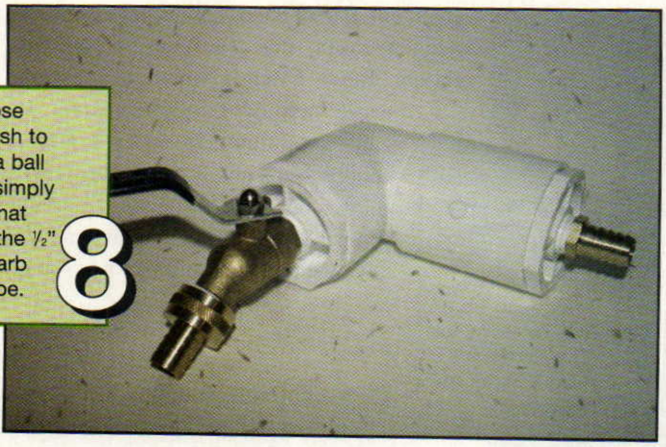
6 Insert the bushing adapters into each side of the elbow joint.



5 Slide the coupling over the end of the elbow joint where the filter sticks out.



7 After applying pipe tape to the barbs, insert them into each of the bushings on each side of the joint.



8

For those who wish to install a ball valve, simply apply that where the ½" hose barb would be.

elbow opening (Fig. 4). Now slide the coupling over the end of the elbow where the filter sticks out (Fig. 5). On both ends of the joint, insert the bushing adapters (Fig. 6). Now we're ready to screw in the water in/out connections. Liberally apply pipe tape to the threads of the ⅜" hose barb and screw it in to the bushing attached to the coupling piece. Repeat the same procedure with the ½" hose barb and screw it in to the other bushing (Fig. 7). As an alternative, you can "kick it up a notch" by using a ½" ball valve in place of the ½" hose barb. I chose a ball valve with a spigot bib because it has an angled head, which makes it ideal for countertop use (Fig. 8).

Setup and use

Note: This project is designed to be used with a kitchen sink, but can easily be adapted for use with garden hose fittings (see right for alternative parts).

Unscrew the standard aerating faucet insert from your sink and screw in the dishwasher snap adapter. Attach one end of a length of ⅜" vinyl tubing to the faucet and the other end to the ⅜" hose barb on the water filter (Fig. 9). All that remains is to turn on the water at your faucet and collect the filtered water in a hot liquor tank, bucket or kettle (Fig. 10). If you opted to use a ball valve for the water out connection, be sure the valve is in the open position when you turn on the water from your sink. Otherwise, the pressure buildup will cause the PVC parts to fly apart rapidly and possibly violently. (I discovered this the hard way!) Be careful.

Allow a few gallons to run through the filter before collecting any water for brewing. This will allow for any filter media dust to be expelled, and give you a chance to verify the integrity of the various connections. If you notice leaks around the in/out connections, reapply pipe tape and re-tighten the connection. Leaks at the PVC joints indicate that the parts do not fit snugly. Disassemble the unit, reconnect everything, and test again. If you still get leaks, you can use plastic pipe cement to seal each connection. Just make sure that whatever you choose is safe for use with potable water.

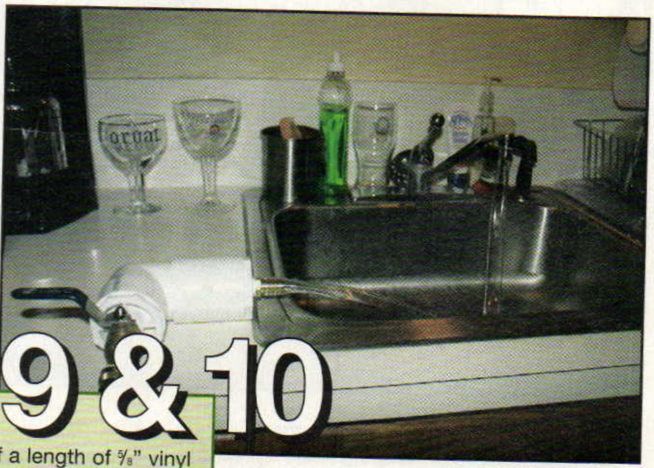
If after time, the flow rate of the filter slows down noticeably, it is likely that there is a buildup of sediment partially blocking the filter. To remedy this, connect your sink faucet to the water-out hose barb or valve and let the water run for a few minutes. This will back-flush the filter and eject the sediment.

Flow rate

The filter used in this project is rated to operate effectively at flow rates up to 2.5 gallons per minute (which is the federally mandated maximum flow rate for showerheads and faucets, established by the Energy Policy Act of 1992). Depending on your water pressure, you may have to run water through the filter at less than the maximum rate possible in order to get adequate filtration. If it takes more than 24 seconds to filter one gallon, your flow rate is within the operating standard. If it takes less than 24 seconds, you need to lower your flow rate for optimal results.

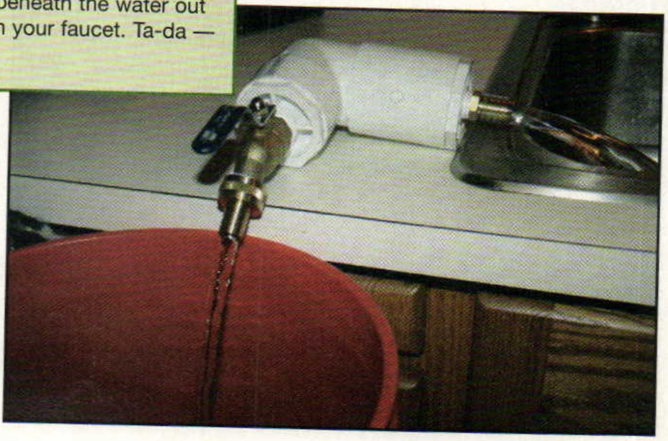
Alternate parts

If you'd rather use the filter with your garden hose hookup, you can simply substitute a ¾" garden hose adapter in place of the ½" male thread x ⅜" hose barb on the water-in side. Now just attach the filter to your garden hose connector and let 'er rip! You can also get a garden hose adapter for your sink and use a washing machine water hose if you don't want to fuss with the vinyl tubing and barbs. Also, you can substitute nylon hose barbs in place of the brass barbs for a cleaner look and an all-plastic configuration.



9 & 10

Attach one end of a length of ⅜" vinyl tubing to the faucet and the other end to the ⅜" hose barb of the water filter. Put the container that will collect your brewing water beneath the water out end and turn on your faucet. Ta-da — filtered water!



Extract for All-Grainers

Extracting the secrets of malt extract in your brewing

by Bill Pierce


photo by charles a. parker/images plus

Once a homebrewer switches to all-grain brewing, he (or she) will often avoid using malt extract, except perhaps for making yeast starters. The lure of doing things "from scratch" blinds them to a few circumstances when using malt extract can be very practical. Award-winning beers can be brewed using malt extract, as demonstrated by best-of-show winners I have judged at beer competitions. Moreover, we shouldn't forget the occasions when time or equipment limitations make using malt extract a reasonable and convenient choice. We wouldn't want to take the fun out of homebrewing.

Partial mash brewers are, of course, adept at making beers by combining wort from a mash and wort made from diluted malt extract. And many of the topics I discuss in this installment of Advenced Brewing will apply to both full mash brewers — whose mash tun size may not be adequate in all circumstances — and partial mash brewers.

Not so secret ingredients and process

Malt extract comes in two basic forms, liquid malt extract and dried malt extract (often abbreviated to LME and DME). The process for producing both begins similarly: crushed grains are mashed in hot water in much the same way as in any brewery. Then the mash runoff, containing the sugars that have been converted from the malt starches, is collected and boiled in order to sanitize it, concentrate the sugars and precipitate proteins that can contribute to haze. However, unlike in brewing, the extract manufacturer boils the wort in a partial vacuum. You may recall that the boiling temperature decreases with the air pressure; for example, at higher altitudes water boils at a lower temperature. Extract is typically boiled at 100–120 °F (39–49 °C), which requires a significant vacuum.

The reasons for the lower temperature vacuum boil are twofold. Higher temperatures tend to promote oxidation, which can result in premature staling and off-flavors. This is not such a problem if the wort is intended to be chilled and fermented relatively quickly, but it can be an issue with a product that may not be used for several months or longer. Secondly, heat can darken the wort, a more important concern since extract will pick up some color in the process of concentrating it, and may be boiled again by the brewer.

The wort for extract is boiled for a longer time and concentrated to a much greater degree than if it were to be fermented right away. Liquid malt extract has the consistency of very thick syrup and typically has a water content of 20% and a specific gravity of about 1.450. (This can't be measured directly with hydrometers in the range that homebrewers use. You can however, find the specific gravity of your liquid malt extract by mixing one volume of liquid malt extract and 9 volumes of water, preferably distilled. Mix thoroughly, take the specific gravity and multiply the points by ten.) The wort for dried malt extract is boiled for a somewhat shorter time; the less dense syrup is then injected through a spray nozzle into a vessel at an even higher vacuum. The resulting pressure and temperature drop very quickly removes and freezes the water, leaving a fine dry powder with a moisture content of only about 1%.

