

BUILD A
DOUBLE PIPE CHILLER

USING BRETT
IN YOUR BREWS

BREWING
OLD ALES

Brew

THE HOW-TO HOMEBREW BEER MAGAZINE

YOUR OWN

SEPTEMBER 2013, VOL.19, NO.5

Exploring the World of Beer Yeast

- Guide to 206 Yeast Strains
- Washing and Reusing Yeast
- Mastering Yeast Fermentation Flavors
- Pitch the Right Amount Every Time
- Keys to a Good Yeast Starter

www.byo.com

\$5.99



+ Legal Recipes
from Alabama
& Mississippi



NORTHERN BREWER

Quality Ingredients, Supplies and Service Since 1993

800.681.BREW

A DRAFT BEER MUST HAVE!



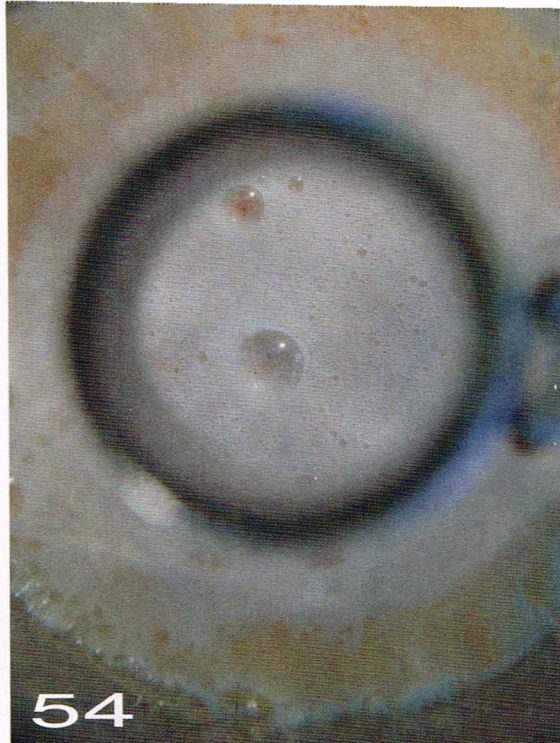
The GOVERNOR has everything you need for dispensing your beer and more.

"DESIGNED BY HOMEBREWER'S FOR HOMEBREWERS."

northernbrewer.com/byo

CONTENTS

September 2013 Volume 19 Number 5



features

28 Brewer's Yeast & Brett Fermentation Flavors

Learn the science behind the more than 500 flavor and aroma compounds that yeast create during fermentation.
by Chris White

36 Homebrew Yeast Strains Chart

A comprehensive list of 206 commercial yeast strains available to homebrewers, categorized by type and manufacturer.

46 Homebrew Pitching Rates

One of the most important factors for running a healthy fermentation in your homebrews is pitching the right amount of healthy yeast.

by Michael Dawson

54 Take Two: Reusing Yeast

Reusing homebrew yeast is a simple technique that any intermediate or advanced homebrewer can master quickly; and for those who brew frequently, can save a few dollars.
by Gretchen Schmidhausler

62 Making it Legal: Homebrewing in 50 States

As of July 1 of this year, homebrewing is finally legal in all 50 US states. Read about the brewers who helped pass legalization laws in the last two holdout states — Mississippi and Alabama. **Plus:** Five now-legal homebrew recipes.
by Dawson Raspuzzi



19

departments

5 Mail

A reader reminds us what the limits are for session beers, and another brews in remembrance of his best friend.

8 Homebrew Nation

A North Carolina brewer repurposes an artillery shell, and The Replicator goes to Mexico to clone Los Muertos Brewing's Agave Maria Amber Ale.

13 Tips from the Pros

Two pros give advice for brewing with *Brettanomyces*.

15 Mr. Wizard

The Wiz discusses the merits of mash mixers and some tips for fine-tuning your sparge.

19 Style Profile

Old ale, like English barleywine, has rich, malty flavors. Try your hand at this often misunderstood style.

71 Techniques

It's one thing to brew a great beer once, but can you make that same beer again? Terry Foster explores consistency.

75 Advanced Brewing

Learn more about the theory and practice of lautering.

79 Projects

Build your own double pipe wort chiller that is efficient and easy to clean.

96 Last Call

Meet Annie Johnson, the winner of the American Homebrew Association's 2013 "Homebrewer of the Year" award.

where to find it

83 Reader Service

84 Classifieds & Brewer's Marketplace

86 Homebrew Supplier Directory

RECIPE INDEX

Los Muertos Brewing's Agave Maria Amber Ale clone	12
Old Ale	20
Miss'ippi #BIGCASCADE Pale Ale	64
inSANTIAM IPA	64
Amarillo Amber Ale	64
Weizenbock	65
Ruthie's Rye P.A.	65