Some liquid malt extract has hops added during the boil, but the vast majority of hopped extract is used only in kits. For our all-grain purposes, hopped extract is best avoided, so we can better control the bittering level.

Liquid malt extract may be canned or bulk packaged; it is relatively stable in terms of shipping and short-term storage, but it should really be considered a perishable product, as it is prone to staling and also darkening. Most homebrew shops and suppliers are known to turn over their stock frequently. If you can't get fresh liquid malt extract use dried liquid malt extract. If kept away from moisture, it will remain fresh for several years or longer.

Extract by the numbers

Extract manufacturers provide color values for their light, amber and dark extracts, and these may be used in the same manner as grains in calculating the color of the resulting beer. (A full rundown of all extract specifications can be found in the October 2006 issue of *BYO*.) There is, however, little available information about the grain bill used in the production of many malt extracts. For light extract, it is safe to assume that only pale malt is used, but it is difficult to know the percentage and color of the crystal or caramel malt in amber extract and the roast grains used in darker extracts. For example, is an amber extract produced with 20% crystal malt (20 °L) or 5% dark crystal malt (120 °L)? For this reason, many advanced homebrewers prefer to use only light extract and to mash or steep the other specialty grains that contribute color and flavor to their beer. This allows far more precise control over the beer character and flavor. Information regarding the composition of wheat malt extracts is known, with the percentage of malted wheat varying in the 40–60% range. Likewise, some Munich malt extracts state the amount of Munich in them, usually 30–50%.

As mentioned, the boiling during manufacture darkens the extract somewhat, so it is true that no extract is quite as light in color as the palest malt. Even the palest extracts have color ratings of about 3.5 °L, as opposed to 1.5 °L for the lightest colored malted grains. However, adding the extract near the end of the boil can minimize the additional darkening of your beer. Because it has already been boiled, the long boil times required for all-grain beers are unnecessary for liquid malt extract.

Many manufacturers do provide values for the sugars in their extract. This is equivalent to the "extract potential" of grains, except that the sugars in malt extract can be considered 100% extractable. Extract potentials are based on that of pure sucrose (even though extract and wort contain a variety of sugars), which is accepted by convention to have a potential of 1.04621. In other words, 1.0 pound (0.45 kg) dissolved in 1.0 gallon (3.8 L) will have a specific gravity of 1.046 at the reference temperature of the measuring instrument (typically a hydrometer). The reason the average extract potential of light DME and LME — 1.045 and 1.036, respectively; you can use these values and achieve reasonable accuracy in the absence of those from the manufacturer — is lower than that of sucrose is the moisture content.

Down to the finish line

The extract potential values for dried malt extract and liquid malt extract say nothing about fermentability and attenuation, that is, the percentage of sugars that can be digested by the yeast and the effect on the final gravity of the beer. Of course this is also true of malted grains; the maltster has no control over the brewer's mashing and fermenting conditions. However, with grain the brewer can vary the mash temperatures and times to produce more or less fermentable wort, while for malt extract, this has already occurred during manufacture. Evidence based on extracts from a number of manufacturers shows quite a variety in this respect. The average apparent attenuation when fermented with a neutral yeast strain can range from more than 75 percent to as low as 50 percent. This would mean that the final gravity of wort with an original specific gravity 1.048 could range from 1.012 to 1.024. A beer with the lower attenuation and higher final gravity values would have considerably more residual sweetness and body.

Therefore some discretion is clearly in order when brewing a 100 percent extract beer. Good homebrew shops and suppliers are knowledgeable about the extracts they sell, and can provide at least general guidelines about their fermentability, in addition to data from the manufacturers. Homebrewers can use this information, as well as their own previous experience, to select the extract best suited to their beer. For the all-grain brewing situations discussed next, extract is used to provide only a portion of the fermentables, resulting in less variability in terms of attenuation.

Quick and ready

Why would a homebrewer who is commited to all-grain want to use extract? The answer lies in its great usefulness as a quick and ready source of sugars, especially for boosting the specific gravity or volume of the wort prior to the boil. Yes, corn sugar or pure sucrose (ordinary table sugar) can be used for the same purpose and is less expensive and even more widely available. However, sucrose and other simple sugars are so fermentable that they tend to reduce the body of a beer. Malt extract is a better way to raise the gravity without decreasing the body, and in fact can even be used to increase it if that is desired.

Brewers may need to increase the gravity or volume of their beers for a number of reasons. The first is when the specific gravity is below the target for the recipe. Even with experience and care, mashing is not always a totally smooth and predictable process. The variables and factors are many, and grain is occasionally of inconsistent quality. For these and other unpredictable reasons, it is entirely possible to come up short of the target. Homebrewers of the "relax, don't worry, etc." school may accept this as the outcome of fate, but others are less forgiving.

Secondly, malt extract can be a boon to high gravity brewing. Big beers require a lot of fermentable sugars, with the equipment capacity to match. Sometimes this means having to reduce the batch size in order to accommodate more grain and compensate for the longer boiling time and greater evaporation.

Augmenting the fermentables with malt extract may be the most, or sometimes the only, reasonable solution. For example, your mash tun may only have the capacity to mash enough grain for a 5.0-gallon (19-L) batch of a beer with a maximum original specific gravity of 1.080, yet you want to brew a 1.100 OG barley wine. On a larger scale, this problem is also faced by a number of commercial craft breweries when brewing their highest gravity beers.

Alternately, you may want to increase the batch size of a recipe, for example, in order to have enough beer to serve for a party or a meeting of your local homebrew club. For example, you may wish to brew 10 gallons (38 L) of beer rather than 5.0 gallons (19 L). Again, you may be limited by the capacity of your mash tun. In all of these cases, there is no need for despair. Having some extract on hand and knowing how to use it can remedy such problems in short order. (Of course, you may also need a bigger kettle or multiple kettles to boil all your beer.)

Doing the math

If you can measure the wort specific gravity or volume with reasonable accuracy, it is not overly difficult to calculate how much extract is needed to raise the gravity a specified amount. (Measuring specific gravity and volume requires a hydrometer and thermometer, or refractometer, and a calibrated kettle or other brewing vessel.)

To calculate how much extract to add to raise the specific gravity from your actual gravity to your target gravity, use this equation:

$W_{ex} = [V * (SG_{target} - SG_{actual})]/EP_{ex}$

where W_{ex} is the weight of malt extract addition (in pounds), V is the volume of wort (in gallons), SG_{target} is the target specific gravity (in points), SG_{actual} is the actual specific gravity (in points) and EP_{ex} is the extract potential points of malt extract (in "ppg" or points per pound per gallon).

Since the values for extract potential used by most homebrewers are in "ppg," I will work the examples in English units. You can also work with metric units if you use liters as your measure of volume and use a metric measure of extract potential.

It should be noted that the previous formula is for the weight of the malt extract rather than the volume. Despite the convenience of volume measurements, it is much more accurate to measure malt extract by weight.

Three uses for malt extract

For our first example, let's say a recipe has a target pre-boil specific gravity of 1.050. After mashing and collecting the runoff, you find that the actual gravity is 1.040. The volume is 7.0 gallons (26 L). Using the formula for how much extract to add, you would calculate:

$W_{ex} = [7 * (50 - 40)] / 45 = 1.56$

$W_{ex} = [7 * (50 - 40)] / 36 = 1.94$

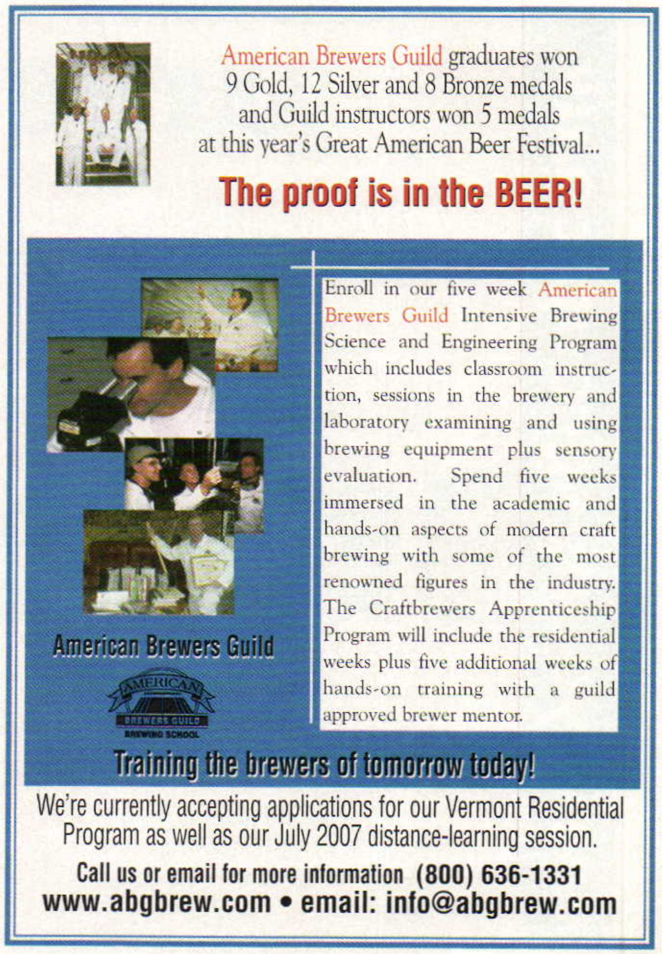
So, you would add either 1.56 lbs. (0.71 kg) of dried malt extract or 1.94 lbs. (0.88 kg) of liquid malt extract to boost your 7 gallons (26 L) of wort from a specific gravity of 1.040 to 1.050.

Probably the most common situation in which an all-grain brewer will use malt extract is when brewing a beer with an original gravity that exceeds what he can reach with wort collected from his mash tun. Or, it may be possible to reach the target gravity, but require a very extended boil. (This can apply to either all-grain brewers making big beers or partial mash brewers making most styles of beer.) For our example, let's say you wish to collect 7.0 gallons (26 L) of runoff for a barley wine and then boil it down to 5.0 gallons (19 L) with a specific gravity of 1.085. Let's further say that, after collecting your 7.0 gallons (26 L) of wort, your specific gravity is 1.055. To figure out how much extract to add, if any, you would first need to predict what your post-boil gravity will be, based on your pre-boil gravity. To do this, use the formula:

$C_1V_1 = C_2V_2$

where C_1 and V_1 are the concentration (in specific gravity points) and volume (in gallons), respectively, of the first solution, and C_2 and V_2 the concentration and volume of the second.

In our example, 55(7) = X(5). Solving for X yields ([55(7)]/5 =) 77 — in other words a calculated post-boil gravity of 1.077. To increase the specific gravity to 1.085, use the previous formula:



$$W_{ex} = [5 * (85 - 77)] / 45 = 0.88$$

$$W_{ex} = [5 * (85 - 77)] / 36 = 1.1$$

So, you would either need to add 0.88 lbs. (0.40 kg) of dried malt extract or 1.1 lbs. (0.50 kg) of liquid malt extract to your 7.0 gallons (26 L) of pre-boil wort. Then, once your wort is boiled down to 5 gallons (19 L), you should hit your target gravity.

A final handy use of malt extract is when you want to brew a larger volume of a beer than your mash tun can provide wort for. So for our final example, let's say you want to brew 10 gallons (38 L) at a specific gravity of 1.048, but when you quit collecting wort, you have 8.0 gallons (30 L) at 1.044.

As before, the first thing you would do is predict your original gravity at your planned volume from the wort you collected, using the "CV" formula. In this case, 44(8) = X(10) and therefore X = 35.2. In other words, upon adding water, you have enough fermentables for 10 gallons (38 L) of wort at SG 1.032. To reach your target gravity of 1.048, you would need:

$$W_{ex} = [5 * (48 - 32)] / 45 = 1.78$$

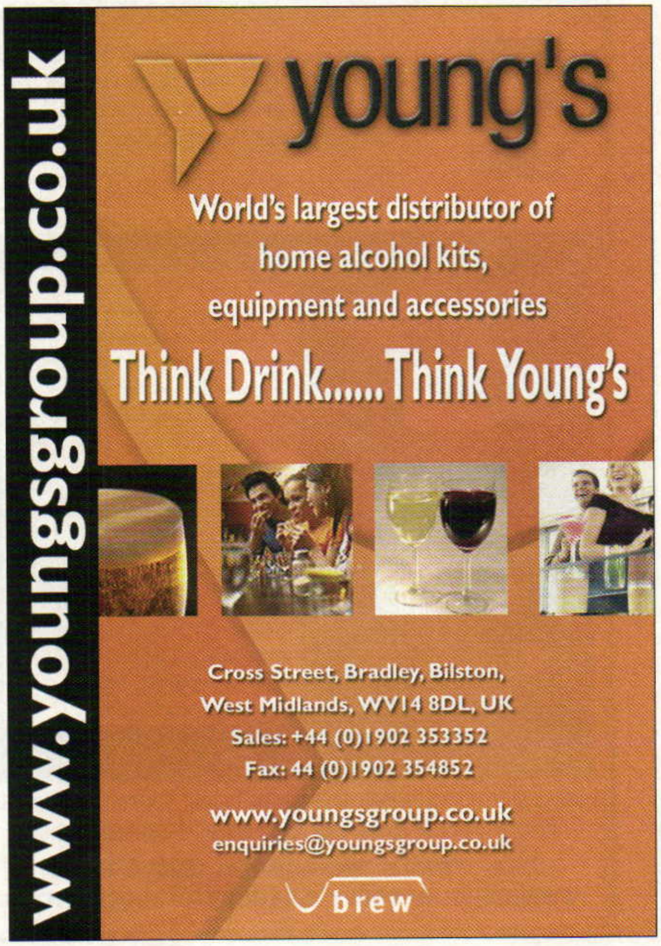
$$W_{ex} = [5 * (48 - 32)] / 36 = 2.22$$

Put into words, you would need to dilute your wort with water to its pre-boil volume, then add either 1.78 lbs. (0.81 kg) of dried malt extract or 2.22 lbs. (1.0 kg) of liquid malt extract. Upon boiling down to your target volume (10 gallons/38 L), you should also hit your target gravity (1.048). (Of course, when brewing more beer, your mash tun is not the only limiting factor. You may have to round up a larger kettle or split your wort and boil in more than one kettle.)

Pump up the volume

Astute readers may ask about the increase in volume from the extract addition. With a typical water content of 20%, liquid malt extract has a calculated volume of 10.6 fl. oz. per pound (692 mL/kg). At first thought, the additional volume contributed by dried malt extract would seem negligible. However, it is real and measurable, and for those who are sticklers for accuracy, we will mention it here. When sugar is dissolved in water, there is an increase in volume. Because of molecular interactions, the formula is not strictly linear, and the result increases slightly along with the specific gravity of the solution. A very reasonable average value for the gravities used in brewing is 9.42 fl. oz. per pound (614.2 mL/kg). That is, 1.0 lb. (0.45 kg) of dried malt extract added to the wort will increase the volume by 9.42 fl. oz. (or 1.0 kg will increase the volume by 614.2 mL).

Bill Pierce writes the Advanced Brewing column in every issue of Brew Your Own.



The Extract Facts, Jack

Some handy facts for dealing with dried liquid malt extract.

Color
dried malt extract: 3.5–5 °L
liquid malt extract: 4–6 °L

Moisture Content
dried malt extract: approximately 1%(*)
liquid malt extract: approximately 20%

(*) if left exposed to air, dried malt extract will continue to absorb water

Extract Potential
The specific gravity of 1.0 lb. of malt extract diluted to 1.0 gallon of wort (or 121 g/L).
dried malt extract: 1.045
liquid malt extract: 1.033–1.037(*)

(*) in BYO *standardized recipes, the lowest figure — 1.033 — is used.*

Specific Gravity
dried malt extract: not a liquid
liquid malt extract: approximately 1.450

Weight per U.S. gallon
dried malt extract:
very approximately 5.8 lbs. (0.69 kg/L)
liquid malt extract:
very approximately 12.0 lbs. (1.43 kg/L)

Weight per 1 cup (8 fl. oz.)
dried malt extract:
very approximately 5.8 oz. (0.69 g/mL)
liquid malt extract:
very approximately. 12.1 oz. (1.4 g/mL)

Volume of 1.0 lb.
dried malt extract:
very approximately 2.75 cups or 22 fl. oz.
liquid malt extract:
very approximately 1.3 cups or 10.6 fl oz.

Volume of 1.0 kg
dried malt extract:
very approximately 1420 mL
liquid malt extract:
very approximately. 700 mL

Note: weighing extract is more accurate than using a volumetric measurement.

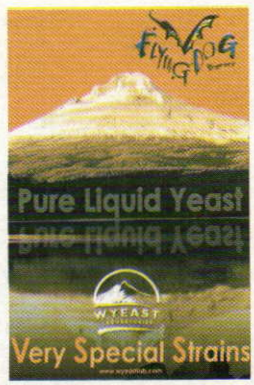
brewer's log

BeerTools releases software

BeerTools has released BeerTools Pro. Recipe formulation, mash scheduling and an ingredient database are included. This software works with both Mac and PC. Use it for calibrating equipment, arranging mashing schedules, calculating carbonation, etc. For more information visit www.beertools.com.