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

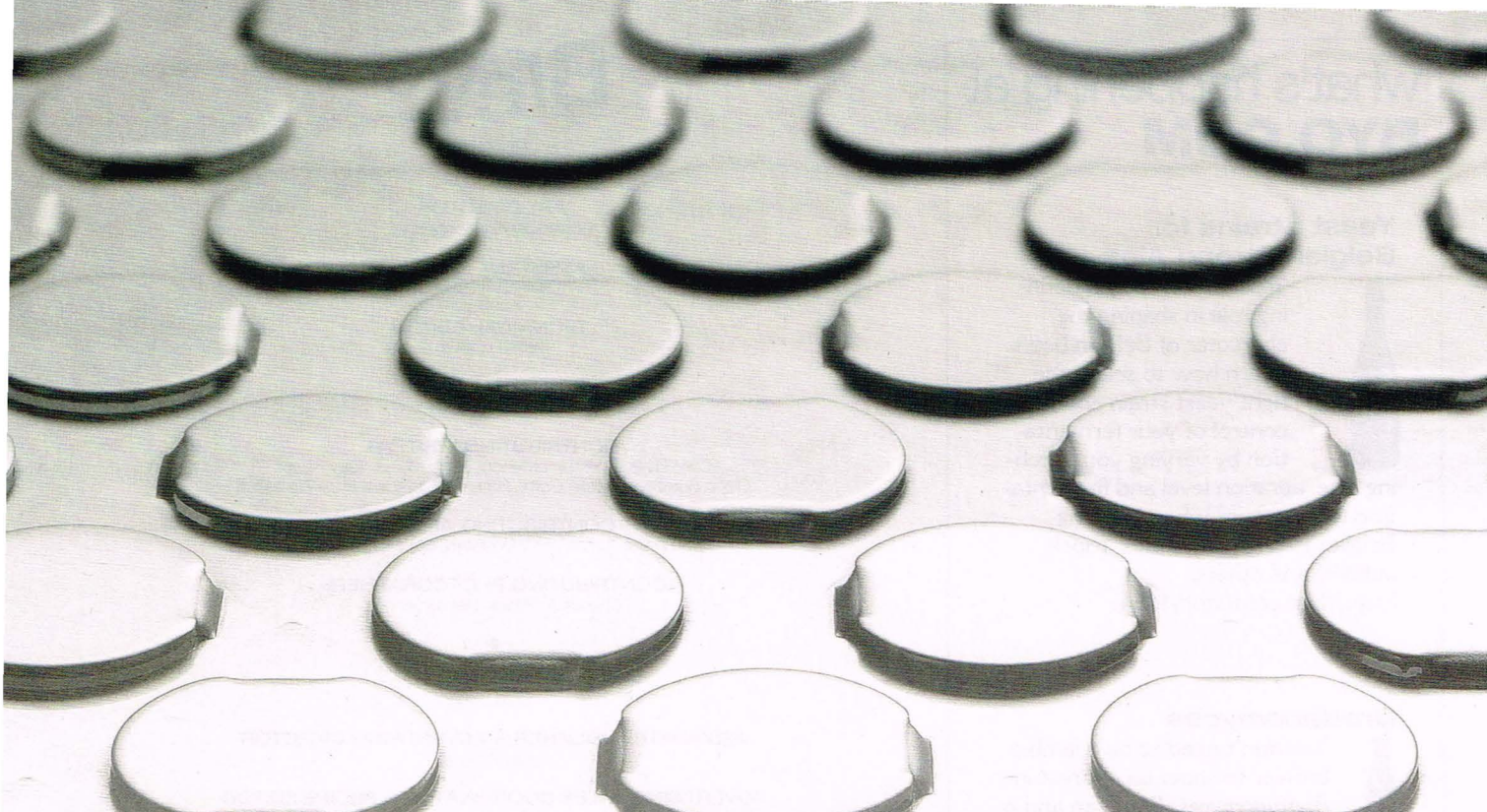
chocolate malts = 1.034

dark roasted grains = 1.024–1.026

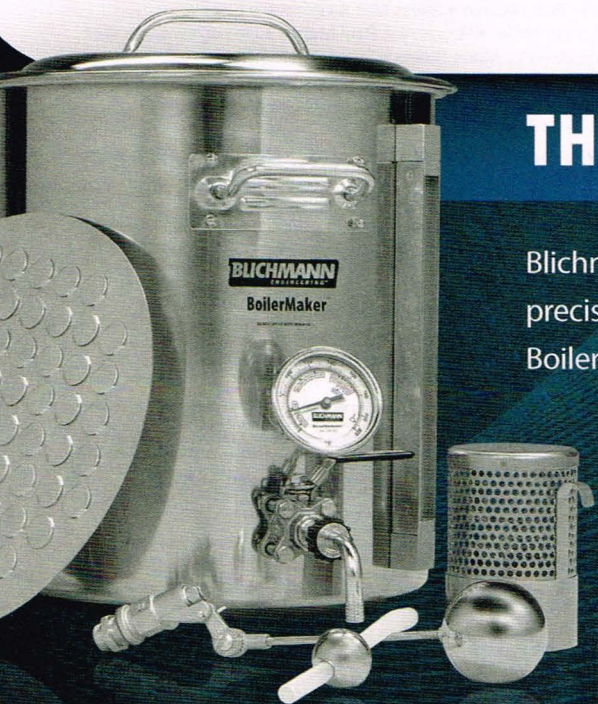
flaked maize and rice = 1.037–1.038

Hops:

We calculate IBUs based on 25% hop utilization for a one-hour boil of hop pellets at specific gravities less than 1.050. For post-boil hop stands, we calculate IBUs based on 10% hop utilization for 30-minute hop stands at specific gravities less than 1.050.



FALSE BOTTOM. TRUE INNOVATION.



THE INDUSTRY'S BEST BREW POT.

Blichmann Engineering brewing equipment is intuitively designed, precisely engineered, and loaded with patented innovations, like the BoilerMaker™ brew pot's optional Button Louver False Bottom. After experiencing this hassle-free mash filter's superior plug resistance and efficiency, you won't want to go back. Our unrivaled quality, performance, and innovations let you focus on what matters most – your beer.



BREWING INNOVATION

Check us out at blichmannengineering.com

what's happening at BYO.COM

Yeast Strains for Belgian Strong Ales



Yeast strains play a defining role in shaping the character of Belgian beers. Learn how to select the right yeast strain and take control of your fermentation by varying your pitching rate, aeration level and fermentation temperature when brewing Belgian strong golden ales, tripels, dubbels and others.

<http://byo.com/story1664>

Brettanomyces



You don't need to be a lambic brewer to show an interest in *Brettanomyces*. *Brett* can and is used in the production of other beers, including classic styles and modern creations.

<http://byo.com/story262>

Choose The Right Yeast For Your Beer



We spend a lot of time classifying beer into certain styles, such as American pale ale and European dark lager. Take a look at different types of yeast and how they influence the beers

we brew with them.

<http://byo.com/story460>

Controlling Fermentation Temperature



Controlling the temperature of your fermentations is one of the best ways to improve the quality of your beers; we'll show you how — from low-tech tricks to high-tech equipment.

<http://byo.com/story1869>

THE HOW-TO HOMEBREW BEER MAGAZINE
Brew
YOUR OWN

EDITOR
Betsy Parks

ART DIRECTOR
Coleen Jewett Heingartner

ASSISTANT EDITOR
Dawson Raspuzzi

TECHNICAL EDITOR
Ashton Lewis

EDITORIAL INTERN
Michael Madaus

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

CONTRIBUTING ARTISTS
Shawn Turner, Jim Woodward, Chris Champine

CONTRIBUTING PHOTOGRAPHERS
Charles A. Parker, Les Jørgensen

PUBLISHER
Brad Ring

ASSOCIATE PUBLISHER & ADVERTISING DIRECTOR
Kiev Rattee

ADVERTISING SALES COORDINATOR & RECIPE EDITOR
Dave Green

EVENTS & MARKETING COORDINATOR
Jannell Kristiansen

BOOKKEEPER
Faith Alberti

SUBSCRIPTION CUSTOMER SERVICE MANAGER
Anita Draper

NEWSSTAND DIRECTOR
Carl Kopf

EDITORIAL REVIEW BOARD

Tomme Arthur • Port Brewing/Lost Abbey Steve Bader • Bader Beer and Wine Supply
David Berg • August Schell Brewing Co. John "JB" Brack • Craft Beer Seminars
Horst Dornbusch • Beer Author Greg Doss • Wyeast Laboratories
Chris Graham • MoreBeer! Bob Hansen • Briess Malt & Ingredients Co.
Anita Johnson • Great Fermentations (IN) John Maier • Rogue Ales Paul Manzo • Homebrew Consultant
Ralph Olson • Hopunion USA Inc. Mitch Steele • Stone Brewing Co.
Mark & Tess Szamatulski • Maltose Express John Weerts • Homebrew Consultant
Chris White • White Labs Anne Whyte • Vermont Homebrew Supply David Wills • Freshops