Coopers releases ginger beer

Coopers has released a kit for brewing ginger beer. The kit makes 4 gallons (~20 L). It can be made as an alcoholic drink (3.5% ABV) with the addition of 1 kg raw sugar or a non-alcoholic drink if you only use priming sugar in the bottles. For more information visit www.cascadiabrew.com.



Wyeast Laboratories introduces VSS

The "VSS" program will feature Very Special Strains of beer, wine and distiller's yeast, otherwise unavailable to homebrewers. The VSS promotions will run quarterly and the current strain is the Flying Dog Ale yeast. For more information visit www.wyeastlab.com.

READER SERVICE

For direct links to all of our advertisers' Websites, go to www.byo.com

CLASSIFIEDS

APPAREL
GET YOUR BYO GEAR!
Logo shirts, sweats, hats, & lots more.
www.cafepress.com/brewyourown

BREWING EQUIPMENT
The Barley Crusher MaltMill
"Homebrewer's best friend."
Mills for the homebrewer, brew shop and microbrewer.
www.barleycrusher.com

LATEST AND BEST Homebrew Heaters now available in the U.S.!
See them at www.quickheat.net
E-mail us for a list of the Homebrew Shops who stock them – Dealer enquiries welcome.

PROFESSIONAL OPPORTUNITIES
Go Pro in Costa Rica
microbrewery start-up
25kL max annual production
http://hotel-tilawa.com/volcanobrew/
or contact jp@tilawa.com

SOFTWARE
BEERSMITH BREWING SOFTWARE
Take the guesswork out of brewing!
Free 21 day trial!
www.beersmith.com

SUPPLIES
DRAFTSMAN BREWING COMPANY
Don't dodge the draft!
Call today for our FREE homebrew supply catalog.
1-888-440-BEER
www.draftsman.com

MICRO DISTILLING
Stills, Flavours, All Equipment.
Ex Factory
www.spiritsunlimited.co.nz

ZYMURGY OUTFITTERS
Specializing in custom ingredient kits from the ordinary to the extraordinary for all your homebrewing adventures.
www.zymurgyoutfitters.com
(608) 835-7370

WINEMAKING
WINEMAKER BACK ISSUES
Tips, techniques and recipes from magazine issues dating back to 2001.
Call 802-362-3981 or visit
www.winemakermagstore.com

WINEMAKER APPAREL
Logo hats, shirts, hoodies & much more!
www.cafepress.com/winemaker

Enter Your MEAD in the 2007 WineMaker International Amateur WINE COMPETITION

The best homemade meads from across North America will compete for gold, silver and bronze medals plus a best of show award. Enter your meads and you can gain international recognition for your skills and get valuable feedback from the competition's experienced judging panel!

Enter your best in one of the three mead categories:

- **TRADITIONAL Mead**
  Sponsor: Brew Your Own
- **FRUIT MEAD**
  Sponsor: The Purple Foot - Milwaukee
- **HERB AND SPICE MEAD**
  Sponsor: Brew Your Own

The Best of Show Mead medal is sponsored by Fine Vine Wines— The Winemaker's Toy Store.

The Wine Maker's Toy Store

Make Wine Too?

Enter your best wines in one of 47 categories. Wines made from kits, concentrates, fresh grapes and fruits will compete head-to-head in each category, so ultimate bragging rights are on the line!

Entry deadline is: **March 30th, 2007**
Entry forms and competition rules will be available in October at:
www.winemakermag.com
Or contact us at: **Battenkill Communications**
5053 Main Street, Suite A • Manchester Center, VT 05255
e-mail: competition@winemakermag.com
ph: (802) 362-3981 fax: (802) 362-2377

BREWER'S MARKETPLACE

St. Louis Wine & Beermaking, LLC

Serving Brewers and Vintners Since 1991

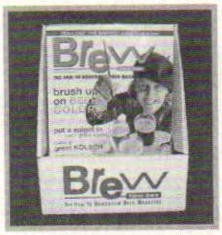
And We're Still Here For You

Secure On-Line Ordering

251 Lamp & Lantern Village
St. Louis, MO 63017
(888) 622-WINE • FAX (636) 527-5413
E-mail: info@wineandbeermaking.com
www@wineandbeermaking.com

The Complete Source for Beer, Wine & Meadmakers

Attention Homebrew Shops
Interested in selling
Brew?
It's easy!



- Free point-of-purchase display rack
- Big 45% discount off cover price
- Minimum order of just 5 copies
- Help drive more customer business and demand
- Flat shipping fee
- NEW! Free Online listing & Hotlink on byo.com!

To set up an account or find out more call John at (802) 362-3981 ext. 106

FOXX EQUIPMENT company

Quality Kegging Parts especially for the Home Brewer.

Visit foxxequipment.com to find a Home Brew Shop near you!

HOMEBREW DIRECTORY

ALABAMA

Werner's Trading Company
1115 Fourth St. S.W.
Cullman
1-800-965-8796
www.wernerstradingco.com
The Unusual Store.

The Wine Smith
6800 A Moffett Rd. (US Hwy. 98)
Mobile 36618
(251) 645-5554
Fax (251) 645-6446
e-mail: winesmith@bellsouth.net
www.thewinesmith.biz
Serving Central Gulf Coast Homebrewers

ARIZONA

Brew Your Own Brew
2564 N. Campbell Ave., Suite 106
Tucson
(520) 322-5049 or
1-888-322-5049
www.brewyourownbrew.com
Where the art of homebrewing starts.

Homebrewers Outpost & Mail Order Co.
801 S. Milton Rd., Suite 2
Flagstaff
1-800-450-9535
www.homebrewers.com
Free Shipping in Arizona on orders over $50.

What Ale's Ya
6363 West Bell Road
Glendale
(623) 486-8016
www.whatalesya.com
Great selection of beer & wine making supplies.

ARKANSAS

Fermentables
3915 Crutcher St.
North Little Rock 72118
(501) 758-6261
www.fermentables.com
Complete homebrew & winemakers supply

The Home Brewery
455 E. Township St.
Fayetteville 1-800-618-9474
homebrewery@arkansasusa.com
www.thehomebrewery.com
Top-quality Home Brewery products.

CALIFORNIA

Beer, Beer & More Beer Riverside
1506 Columbia Ave. #12
Riverside 92507
1-800-622-7393
www.morebeer.com
Top-quality Supplies for the Home Brewer or Vintner.

The Beverage People
840 Piner Road, #14
Santa Rosa 1-800-544-1867
www.thebeveragepeople.com
Fast Shipping, Great Service!

Brewers Discount
8565 Twin Trails Dr.
Antelope 95843
1-800-901-8859
sales@brewersdiscount.com
www.brewersdiscount.com
Lowest prices on the Web!

Doc's Cellar
855 Capitolio Way, Ste. #2
San Luis Obispo
805-781-9974
www.docscellar.com
Largest beer & wine supplier on the central coast.

The Good Brewer
2960 Pacific Ave.
Livermore 94550
(925) 373-0333
Fax (925) 373-6232
www.goodbrewer.com
Home brew and wine making supplies

Home Brew Shop
1570 Nord Ave.
Chico 95926
(530) 342-3768
e-mail: homebrushop@yahoo.com
Years of experience, advice always free!

HopTech Home Brewing Supplies
6398 Dougherty Rd. #7
Dublin 94568
1-800-DRY-HOPS
www.hoptech.com
Beer, Wine, Root Beer-Kits & Brew Supplies!

HydroBrew
1319 South Coast Hwy.
Oceanside 92054
(760) 966-1885
www.hydrobrew.com
Homebrewing & Hydroponics supplies serving the San Diego area.

Morning Glory Fermentation Supply
6601-C Merchandise Way
Diamond Springs 95619
1-866-622-9660
www.morninggloryfermentation.com
Great selection. Best quality. Awesome service!

Napa Fermentation Supplies
575 3rd St., Bldg. A (Inside Town & Country Fairgrounds)
P.O. Box 5839
Napa 94581
(707) 255-6372
www.napafermentation.com
Serving your brewing needs since 1983!

Original Home Brew Outlet
5528 Auburn Blvd., #1
Sacramento
(916) 348-6322
Check us out on the Web at www.ehomebrew.com

O'Shea Brewing Company
28142 Camino Capistrano
Laguna Niguel
(949) 364-4440
www.osheabrewing.com
Providing southern California with great beer!

Seven Bridges Organic Homebrewing Supplies
325 A River St.
Santa Cruz 95060
1-800-768-4409
Fax 831-466-9844
www.breworganic.com
Certified Organic Brewing Ingredients

Stein Fillers
4160 Norse Way
Long Beach
(562) 425-0588
www.steinfillers.com
brew@steinfillers.com
A nonprofit public benefit company.