SUBSCRIPTIONS ONLY
Brew Your Own P.O. Box 469121 • Escondido, CA 92046
Tel: (800) 900-7594 • M-F 8:30-5:00 PST
E-mail: byo@pcspublink.com • Fax: (760) 738-4805
Special Subscription Offer
8 issues for \$28.00

EDITORIAL & ADVERTISING OFFICE
Brew Your Own
5515 Main Street
Manchester Center, VT 05255
Tel: (802) 362-3981 Fax: (802) 362-2377
Email: BYO@byo.com

ADVERTISING CONTACT: Kiev Rattee (kiev@byo.com)
EDITORIAL CONTACT: Betsy Parks (betsy@byo.com)

FACEBOOK: www.facebook.com/BrewYourOwn
TWITTER: @BrewYourOwn

Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for \$28.00 per year by Battenkill Communications, 5515 Main Street, Manchester Center, VT 05255; tel: (802) 362-3981; fax: (802) 362-2377; e-mail: BYO@byo.com. Periodicals postage rate paid at Manchester Center, VT and additional mailing offices. Canada Post: Return undeliverables to P.O. Box 25542, London, ON N6C 6B2. 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 print subscription rate to Canada and Mexico is \$33; for all other countries the print subscription rate is \$45.

All contents of **Brew Your Own** are Copyright © 2013 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 19, Number 5: September 2013

Cover Photo: Charles A. Parker



Chris White is the Founder and President of White Labs Inc. Pure Yeast and Fermentation in San Diego, California, which serves the beer, wine and distilling industries. Chris started White Labs in 1995

after researching and developing a library of brewer's yeast strains from around the world. He received an undergraduate degree in biochemistry from UC-Davis, and a Ph.D in biochemistry from UC-San Diego. Besides his duties at White Labs, Chris is a member of the Siebel Institute faculty and a contributor to *Brew Your Own*. On page 28 of this issue, Chris discusses the science behind the hundreds of flavors and aromas created by brewer's yeast during fermentation.



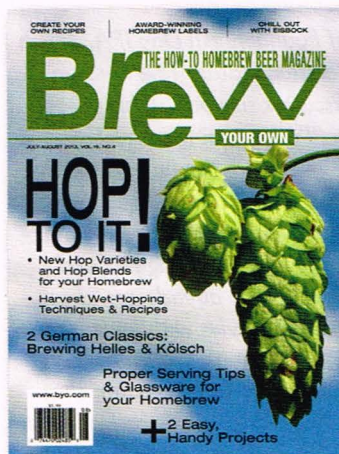
Michael Dawson is the Brand Manager at Wyeast Laboratories, Inc. in Odell, Oregon, which provides fresh, pure liquid yeast to hobbyists and professionals around the world. Before coming to Wyeast, Michael worked as the

Brand Manager and Senior Product Development Manager at Northern Brewer in St. Paul, Minnesota, where he helped create *Brewing TV*, a webcast and community-based project that used video to tell the stories of American homebrewing and craft beer. He is also an active homebrewer and contributes to a number of brewing magazines. In this issue, Michael makes his *Brew Your Own* debut with a story about homebrew pitching rates. Check it out on page 46.



Dawson Raspuzzi is the new Assistant Editor of *Brew Your Own*. Before coming to *BYO*, Dawson had been a reporter with Vermont newspapers since receiving a journalism degree six years ago from Castleton State College.

Dawson has been a homebrewer for the past couple of years, mostly brewing extract batches. He does double time in this issue, talking to two pros about brewing with *Brettanomyces* in "Tips from the Pros" on page 13, and writing about new homebrewing legislation in Mississippi and Alabama that now makes it legal to homebrew no matter where you live in the United States, which appears on page 62.



Helles, Kölsch and glassware

I am writing with regards to two articles in the July-August 2013 Issue of *Brew Your Own*. The first being Horst Dornbusch's article on Helles and Kölsch style beers and the second article on glassware by Ruth Miller. While I enjoyed both articles and found them very informative and educational, I have comments on both.

First, Helles and Kölsch are not summer beers nor are they session beers as the title suggests. Horst clarifies the first point by stating these are year-round staples in Germany, however, the term session is once again misused. These beers are standard strength beers at 4.7–5.0%. Session beers are usually 3.5–4.0 % alcohol by volume. If one looks to the Czech Republic, United Kingdom and Ireland, one will find their standard session beers in this range. This is misleading to the unformed beer drinker in that the assumption is that someone can drink more of them. I continually see the word "session" misused in the USA and I feel compelled to highlight this concern.

Second, Ruth Miller's article covers most beer glasses except one which I find the most versatile: the "Willi Becher." This is my favorite beer glass for any style. It is the style used for the GABF for many years. While certain styles will benefit from other shapes, when evaluating homebrew or tasting a wide variety of beer I would choose this style. Why was this glass style not included? Almost every Bavarian and Czech Brewery uses one size or more of this glass style.

Jim Dunlap
Woodinville, Washington

BYO Editor Betsy Parks responds: Thanks for the feedback on those two articles, Jim. To address the first comment about Horst's piece, I don't disagree with you on the standard guidelines of session beers — which do run smaller than both Helles and Kölsch as they are defined in the Beer Judge Certification Program style guidelines. One of my favorite blogs, The Session Beer Project (<http://sessionbeerproject.blogspot.com/>) addresses a similar issue in a July 22,

2013 post about the success of Founders All Day IPA, which clocks in at 4.7%, but claims session status. The Session Beer Project's Lew Bryson discusses size best in his post of the low-gravity IPA successes, "I'm not going to celebrate All Day IPA as a session beer — though I'm happy to drink it — but I'm going to take its success as a harbinger. And I'm going to encourage other brewers to kick its ass by making a beer that's just as good, just as interesting . . . and under 4.6%. I know they can do it; they already are." For session beer enthusiasts, attention to styles with lower gravities can only be a good thing for the small beer movement.

As for the story about glassware, I have to admit that my favorite glass in the Brew Your Own office collection is a Willi Becher pint glass from Springfield Brewing Company in Springfield, Missouri — home of Mr. Wizard Ashton Lewis. How I could have missed this most beloved glass style when reading Ruth's story is beyond me. Also in that story, the flute illustration on page 56 is incorrectly identified — the proper flute is pictured and identified on page 59 as a Pilsner.

Thanks for Avec Les Bon Voeux

Brewing a clone of the beer Avec Les Bon Voeux has been a major goal of mine since I started brewing a little over a year ago. My first attempt was a miserable failure.

I searched everywhere for a clone recipe with no success. To find a recipe in the May-June 2013 issue of *BYO* was a tremendous coup! I was so excited I brewed it within a week of receiving the issue. I finally cracked open the first bottle and it is absolutely fantastic! I'd love to contact Nathan Smith to send him my personal thanks. Avec Les Bon Voeux was a favorite of my best friend and I. We even visited the Dupont brewery some years ago. I was looking forward to finally presenting him with a successful clone but sadly he passed away prematurely in May due to brain cancer and I wasn't able to share this beer with him. It was a really difficult loss but at least I have the happy memories of sharing Dupont's amazing beer with him every time I open one of these bottles.

Dennis Schissler
via email

Nathan Smith responds: Thanks for the kind words! Avec is a very wonderful and unique beer, and I'm thrilled that the clone recipe worked well for you. Save some of your batch, keep it cool and it has a lot of good aging potential. Next time I share a bottle of Best Wishes I'll remember this story and we'll lift a glass to you and your friend. Thanks for brewing the beer and sharing your story. *BYO*

Wow!



The reviews are in, and brewers are blown away by our two newest yeast strains.

Lallemand BRY-97 and Belle Saison offer the high performance and ease-of-use of dry yeast along with the perfect flavor profile to match their respective styles. Vacuum-sealed Lallemand brewing yeast is tested 24 times to ensure the highest levels of purity, giving you reliable fermentation with every batch of beer you produce.

Trust Lallemand yeast to bring out the best in your full range of ales, lagers and specialty beers.

WWW.LALLEMANDBREWING.COM

NEW NAME | NEW BRAND | NEW PACKAGING

And now, something else that's new in every box - improved formulas and select ingredients. Watch for the new BSG HandCraft packaging at a retailer near you.



1.800.999.2440
BSGHANDCRAFT.COM

ATLANTA | 30336
SAN LEANDRO | 94578
WESTPORT | 02790

homebrew nation

READER PROJECT: Artillery Draft Tower

Thomas Richardson • Trinity, North Carolina



Tools & Materials

105 mm artillery shell
Dedicated right angle tower shank
Dispensing faucet
Tap handle
Shank hardware
1 1/4-inch copper tubing
Beverage tubing
Drill with 1/2-inch carbide drill bit
Grinder
Roto saw
Hand file

In recent years I have built a gravity-fed brew stand, an outdoor bar table from old decking I recycled when I put a new deck on my house, an enclosure and roof around my bar and brewing setup that now allows me to make beer and serve my homebrew outdoors rain or shine, and — my most recent addition — a military draft tower.

The tower was an inspiration from an article in *BYO's* November 2011 issue, "Build a Draft Tower." The idea for my tower came from conversations with my good friends Bo Colbert and Dan Whitford as we sat at my bar enjoying some homebrew and discussing ideas for a unique beer tower. Dan and I are both retired military veterans and were talking about the similarities in the shape of a beer tower and artillery shells, which both of us are familiar with because spent shells were used as butt kits in the barracks — specifically 155 mm shells. Bo suggested we use a smaller model as a draft tower, and as luck would have it, I had recently seen a 105 mm Howitzer artillery shell in a military surplus store that was still available.

After gathering the supplies we

needed, the hardest part of building the tower was drilling through the 105 mm shell because it is made of hardened steel. It took about one hour and three carbide drill bits just to drill the hole for the dispensing faucet.

Installing the shank and tubing also took time because I had to get my hand and arm up into the shell to attach the nuts and washer without being able to see any of the installation, which made the process more difficult than doing so in normal beer towers.

In order to attach the tower to the bartop, I screwed a round block of wood into the bottom of the shell. Then I drilled a hole in the center of the wood block and through my bar to feed beverage tubing up it from a 5-gallon (19 L) corny keg under the bar. I secured the tower by drilling screws from under my bar into the wood block. To finish off the tower, I wrapped a belt of M249 SAW 5.56 mm rounds around its base. Another touch I added is making a tap handle out of an empty M18 smoke grenade complete with M201A1 pull-ring and spoon.

byo.com brew polls

Which best describes how you select a yeast strain for your homebrew?

I use the yeast common for the style of beer I'm brewing
40%

I use the yeast recommended in the recipe
30%

I experiment with various yeast strains
22%

I use whatever yeast I have available
8%



social homebrews



Join *BYO* on Facebook:
www.facebook.com/BrewYourOwn



Follow *BYO* on Twitter at:
@BrewYourOwn

what's new?

Lager Your Homebrew Without a Refrigerator



The LagerJacket allows homebrewers who lack the physical space or desire to own another refrigerator to bring their fermenter down to lager temperatures. The LagerJacket is an immersion-cooling device that sits on top of your existing fermenter and maintains a precise temperature for as long as it is plugged in. With a digital control system, you can set the temperature to as low as the 30s °F (~1 °C). For more details, visit www.brewjacket.com.

Mangrove Jack's Craft Series Yeast



After years of development, Mangrove Jack's has released 8 new beer and one new cider dry yeast strains. Craft Series Yeasts have been propagated and dried using state of the art manufacturing facilities to ensure correct pitching counts, shelf stability, and ease of use. Available to homebrew suppliers through Brewcraft USA, strains include: Bavarian Wheat, British Ale, US West Coast, Burton Union, Bohemian Lager, Belgian Ale, Newcastle Dark, Workhorse Beer and Cider. For more details on the new strains, visit www.mangrovejacks.com.