COLORADO

Beer and Wine at Home
1325 W. 121st. Ave.
Westminster
(720) 872-9463
www.beerathome.com
Now Open!

Beer at Home
4393 South Broadway
Englewood
(303) 789-3676
1-800-789-3677
www.beerathome.com

The Brew Hut
15108 East Hampden Ave.
Aurora
1-800-730-9336
www.thebrewhut.com
Beer, Wine, Mead & Soda — WE HAVE IT ALL!

Lil' Ole' Winemaker
516 Main Street
Grand Junction 81501
(970) 242-3754
Serving Colorado & Utah brewers since 1978

Stomp Them Grapes!
2563 15th Street, 101
Denver 80211
(303) 433-6552
www.stompthemgrapes.com
Because making it is almost as fun as drinking it!

CONNECTICUT

Beer & Wine Makers Warehouse
290 Murphy Road
Hartford 06114
(860) 247-BWMW (2969)
e-mail: bwmwct@cs.com
www.bwmwct.com
Area's largest selection of beer & winemaking supplies. Visit our 3000 sq ft facility with class & demo areas. New grain crushing room.

Maltose Express
887 Main St. (Route 25)
Monroe 06468
In CT.: (203) 452-7332
Out of State: 1-800-MALTOSE
www.maltose.com
Connecticut's largest homebrew & winemaking supply store. Buy supplies from the authors of "CLONEBREWS" and "BEER CAPTURED"!

DELAWARE

Delmarva Brewing Craft
24612 Wiley Branch Road
Millsboro 1-877-556-9433
Fax (302) 934-1701
www.xtremebrewing.com
contact@xtremebrewing.com
Make your own great beer or wine.

FLORIDA

The Shady Lady
2475 B East Nine Mile Rd.
Pensacola 32514
(850) 436-4436
www.theshadylady.net
From bottles to books, from kits to chemicals - We have everything to brew your own!

GEORGIA

Beer Necessities
9850 Nesbit Ferry Rd.
Alpharetta 30022
(770) 645-1777
www.brewvan.com
Located North of Atlanta off of HWY 400

Just Brew It
103 Rainbow Way
Fayetteville 30214
1-888-719-4645
Fax (770) 719-0274
www.aardvarkbrewing.com
9 miles south of Perimeter on GA Hwy. 85

Wine Craft of Atlanta
5920 Roswell Rd., C-205
Atlanta 30328 (404) 252-5606
www.winecraftatl.com
winecraftatl@bellsouth.net
Helping customers make beer and wine since 1969!

IDAHO

Your Place or Mine?
9424 N. Government Way
Hayden Lake 83864
1-800-606-6046
or (208) 762-2550
www.vintit.com
"Check us out again for the very first time."

ILLINOIS

Bev Art Brewer & Winemaker Supply
10033 S. Western Ave.
Chicago
(773) 233-7579
www.bev-art.com
Mead supplies, grains, liquid yeast and beer making classes on Premise.

The Brewer's Coop
30 W. 114 Butterfield Road
Warrenville 60555
(630) 393-BEER (2337)
www.TheBrewersCoop.com
DuPage County's LARGEST homebrew shop!

Chicagoland Winemakers Inc.
689 West North Ave.
Elmhurst 60126
Phone: 1-800-226-BREW
e-mail: cwinemaker@aol.com
www.cwinemaker.com
Personal Instruction!

Crystal Lake Health Food Store
25 E. Crystal Lake Ave.
Crystal Lake
(815) 459-7942
Upstairs brew shop - Complete selection incl. Honey, Maple Syrup & unusual grains.

Home Brew Shop LTD
225 West Main Street
St. Charles 60174
(630) 377-1338
www.homebrewshopltd.com
Full line of Kegging equipment, Varietal Honey

Somethings Brewn'
401 E. Main Street
Galesburg 61401
(309) 341-4118
www.somethingsbrewn.com
Midwestern Illinois' most complete beer and winemaking shop.

INDIANA

The Brewers Art Supply
1520 N. Wells Street
Fort Wayne 46808
(260) 426-7399
e-mail: francie.brew@verizon.net
www.brewersartsupply.com
Friendly, Reliable service in house and on-line

Co-op Corner General Store
5015 N. St. Joe Ave.
Evansville 47720
1-800-398-9214 or
(812) 423-6481
raad@warrickcountycoop.com
Beer & Wine. Brew supplier for Southern Indiana.

Great Fermentations of Indiana
5127 E. 65th St.
Indianapolis
(317) 257-WINE (9463)
Toll-Free 1-888-463-2739
www.greatfermentations.com
E-mail us at anita@greatfermentations.com

Kennywood Brewing Supply
Crown Point (219) 765-BREW
www.kennywoodbrew.com
Visit us online. Fresh homebrewing ingredients and more!

Quality Wine and Ale Supply
530 E. Lexington Ave., Suite 115
Elkhart 46516
Phone or fax (574) 295-9975
e-mail: info@homebrewit.com
www.homebrewit.com
Quality wine & beer making supplies. 24/7 secure online ordering w/fast, safe & reliable worldwide shipping. Visit our FULLY STOCKED retail store in Elkhart for everday supplies and over 200 wine and beer kits always in stock.

IOWA

Bluff Street Brew Haus
372 Bluff Street
Dubuque
(563) 582-5420
Fax (563) 582-5423
jerry@bluffbrewhaus.com
www.bluffbrewhaus.com
Complete line of wine & beermaking supplies.

KANSAS

Bacchus & Barleycorn Ltd.
6633 Nieman Road
Shawnee 66203
(913) 962-2501
www.bacchus-barleycorn.com
Your one stop home fermentation shop!

Homebrew Pro Shoppe, Inc.
2059 E. Santa Fe
Olathe (913) 768-1090 or
Toll Free: 1-866-BYO-BREW
Secure online ordering: www.brewcat.com

Kramer's Ale-N-Vino
925 N. Kansas Ave.
Topeka 66608
(785) 232-1990
e-mail: ale-n-vino@kscoxmail.com
www.ale-n-vino.com
Not the largest, just the best. Personal service.

MARYLAND

Annapolis Home Brew
836 Ritchie Hwy., Suite 19
Severna Park 21146
(800) 279-7556
Fax (410) 975-0931
www.annapolishomebrew.com
Friendly and informative personal service; Online ordering.

The Cracked Cork LLC
19202 Poffenberger Rd.
Hagerstown 21740
(301) 791-2882
e-mail: egbowles1@earthlink.net
www.crackedcork.com
Brew on Premise and brewing supplies.

The Flying Barrel
103 South Carrol St.
Frederick
(301) 663-4491 or
Fax (301) 663-6195
www.flyingbarrel.com
Maryland's 1st Brew-On-Premise; winemaking and homebrewing supplies!

Maryland Homebrew
6770 Oak Hall Lane, #115
Columbia
1-888-BREWNOW
www.mdhb.com
We ship UPS daily.

MASSACHUSETTS

Beer & Wine Hobby
155 New Boston St., Unit T
Woburn
1-800-523-5423
e-mail: shop@beer-wine.com
Web site: www.beer-wine.com
One stop shopping for the most discriminating beginner & advanced beer & wine hobbyist.

Beer & Winemaking Supplies, Inc.
154 King St.
Northampton
(413) 586-0150
Fax (413) 584-5674
www.beer-winemaking.com
30th year! Fresh White Labs.

Modern Homebrew Emporium
2304 Massachusetts Ave.
Cambridge 02140
(617) 498-0400
Fax (617) 498-0444
www.modernbrewer.com
The Freshest Supplies, In Business for 13 Years!

NFG Homebrew Supplies
72 Summer St.
Leominster
(978) 840-1955
Toll Free: 1-866-559-1955
www.nfghomebrew.com
Email: nfgbrew@aol.com
Great prices! Personalized service! Secure on-line ordering.

Strange Brew Beer & Winemaking Supply
331 Boston Post Rd. E. (Rt. 20)
Marlboro 1-888-BREWING
e-mail: dash@Home-Brew.com
Website: www.Home-Brew.com
We put the dash back in Home-Brew!

West Boylston Homebrew Emporium
Causeway Mall, Rt. 12
West Boylston (508) 835-3374
www.wbhomebrew.com
Service, variety, quality. Open 7 days.