Antimicrobial Tubing

EJ Beverage has new Antimicrobial and PVC Free Home Tubing Conversion Kits available for home dispensing systems. Derived from medical technologies, the Brew Silver™ beer line and Brew Ultra Barrier™ gas tubing is designed to help eliminate bacteria between cleaning and the potential health and environmental risks of PVC. For more information, visit www.homebrewtubing.com.



calendar



September 14 Pacific Brewers Cup Torrance, California

Long Beach Homebrewers, Pacific Gravity and the Strand Brewers Club present the 17th annual Pacific Brewers Cup. The competition will be held at Smog City Brewery in Torrance. An entry can be two bottles of beer, mead or cider with registration closing August 31. This year's Best of Show winner will have the opportunity to brew their beer at Ohana Brewing Company. Entry Fee: \$7 per entry
Web: <http://pacificbrewerscup.com/>

September 14 Blacksburg Brew Do Homebrew Competition Blacksburg, Virginia

The 5th annual Brew Do craft beer festival will feature an awards presentation for the homebrew competition as well as a plethora of craft beer from local, Mid-Atlantic, and national craft- and micro-breweries. Proceeds from this event benefit The Blacksburg Partnership, a non-profit organization working to enhance the quality of life in Blacksburg. Entry Fee: \$5
Web: <http://blacksburgbrewdo.com/>

September 28 Third Annual Orpheus Cup Mead Fest Denver, Colorado

This mead tasting and homebrew competition at the French Quarter Condominium Clubhouse supports Orpheus Pagan Chamber Choir. Taste over 30 meads from meaderies across the country and at the Homebrewer's Community Tasting Table. Entry Fee: \$10
Web: <http://orpheuspc.org/orpheus-cup-mead-fest.html>

September 28 Maryland Microbrewery Festival Homebrew Competition Westminster, Maryland

Presented by the Midnight Homebrewers' League, the winner of this BJCP-sanctioned homebrew competition will be brewed by Dog Brewing Co. for draft sales at Buffalo Wild Wings restaurants in Maryland.

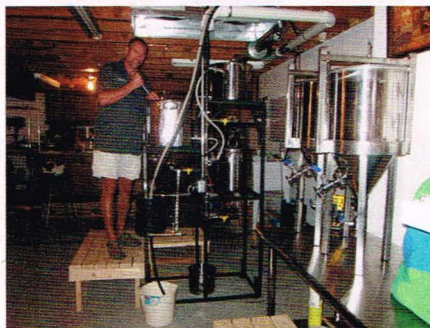
homebrew nation

homebrew drool systems

Basement Brewing

Scott Conrad • Grafton, Wisconsin

I have been a homebrewer for the last 15 years. I started all-grain brewing after two years. Growing tired of stovetop brewing with one kettle and a rigged-up sparging setup, I decided I needed something better. Inspired by your homebrew drool system segment and other pictures I had seen, I decided to build a three-tier gravity system four years ago.



At the time I did most of my brewing in the cold months so I built my new system in the basement. I have three 80,000 BTU wok burners tied into the natural gas of the house. My boil kettle is 9 gallons (34 L) and my HLT is my old 7.5-gallon (28-L) kettle from my stovetop days. I built a counterflow chiller and added ventilation and air intake.



Last fall I added the two SS conical fermenters and bought a pump to move the wort from the chiller to the fermenters as they are a bit more awkward to handle than a car-boy. Trying to maintain a steady mash temperature, I first insulated my mash/lauter tun and then, seeing that I have a pump, added a HERMS setup that works great.



I keg all of my beers, which are then dispensed from the living room kegerator. So far I have brewed all ales but I am looking for a small chest freezer that I can set up to do lagers. My wife Brigitte, being a big fan of my homebrew and also being the gardener, started growing hops at our house that now supply half of the hops I need each year.

**YEAST MADE
FRESH WEEKLY
IN SMALL BATCHES**

**70 STRAINS OF YEAST,
BRETTANOMYCES AND
BACTERIA AVAILABLE**

**GROWN IN 100%
BARLEY MALT**



**BREWER REVIEWS OF
STRAINS ON WHITE LABS.COM**

CONCENTRATED YEAST YOU CAN SEE

**UNIQUE STRAINS COLLECTED
FROM AROUND THE WORLD**

**- BLUEPRINT OF -
WHITE LABS YEAST**

whitelabs.com | yeastman.com

beginner's block

ATTENUATE & FLOCCULATE

by dawson raspuzzi

So you've finished the boil, cooled the wort, pitched your yeast and put your fermenter in a quiet place to let the yeast do what it does best — turn that wort of yours into miraculous, wonderful beer. Over the next week or two the yeast will consume the sugars in the wort to create alcohol and CO₂, a process known as fermentation. Once fermentation concludes it is time to rack the beer, but how can you be sure your beer is fully attenuated? That's what this column is about.

Sure, the hardest part is over, but fermenting beer isn't like cooking dinner in a rotisserie oven where you can just set it and forget it.

Measuring attenuation rates (the percentage of sugars yeast consume during fermentation) is an important step throughout fermentation that is done by tracking the specific gravity of a sample of the wort. The specific gravity of water is 1.000. The density of wort is higher primarily due to the sugars in it. As yeast consume the sugars the density — and therefore the specific gravity — drop. The percent of sugars the yeast consume is known as the apparent attenuation percentage. Alcohol must be removed to determine the *actual* attenuation percentage, however; homebrewers and even some commercial brewers often just rely on the apparent percent.

The first number you need in order to calculate the apparent attenuation percentage is the original gravity (OG), which is the specific gravity of the wort prior to pitching your yeast. After adding yeast, collect a sample of the wort that you can use to take daily hydrometer readings. Remember to record your data from each reading. The specific gravity should drop each day during active fermentation as the sugars are eaten. Fermentation is complete once the specific gravity remains constant

three consecutive days. At this point, record the specific gravity, which is your final gravity (FG). Use the following equation to calculate the apparent attenuation percentage: $[(OG-FG)/(OG-1)] \times 100$

Yeast strains come with stated attenuation ranges (typically between 65-85%). A handful of factors such as mashing temperatures, fermentation conditions and gravity of a particular beer may cause attenuation to vary, but when your beer is through fermenting it should fall within the range of the yeast used. Those ranges are useful when choosing yeast for a specific beer style. For instance, when brewing an American pale ale you want a yeast strain that will produce a dry finish and allow the hop flavors to come through. Chris White, president of White Labs, suggests in a *BYO* article from January 1999 that a good choice would be a neutral yeast with an attenuation of 70-80%. When making an English-style mild ale, White suggests a strain with a lower attenuation in the range of 65-70%.

Following fermentation, yeast normally flocculates (when cells aggregate together into clumps and descend to the floor of the fermenter) leaving a clean, clear beer above it. If yeast flocculate too early the beer will be under-attenuated and sweet, and may contain unacceptably high levels of diacetyl (butter-like aroma) and acetaldehyde (green apple aroma). In the case the yeast does not flocculate, the beer will remain cloudy and have a stronger taste of yeast.

Not all yeast flocculate at the same rate. Beer styles that are known for their cloudy haze, such as a hefeweizen, use yeast with a low flocculation rate (the cloudiness in commercial examples is also due to being unfiltered) while an English ale strain would fall on the other end of the spectrum.

FROM THE MOST INNOVATIVE HOMEBREW SHOP IN THE COUNTRY...