The Witches Brew, Inc.
12 Maple Ave.
Foxborough (508) 543-0433
thewitchesbrew@att.net
www.thewitchesbrew.com
You've Got the Notion, We've Got the Potion

MICHIGAN

Adventures in Homebrewing
23869 Van Born Rd.
Taylor 48180
(313) 277-BREW
Visit us at www.homebrewing.org

Brewingworld
5919 Chicago Rd.
Warren 48092 (586) 264-2351
Brew on Premise, Microbrewery, Homebrewing Supplies
www.brewingworld.com
www.kbrewery.com

Cap'n' Cork Homebrew Supplies
16812 - 21 Mile Road
Macomb Twp. (586) 286-5202
Fax (586) 286-5133
www.capncorkhomebrew.com
e-mail: capncork@covad.net
Wyeast, White Labs, Hops & Bulk Grains!

Park Winery and Home Brew Supply
15320 Charlevoix
Grosse Pointe Park 48230
(313) 821-9463
Fax: (313) 821-5298
www.parkwinery.com
Beer & Wine making supplies, Wine on Premise

The Red Salamander
205 North Bridge St.
Grand Ledge (517) 627-2012
Fax (517) 627-3167
Phone or fax your order.

Siciliano's Market
2840 Lake Michigan Dr. N.W.
Grand Rapids 49504
(616) 453-9674
Fax (616) 453-9687
www.sicilianosmkt.com
The largest selection of beer and wine making supplies in west Michigan.

things BEER
Webberville
1-800-765-9435
www.thingsbeer.com
Your Full-Service Homebrew Shop With A Home Town Feel!

MINNESOTA

Homebrewersupply.com
Minneapolis 55413
(612) 788-6160
info@homebrewersupply.com
www.homebrewersupply.com
Large Selection, low prices. Free shipping on orders over $60. Most orders shipped within 24 hours.*

Midwest Homebrewing and Winemaking Supplies
3440 Beltline Blvd.
St. Louis Park 55416
1-888-449-2739
www.midwestsupplies.com
FREE instructional video with any purchase

Northern Brewer, Ltd.
1150 Grand Ave.
St. Paul 55105
1-800-681-2739
www.northernbrewer.com
Call or write for a FREE CATALOG!

MISSOURI

The Home Brewery
205 West Bain (P.O. Box 730)
Ozark 65721
1-800-321-BREW (2739)
brewery@homebrewery.com
www.homebrewery.com
The original Home Brewery products.

Homebrew Pro Shoppe, Inc.
14 SW 3rd Street
Lee's Summit 64063
(816) 524-0808 or
Toll-Free 1-866-BYO-BREW
support@brewcat.com
www.brewcat.com
Secure On-line shopping - Complete line of beer & wine making supplies & equipment.

St. Louis Wine & Beermaking
251 Lamp & Lantern Village
St. Louis 63017
1-888-622-WINE (9463)
www.wineandbeermaking.com
The complete source for Beer, Wine & Mead makers!
Fax us at (636) 527-5413

MONTANA

Montana Home Brewing Supply
7220 Hwy 93 So.
PO Box 1142
Lakeside 59922
(406) 844-0407
e-mail: sales@mthbs.com
www.mthbs.com
Beer and wine making supplies

NEBRASKA

Fermenter's Supply & Equipment
8410 'K' Plaza, Suite #10
Omaha 68127 (402) 593-9171
Fax: (402) 593-9942
e-mail: FSE@tconl.com
www.fermenterssupply.com
Beer & winemaking supplies since 1971. Same day shipping on most orders.

NEW HAMPSHIRE

Kettle to Keg
161 Main Street
Pembroke 03275
(603) 485-2054
www.kettletokeg.com
Homebrewing supplies, tea & gifts

NEW JERSEY

BEERCRAFTERS
110A Greentree Road
Turnersville 08012
(856) 2-BREW-IT
E-mail: beercrafters@comcast.net
www.beercrafters.com
NJ's Leader in Home Wine & Beer Supplies

Brewer's Apprentice
179 South Street
Freehold 07728 (732) 863-9411
www.brewapp.com
Online Homebrew Shopping.

Rubino's Homemade Wine & Beer Supply
2919 Route 206, Store# 405
(located at the Columbus Farmer's Market) Columbus 08022
(609) 261-8420
homebrewsupply@optonline.net
www.makewinebeer.com
Beer making equipment & ingredient kits including: Brew House, True Brew & Brewer's Best.

NEW YORK

Bottom of the Barrel
1736 Mt. Hope Ave.
Oneida 13421 (315) 366-0655
Fax (315) 363-0670
Best Little Homebrew Store Around.

E.J. Wren Homebrewer, Inc.
Ponderosa Plaza,
Old Liverpool Rd.
Liverpool 13088
1-800-724-6875
e-mail: ejwren@twcny.rr.com
www.ejwren.com
Largest homebrew shop in Central New York

Hennessy Homebrew Emporium
470 N. Greenbush Rd.
Rensselaer 12144
(800) 462-7397
www.beerbrew.com
Huge Selection, Open 7 days a week, Est. 1984

Niagara Tradition Homebrewing Supplies
1296 Sheridan Drive
Buffalo 14217
(800) 283-4418
Fax (716) 877-6274
On-line ordering. Next-day service. Huge Inventory.
www.nthomebrew.com

Party Creations
345 Rokeby Rd.
Red Hook 12571
(845) 758-0661
www.partycreations.net
Everything for making beer and wine

NORTH CAROLINA

Alternative Beverage
114 Freeland Lane
Charlotte
Advice Line: (704) 527-2337
Order Line: 1-800-365-2739
www.ebrew.com
29 years serving all home brewers' & winemakers' needs! One of the largest suppliers in the country

Asheville Brewers Supply
2 Wall Street #101
Asheville 28801
(828) 285-0515
www.ashevillebrewers.com
The South's Finest Since 1994!

OHIO

The Grape and Granary
915 Home Ave.
Akron 44310
(800) 695-9870
www.grapeandgranary.com
Complete Brewing & Winemaking Store.

Listermann Mfg. Co.
1621 Dana Ave.
Cincinnati 45207
(513) 731-1130
Fax (513) 731-3938
www.listermann.com
Beer, wine and cheesemaking equipment and supplies.

Main Squeeze
229 Xenia Ave.
Yellow Springs 45387
(937) 767-1607
www.mainsqueezeonline.com
Award Winning Brewers helping all Brewers!

The Pumphouse
336 Elm Street
Struthers 44471
1(800) 947-8677 or
(330) 755-3642
www.thepumphouse.cjb.net
Beer & winemaking supplies & more.

Titgemeier's Inc.
701 Western Ave.
Toledo 43609
Phone (419) 243-3731
Fax (419) 243-2097
e-mail: titgemeiers@hotmail.com
www.titgemeiers.com
An empty fermenter is a lost opportunity – Order Today!

OKLAHOMA

High Gravity Homebrewing and Winemaking Supplies
7164 S. Memorial Drive
Tulsa 74133 (918) 461-2605
e-mail:store@highgravitybrew.com
www.highgravitybrew.com
Online ordering. Fast friendly service.

OREGON

Above the Rest Homebrewing Supplies
11945 SW Pacific Hwy, #235
Tigard 97223 (503) 968-2736
Serving Beer & Wine Makers since 1993

PENNSYLVANIA

Ben's Homebrew
327 E. 6th Ave.
Tarentum 15084
Ph & fax (724) 409-4101
e-mail: benshomebrew@gmail.com
www.benshomebrew.com
For all your home brewing and wine making needs.

Country Wines
3333 Babcock Blvd.
Pittsburgh 15237-2421
(412) 366-0151 or
Fax (412) 366-9809
Orders toll-free 866-880-7404
Online catalog at:
www.countrywines.com

Keystone Homebrew Supply
599 Main St.
Bethlehem 18018
(610) 997-0911
sales@keystonehomebrew.com
www.keystonehomebrew.com
Quality Ingredients and Expert Advice!

Keystone Homebrew Supply
779 Bethlehem Pike (Rt. 309)
Montgomeryville
(215) 855-0100
sales@keystonehomebrew.com
www.keystonehomebrew.com
Quality Ingredients and Expert Advice!

South Hills Brewing Supply
2212 Noblestown Rd.
Pittsburgh (412) 937-0773
shbsjon@aol.com
www.southhillsbrewing.com
Not your typical LHBS. Neat • Clean • Stocked • Experienced

Triangle Homebrewing Supply
2100 Smallman St.
Pittsburgh (412) 261-4707
www.ralph.pair.com/triangle.html
Bringing you the BEST for less!

Wine, Barley & Hops Homebrew Supply
248 Bustleton Pike
Feasterville 19053
(215) 322-4780
winebarleyandhops@worldlynx.net
www.winebarleyandhops.com
Your source for premium beer & winemaking supplies

Wine & Beer Emporium
100 Ridge Rd. #27
Chadds Ford 19317
(610) 558-BEER (2337)
winebeeremporium@aol.com
www.winebeeremporium.com
We carry a complete line of beer & winemaking supplies, honeys, cigars and more!

RHODE ISLAND

Blackstone Valley Brewing Supplies
407 Park Ave.
Woonsocket
(401) 765-3830
Quality Products and Personalized Service!