...A CLEANER CLEAN



ENZYMATIC CLEANER

ORDER NOW!
215-855-0100
KEYSTONEHOMEBREW.COM

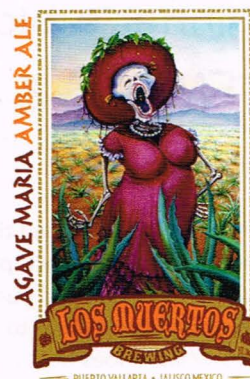
{ **WHOLESALE
INQUIRIES
WELCOME** }

homebrew nation

by marc martin

DEAR REPLICATOR, MY WIFE AND I VISITED PUERTO VALLARTA, MEXICO, IN EARLY MARCH. I FIGURED I COULD SURVIVE ON BOHEMIA AND NEGRO MODELO, SO YOU CAN IMAGINE MY SURPRISE THAT THERE WAS AN ACTUAL BREWPUB IN TOWN. WE VISITED LOS MUERTOS THE FIRST DAY AND I WENT BACK SEVERAL TIMES. THEY HAD AN AMBER ALE THAT WAS VERY MUCH LIKE AN OCTOBERFEST STYLE WITH A NICE MALTY RICHNESS. WE ALWAYS HAVE A FALL OCTOBERFEST PARTY AND I WAS HOPING YOU COULD GET SOME INFORMATION SO I COULD BREW THIS NICE BEER.

DIRK VAN GUNDY
CHICAGO, ILLINOIS



Proving once again the Replicator will go to any length to help a reader, I spent a week in Puerto Vallarta, Mexico, this April. During my visit to Los Muertos brewpub I met owner and brewer, Conner Watts, who has deep homebrewing roots.

Conner's road to opening the first brewpub in this tourist mecca began when he tasted a coffee porter homebrewed by the uncle of his roommate at University of Colorado. Homebrewing had become his passion by the time he returned to his home state of Utah, sometimes brewing up to 30 gallons a month.

Conner and his wife opened a successful restaurant, but after a few years became tired of the cold Utah winters and moved to their favorite vacation spot, Puerto Vallarta. He had no intention of opening a brew-

pub but he longed for the good American craft beers. Finally he decided to roll the dice and open the city's first "Cerveceria Artesanal." To gain experience on a larger scale, Conner first spent a summer working at Coopersmith Pub and Brewery in Fort Collins, Colorado.

He soon discovered that opening a brewpub in Mexico came with a lot of challenges. The word "brewpub" has no Spanish translation and the city didn't have procedures to license a beer-making restaurant. Using a local legal team to jump this hurdle, the next challenge was sourcing brewing equipment. He found a stainless fabricator in Guadalajara who he commissioned to build a seven barrel system. In order to fit the space they had to be taller and narrower than normal.

In November 2012 Conner opened Los Muertos, (The Dead),

which pays tribute to the popular local beach where Conner and his wife were married.

A couple of months later, with the red tape handled and their new brewing system in place, Conner brewed his first batch, the Agave Maria Amber. This winter Los Muertos is on track to brew a lineup of seven ales.

I found the Agave Maria to be very close to a Vienna-style lager with a color that is medium copper with light red highlights and a fine white head. This is a very malt-forward beer due to the low hopping level and the somewhat high level of crystal malt.

Dirk, this fall you can bring a taste from south of the border to your Oktoberfest party because you can "Brew Your Own." For more information about Los Muertos, visit www.losmuertosbrewing.com or call the brewery at 01-322-222-0308. **BYO**

Los Muertos Brewing's Agave Maria Amber Ale Clone (5 gallons/19 L, extract with grains)

OG = 1.050 FG = 1.011 IBU = 20 SRM = 12 ABV = 5.1%

Ingredients

3.3 lbs. (1.5 kg) Briess, light, unhopped, liquid malt extract
22 oz. (0.62 kg) light, dried malt extract
22 oz. (0.62 kg) crystal malt (60 °L)
1.0 lb. (0.45 kg) Munich malt
6.0 oz. (0.17 kg) Victory® malt
4.0 oz. (0.11 kg) agave nectar (extract) (5 min.)
4.5 AAU Willamette hop pellets (60 min.) (0.9 oz./26 g at 5.0% alpha acids)
3.3 AAU U.S. Golding hop pellets (30 min.) (0.7 oz./20 g at 4.75% alpha acids)
3.3 AAU Target hop pellets (0 min.) (0.3 oz./8.5 g at 11% alpha acids)
½ tsp. Irish moss (30 min.)
½ tsp. yeast nutrient (15 min.)
White Labs WLP 001 (American Ale) or Wyeast 1056 (American Ale) or Safale

US-05 (American Ale) yeast
¾ cup (150 g) of corn sugar for priming (if bottling)

Step by Step

Steep the crushed grain in 2 gallons (7.6 L) of water at 152 °F (67 °C) for 30 minutes. Remove grains from the wort and rinse with 2 quarts (1.9 L) of hot water. Add the liquid and dried malt extracts and boil for 60 minutes, adding hops and other additions per schedule. Once the boil is complete, 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. Allow the

beer to condition one week and then bottle or keg. Allow the beer to carbonate and age two weeks and enjoy.

All-grain option:

This is a single-step infusion mash using 7.5 lbs. (3.4 kg) 2-row pale malt to replace the liquid and dried malt extracts. Mix all of the crushed grains with 13 qts. (12.3 L) of 164 °F (73 °C) water to stabilize at 152 °F (67 °C) for 60 minutes. Slowly sparge with 175 °F (79 °C) water. Collect approximately 6 gallons (22.7 L) of wort runoff to boil for 60 minutes. Reduce the 60-minute Willamette hop addition to 0.7 oz. (19.8 g) (3.5 AAU) and the 30-minute Golding additions to 0.5 oz. (14 g) (2.37 AAU) to allow for the higher utilization factor of a full wort boil. Follow the remainder of the extract with grains recipe.

Brettanomyces

tips from the pros
by Dawson Raspuzzi

Don't fear the Brett

BRETTANOMYCES CONTRIBUTES TART, DRY CHARACTERISTICS TO BEER AND IS OFTEN DESCRIBED AS BRINGING A "SWEATY HORSE BLANKET" TASTE OR AROMA TO BEER, WHILE OTHER STRAINS HAVE A CHERRY PIE-LIKE FLAVOR. BECAUSE OF ITS FUNKY ATTRIBUTES, *BRETT* HAS BEEN KNOWN AS A SCOURGE TO WINEMAKERS FOR CENTURIES AND HAS BEEN AVOIDED BY MANY BREWERS AS WELL. BUT HERE ARE TWO PROS WHO CERTAINLY DON'T FEAR THE *BRETT*.

The methods of brewing with *Brettanomyces* weren't really established; they were created more by default as *Brettanomyces* found its way into beer. That's why it's considered a wild fermentation. First, brewers got spontaneous fermentation in styles like lambics and English porters, then came controlled inoculation or purposeful inoculation — primarily in secondary fermentation — to affect the flavor profile.