SOUTH CAROLINA

Bet-Mar Liquid Hobby Shop
736-F Saint Andrews Rd.
Columbia 29210
(803) 798-2033 or
1-800-882-7713
www.liquidhobby.com
Unmatched Value, Service & Quality Since 1968

TENNESSEE

All Seasons Gardening & Brewing Supply
3900 Hillsboro Pike, Ste. 16
Nashville
1-800-790-2188
www.allseasonsnashville.com
Shop online. Nashville's Largest Homebrew Supplier!

Brewers Corner
800 Park Ave., Suite E
Murfreesboro 37129
(615) 849-7797
www.brewerscorner.com
Middle Tennessee's source for homebrew supplies.

TEXAS

Austin Homebrew Supply
7951 Burnet Rd.
Austin
1-800-890-BREW
(512) 300-BREW
www.austinhomebrew.com
Huge online catalog!

DeFalco's Home Wine and Beer Supplies
8715 Stella Link
Houston 77025
(713) 668-9440
Fax (713) 668-8856
www.defalcos.com
Check us out on-line!

Homebrew Headquarters
300 N. Coit Rd., Suite 134
Richardson 75080
(972) 234-4411
1-800-966-4144
www.homebrewhq.com
Dallas' only home beer and wine making supply store!

The Winemaker Shop
3006 S.E. Loop 820
Fort Worth 1-800-482-7397 or
(817) 568-4700
brew@winemakershop.com
http://winemakershop.com
FREE catalog

UTAH

The Beer Nut
1200 S. State
Salt Lake City 84111
(888) 825-4697
Fax (801) 531-8605
www.beernut.com
"Make Beer not Bombs"™

VIRGINIA

HomeBrewUSA
5802 E. Virginia Beach Blvd., #115
Norfolk 23502
1-888-459-BREW
or (757) 459-2739
www.homebrewusa.com
Largest Selection of Beer & Wine Making Supplies & Equipment in Southeastern Virginia!

myLHBS
6201 Leesburg Pike, Suite 400
Falls Church
(703) 655-2714
www.myLHBS.com
We speak beer!

Weekend Brewer - Home Beer & Wine Supply
4205 West Hundred Road
Chester/Richmond area 23831
1-800-320-1456 or
(804) 796-9760
beerinfo@weekendbrewer.com
www.weekendbrewer.com
LARGEST variety of malts & hops in the area!

WASHINGTON

Bader Beer & Wine Supply, Inc.
711 Grand Blvd.
Vancouver, WA 98661
1-800-596-3610
Sign up for our free e-newsletter at www.baderbrewing.com

The Beer Essentials
2624 South 112th St., #E-1
Lakewood 98499
(253) 581-4288 or
1-877-557-BREW (2739)
www.thebeeressentials.com
Mail order and secure on-line ordering available

The Cellar Homebrew
Make your own beer & wine
14320 Greenwood Ave. N.
Seattle 98133
1-800-342-1871
FREE Catalog/Guidebook, FAST Reliable Service, 33 Years! Secure ordering online www.cellar-homebrew.com

Homebrew Heaven
9109 Evergreen Way
Everett 98204
1-800-850-BREW (2739)
Fax 425-290-8336
brewheaven@aol.com
www.homebrewheaven.com
Voted Best Online Web Site for Ordering

Larry's Brewing Supply
7405 S. 212th St., #103
Kent 1-800-441-2739
www.larrysbrewsupply.com
Products for Home and Craft Brewers!

Mountain Homebrew & Wine Supply
8520 122nd Ave. NE, B-6
Kirkland 98033
(425) 803-3996
info@mountainhomebrew.com
www.mountainhomebrew.com
The Northwest's premier home brewing & winemaking store!

Northwest Brewers Supply
1006 6th Street
Anacortes 98221
(800) 460-7095
www.nwbrewers.com
All Your Brewing Needs Since 1987

WISCONSIN

BrewCitySupplies.com
The Market Basket
14835 W. Lisbon Road
Brookfield 53005-1510
1-800-824-5562
Fax (262) 783-5203
www.BrewCitySupplies.com
Secure On-Line Catalog, Superb Service, Superior Selection & Unbeatable Prices

Homebrew Market
1326 North Meade St.
Appleton 54911
1-800-261-BEER
www.homebrewmarket.com
Beer & Wine Supply Retail Store and Mail Order

House of Homebrew
415 Dousman St.
Green Bay 54303
(920)435-1007
Fax (920) 435-1008
staff@houseofhomebrew.com
www.houseofhomebrew.com
Beer, Wine, Cider, Mead, Soda, Coffee, Tea, Cheese Making.

Midstate Fermenters LLC
1425 Wisconsin Dells Pkwy, #3
Wisconsin Dells 53965
Phone or fax (608) 253-FERM
info@midstatefermenters.com
www.midstatefermenters.com
Home Brewing, Winemaking and Kegging Supplies.

Point Brew Supply
3041 A. Michigan Ave.
Stevens Point 54481
(715) 342-9535
marc@pointbrewsupply.com
www.pointbrewsupply.com
"The Feel Good Store"

WindRiver Brewing Co., Inc
861 10th Ave.
Barron 54812
1-800-266-4677
www.windriverbrew.com
FREE catalog. Fast nationwide shipping.

Wine & Hop Shop
1931 Monroe Street
Madison 53711
1-800-657-5199
www.wineandhop.com
Southern Wisconsin's largest selection of beer & winemaking supplies. 10 varieties of wine-making grapes from Mitchell Vineyard.

CANADA

ONTARIO

Canadian Home Brewing
3347 Mainsail Crescent
Mississauga L5L 1H3
1-877-568-BREW
Fax: 905-919-1636
info@canadianhomebrewing.ca
www.canadianhomebrewing.ca
Quality Home Brewing Supplies. Order Online.

SASKATCHEWAN

Paddock Wood Brewing Supplies
#B1-116 103rd Street
Saskatoon S7N 1Y7
1-888-539-3622
experts@paddockwood.com
www.paddockwood.com
Canada's largest mail order store - We've got what you need.

For details on listing your store in the Homebrew Directory call (802) 362-3981

Last CaLL

Dan & Mike's Adventure

A couple homebrewers who couldn't beat the heat

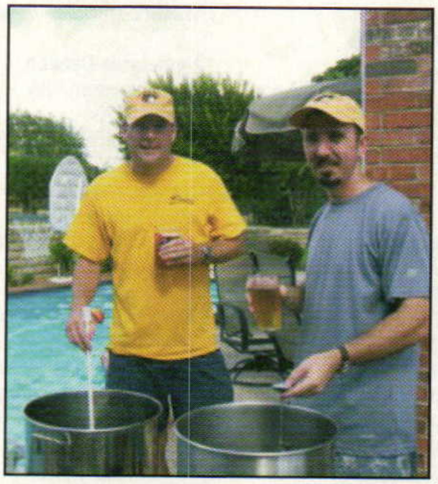
by Dan Zobal • Flower Mound, Texas

It was perfect! The wife and kids were going away for the weekend. I had the house all to myself. I had already misplaced the honey-do-list, or at least planned to. My only task was to keep the dog, the guinea pig and the lizard alive for the entire weekend — a difficult task, but not insurmountable. Hmm, what to do . . . what to do. What about . . . oh, I don't know . . . perhaps a BREW SESSION. Yeah, that's the ticket. One small problem. It was late July, in north Texas. A quick look at the forecast revealed a high of only 100 °F (38 °C). No problem — a little water, a few beers, a dip in the pool, let the games begin!

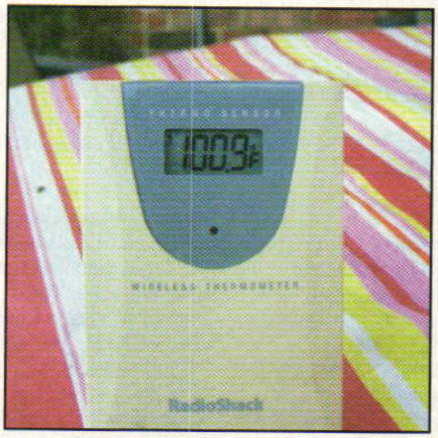
With my buddy Mike arriving back in town late on Friday night and me succumbing to a scratched cornea that same day, we decided to push back the brewing session to 2:00 PM on Saturday — in the heat of the day. What the hell, I've done stupider things, like jamming my eye into the support rod of a dirty clothes hamper (hence the scratched cornea). No pain, no gain, eh? I'm not sure what that annoying little phrase has to do with this situation, but it somehow seems appropriate.