There are four different species of *Brettanomyces* commonly found in beer: *lambicus*, *bruxellensis*, *clausenii*, and *anomalous*. They're not the same by any imagination; some produce better flavors than others.

Brett adds fruitiness to beers in addition to a high acidity taste. It also has a pretty incredible impact on keeping the freshness more intact and delaying degradation of the beer, while enhancing the beer at the same time. *Brett* beers evolve — as a little bit of fermentation takes place you get new esters that form in the bottle; that's one of the things that is nice about a refermented bottle. In addition to creating new esters and flavor compounds in the bottle while aging, what it's also doing is re-esterification where esters break down and form new esters. There are many good things happening in that beer over time. It is getting dryer, you do lose some esters, but other things are going on to supplant what was there and it evolves well.

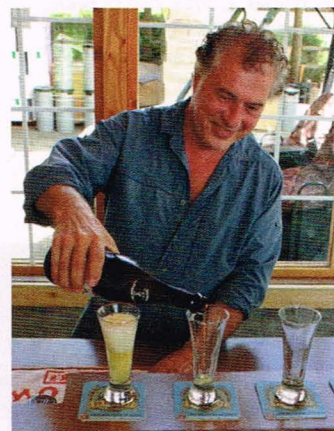
Some people are doing 100 percent *Brett* beers, which I have not tried because I have not personally

found them to be all that desirable flavor-wise. When brewing a 100 percent *Brett* beer, many brewers will wait 6 to 12 months in fermentation. We add *Brett* in secondary (after adding *Saccharomyces* in primary) and with the strains we use we give it two weeks conditioning and we see the pellicle forming, pH dropping, and flavor development occurring. At that point the beer is distinct and very flavorful.

We make our Seizoen with *Saccharomyces* yeast for primary fermentation and a Seizoen *Bretta* that has the addition of our unique strand of *Brett*, in which the maltiness drops out of it. It can almost seem sweeter because of the fruitiness but it is dryer because the malt is not prevalent and the *Brett* tends to eat up a lot of hop flavors as well, however the bitterness remains constant.

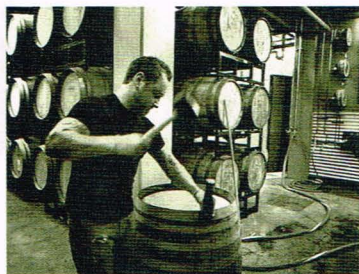
Some brewers are really paranoid about bringing *Brett* into their brewery, or any yeast that is not their brewing strain. In my 25 years of experience, I can say *Brett* should not be feared — contamination should not be an issue for people with a normal cleaning and sanitation regiment.

For anyone who wants to brew with *Brett*, my advice is to experiment with different strains. Try a few different things, and try to manage the yeast and have a big enough cell count to get you a good start. The other important thing is to have patience and continue evaluating your brew over time. It might take a year to get your head wrapped around it and get your beer moving in a direction you want it to.



DAVID LOGSDON is an expert in all things yeast. In 1986, David founded Wyeast Laboratories where he cultured countless strains of yeast, including *Brettanomyces* strains he collected from Belgium. He was also a founding partner and the first brewer of Full Sail Brewing Co. in Hood River, Oregon. After selling his share of Wyeast a few years ago, David started Logsdon Organic Farmhouse Ales in Hood River. Logsdon's Seizoen *Bretta* with *Brettanomyces* won a gold medal in the 2012 Great American Beer Festival.





GABE FLETCHER is the Founder and Brewer of Anchorage Brewing Co. in Anchorage, Alaska. After 13 years as the Head Brewer of Midnight Sun Brewing in Anchorage, Gabe began his own brewery in 2010 where every beer he makes is fermented and aged in oak barrels and includes *Brettanomyces*. Gabe's love of *Brett* is illustrated in Anchorage's slogan, "Where brewing is an art and *Brettanomyces* is king!"

I use *Brettanomyces* because I love how versatile it is. *Brett* can adapt to almost any situation and has a huge range of flavor when fermented in different ways. The other big benefit is its shelf-life stability. You can make a super hoppy Belgian DIPA and the *Brett* will continue to live in the bottle, absorbing any oxygen that is left from the brewing process. After two years the hop flavor is still fresh without the cardboard character from oxidized hops. Eventually the hops die down, but instead of the beer going stale, the *Brett* flavors come to the forefront and you have a whole different experience to enjoy.

Most of my beers have three different yeasts in three different fermentations. I use a Belgian strain for primary fermentation and then I secondary with *Brett* (usually *bruxellensis* from Wyeast) in small barrels. Lastly, I bottle condition, usually with wine yeast. Layering the flavors from all the different fermentations adds a real

depth to the beers.

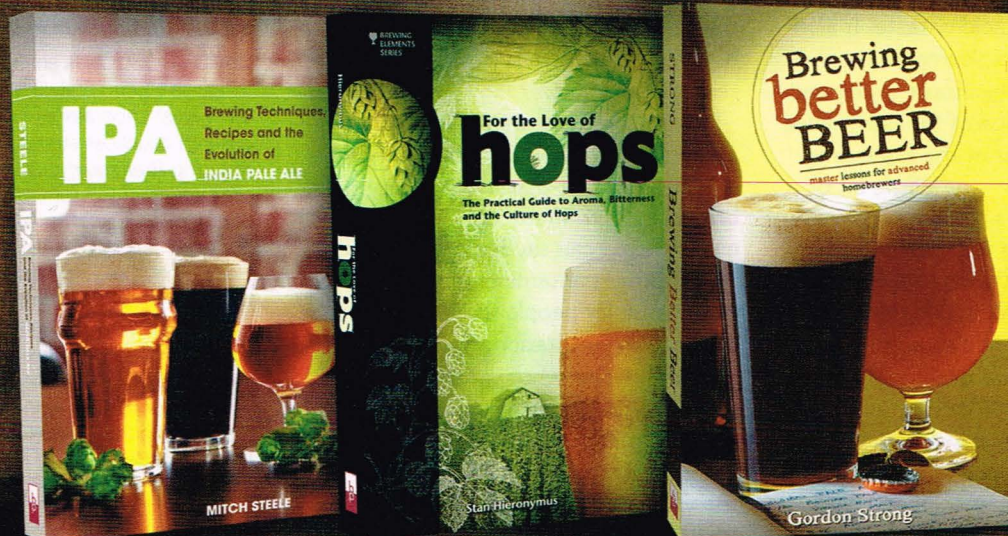
When brewing a long-aging *Brett* beer, I do a mash temperature of 158 °F (70 °C) to add more dextrans to the wort so the *Brett* has something to chew on during its fermentation in barrels. For beers with a shorter time in barrels, I do a low mash temperature around 146 °F (63 °C), and don't go over 13 °Plato (1.053 SG) for the starting gravity. The primary yeast takes care of most of the sugars before the *Brett* comes into play.