After arriving at Mike's house, I began unloading all of my equipment, grains, supplies and beer. Did I already say beer? We set up everything in his backyard, and readied for the day's activities. Of course this included donning the customary Old School Brewery caps. The ubiquitous OSB is our brew club in Flower Mound, Texas with a membership of . . . let's see . . . carry the 2 . . . divide by 3 . . . that would be 2 — Mike and me.

We were both making Czech beers, mine an Octoberfest from the January 2000 *BYO* edition, and Mike's, a Kumburak Pilsner knock-off. As we began measuring the brewing water, the thermometer read 97.5 °F (36 °C). The sweat was pouring from our brows, arms, legs — you get the picture. I faintly remember Mike calling me an "expletive" as I began to whine about the heat. I bucked up after a short trip to my air conditioner — I mean, house — to retrieve some forgotten supplies. After 20 minutes of searching the comfy leather couch with no avail, I returned to Mike's. Amazingly,



Brewing buddies Dan and Mike spent a hot day over the brewing kettles last July. The 100-degree weather was almost unbearable, but the thought of a dip in the pool at the end of the brewing session kept them going. Too bad the Murphy's they experienced was not the stout, but the law!



he had everything ready to go (he always falls for this).

Having brewed together for several years, we had perfected the idiosyncrasies of grain brewing. Why, it only took us an hour to begin adding grain to the mash tun! Boy, how we've progressed! Since neither of us had a camp lighter with us, we fired up the very manly propane burners . . . with a nifty white candle. It was 3:00 PM and the temperature had crept up to a mere 98.3 °F (37 °C). With grains added and strike temperature struck, it was time to relax and have a cold beer. After all, it's not a complete brewing session without a little dehydration and heat exhaustion.

It was 4:30 PM, the grains were converted and it was time to sparge. We briefly talked about having a sparge race (Mike's a pro at this) whereby the winner is really the loser since the OG is off by a very wide margin. The temperature was nearing the century mark and the only thing that kept us going (other than the cold beers) was the thought of jumping into the cold swimming pool after the day's activities.

At 6:00 PM, as we began boiling the wort, we looked over at the thermometer and noticed the temperature had risen to 100.9 °F (38 °C). Our day was now complete! I turned to Mike to shake his hand, as Section 43.2 of Brew Law dictates. Proper protocol also calls for another beer! With the boil finished at 7:30 PM it was time to cool the wort. We were finally on the downside of the brew session! The temperature had dropped to a cool 99 °F (37 °C). We placed the brew pots into ice laden containers and waited for the wort to cool, and waited, and waited. By 9:00 it had cooled enough to pitch the yeast.

We were about to finally reap our reward with a plunge into the cold pool water — well deserved after such a grueling session. As Mike jumped into the water an inexplicable string of expletives came pouring from his mouth. I followed shortly and a similar string reverberated through the neighborhood. As it turns out, one of the kids had inadvertently turned the pool heater on and the temperature was 96 °F (36 °C). This capped off the end of a perfect brewing day!

Epilogue: As I sit here writing about our adventure, whilst drinking a home brew, I can hear the satisfying gurgles of the air exiting the blow-off tube. That sound alone makes it all worthwhile!

MoreBeer!™
Absolutely Everything!™ for Beer-Making

e carry the freshest grains, hops, and yeasts. Over 4000 products. Free Shipping on orders over $59.00. The one stop shop for all your brewing needs

MoreBeer!™ Conicals

We offer 15 models of stainless steel conicals, from very affordable entry level units to the ultimate self-contained temperature controlled models. MoreBeer! was the original manufacturer of stainless conicals for the homebrewing market and is still the only manufacturer to offer them directly to the consumer at considerable savings. With quality features like welded-in stainless fittings and professional-grade accessories we are confident to offer a 5 year fermenter warranty and an equally amazing 1 year electronics warranty on temperature regulated versions.

Do you have questions? Visit our website for photos and descriptions of each model or call one of our customer service specialists to talk about

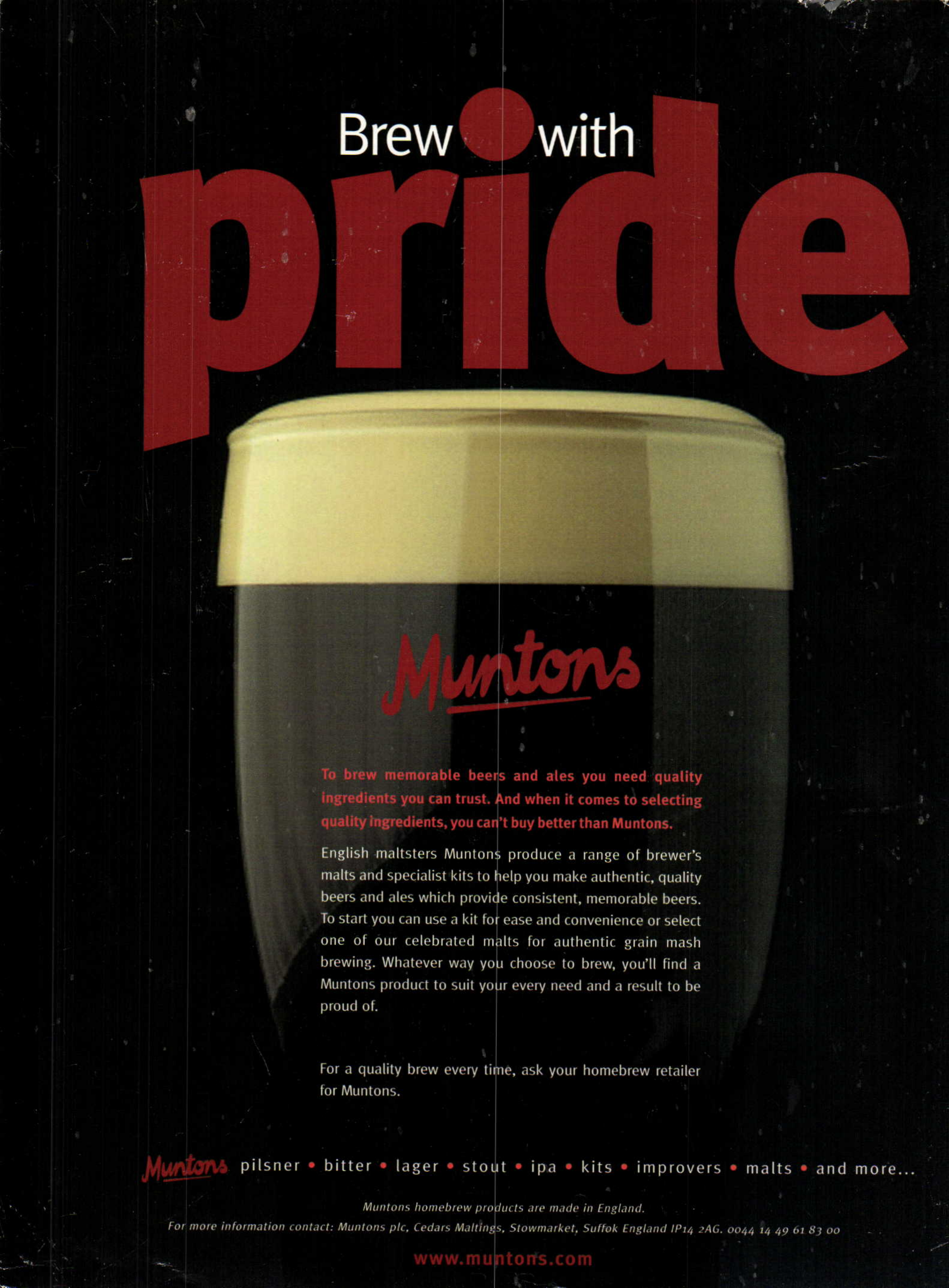
1-800-600-0033

www.MoreBeer.com

MoreBeer!TM is a proud part of the MoreFlavor!TM Family. For more information about MoreFlavor! Visit us at www.MoreFlavor.com

MoreFlavor!™
Absolutely Everything!™ for Making Great Flavor

MoreBeer! MoreWine! MoreCoffee!


Brew with
pride
Muntons
To brew memorable beers and ales you need quality ingredients you can trust. And when it comes to selecting quality ingredients, you can't buy better than Muntons.
English maltsters Muntons produce a range of brewer's malts and specialist kits to help you make authentic, quality beers and ales which provide consistent, memorable beers. To start you can use a kit for ease and convenience or select one of our celebrated malts for authentic grain mash brewing. Whatever way you choose to brew, you'll find a Muntons product to suit your every need and a result to be proud of.
For a quality brew every time, ask your homebrew retailer for Muntons.
Muntons pilsner • bitter • lager • stout • ipa • kits • improvers • malts • and more...
Muntons homebrew products are made in England.
For more information contact: Muntons plc, Cedars Maltings, Stowmarket, Suffok England IP14 2AG. 0044 14 49 61 83 00
www.muntons.com