To experiment with *Brett*, brew your favorite Belgian-style recipe. During secondary, add a couple smack packs of *Brett* and let it sit for 6-8 months. Don't disturb the pellicle that will grow on the top of the beer; that's what protects the beer from oxidation. After 6-8 months, transfer it off the pellicle and bottle condition with a Belgian or wine yeast culture. Give it 3-4 weeks in the bottle and enjoy. **BYO**

For more of Gabe's tips on *Brett*, visit <http://byo.com/story2848>



BEER BOOKS *for any* BREWER



NEW RELEASES

Shop the entire
Brewers Publications
catalog

BrewersPublications.com

Brewers Publications
A Division of the Brewers Association
www.BrewersAssociation.org



Mash Mixer Efficiency

Confusion over sparge temperatures

help me
mr. wizard
by Ashton Lewis



Q

IN THE MAY-JUNE 2013 ISSUE OF *BYO* I DETAILED A HOME PROJECT TITLED "JACKETED MASH MIXER" ABOUT HOW TO BUILD A MASH MIXER. I USED TO GET 75-80% MASH EXTRACT EFFICIENCY WITH MY PREVIOUS EQUIPMENT BUT I HAVE BEEN GETTING AT LEAST 90% SINCE I STARTED USING MY MASH MIXER. I HAVE READ THAT MASH EFFICIENCY IS SUPPOSED TO BE MORE A FUNCTION OF GRAIN CRUSH AND LAUTERING, BUT NOW I THINK THE CONTINUOUS MIXING OF GRAINS IS EQUALLY IMPORTANT AS IT HELPS TO LOOSEN STARCH OUT OF THE MALT KERNELS AND THEREFORE INCREASES EXTRACT YIELD. THE ONLY CHANGE TO THE PROCESS THAT CORRELATES TO THIS INCREASE IN MASH EFFICIENCY IS THE USE OF THE MASH MIXER. SAME LAUTERING METHOD, AMOUNT OF WATER TO SPARGE AND EVEN GRAIN CRUSH.

WALTER DIAZ
TUCSON, ARIZONA

A

Excellent question, Walter, and very nice empirical data related to this topic. I don't

think there is any question that mash mixers have a very real effect on extract yield and this is certainly one of the reasons they are used. When writing about mashing I often combine the topic of multi-temperature mashing together with the tool of choice for the process, the mash mixer, and really take the tool for granted in these mash discussions. So I will spend a little time focusing on the humble mash mixer.

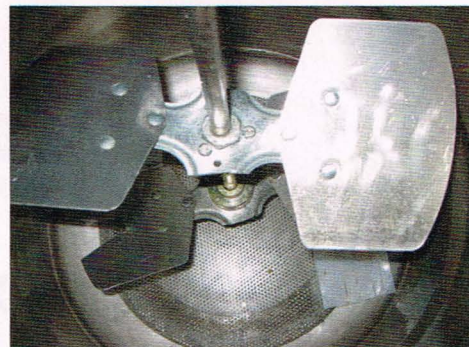
The types of mash mixers used by commercial brewers have three main features. The first is the grist hydrator, which is a device designed to blend water and grist as the two streams flow into the top of the mash mixer. Most grist hydrators are designed in such a way to combine the two streams without the use of any motors or internal components that may clog when used and the desired result is uniformly hydrated grist flowing freely into the mash mixer. If grist is simply dumped into a mash mixer while water is being pumped in from a separate line, the result is large clumps of grist that are not fully hydrated. These clumps never fully break apart during mashing and you end up with a decrease in

yield. For this reason, grist hydrators are really important features of well-designed mash mixers.

The second and third key features

“I don't think there is any question that mash mixers have a very real effect on extract yield . . .”

of the modern mash mixer are tied at the hip, so I will discuss them together; these features are the mixer and the heating jacket. The primary purpose of the mixer is to move the mash around in order to provide uniform heat transfer from the steam jacket to the mash. If the mixer is run too slowly, or simply turned off for experimental purposes, the mash touching the steam jackets will become very hot and begin to boil, but the mash a few inches into the center is slow to react to the heat because mash is thick and does not develop convection currents like pots of liquids that do not contain solids. The home cook knows to gently stir a pot of chili when placed on high heat to avoid scorching the bottom of the pan and the food adjacent to the heat source, and this is really how the mixer is used in a mash mixer.



help me mr. wizard

A mixer is really a type of pump when one considers how the mixer affects the fluid in the container being mixed. Mash mixers are designed to pump the mash downward into the bottom of the mixer. When this happens, the mash flows across the surface of the bottom "head" or dish of the mash mixer and up the sides. Since the heating surfaces are located on the bottom head and the shell of the mash mixer, this pumping motion greatly improves uniform heating of the entire volume of mash. Almost all modern mash mixers use low-shear mixer impellers that run at a relatively slow speed and do not excessively damage husk pieces during the course of mashing. This feature improves the performance of the lauter tun and is considered an extremely important design element of the modern mash mixer. Some older mash mixer designs used mixers that caused more shear damage than modern designs and, due to their less than ideal shape, were often equipped with baffles to help keep the mash homogeneous.

The steam jackets are used for heating, and most mash mixers are nearly covered with heating surface when in use. Homebrewers very, very rarely have steam-heated equipment and instead use electric or gas flame heaters for mash mixers. The important thing to take away from steam-heated designs is the ability to turn off the heat with very minimal thermal lag. If you are heating mash on a kitchen stove and turn the heat off, you know that the

heating element does not cool instantly and will continue heating the mash. Even with steam- or gas-heated mash mixers there is a time delay between turning the heat off and the cessation of heating as measured by changes of temperature within the mash. These are forms of thermal lag and experience will tell you how much lag to expect in your system. In order to control the process, know your lag and simply shut the heat supply off before hitting your set point.

So that is a basic description of the tool known as the mash mixer. One of the nice things that accompany grist hydration and mash mixing is improved extract yield over infusion mash systems. The reason for the improvement in yield is exactly as you suspect; the continuous or intermittent mixing, depending on how the mixer is used, improves starch dissolution and this has a direct effect on extract yield.

I think many homebrewers assume that commercial brewers use mash mixers only when they want to brew beers that benefit from multi-temperature mashing. But the fact is that the mash mixer and lauter tun brewhouse configuration has a few very real advantages over the simple infusion mash method that indeed works so well for smaller brewers. Mash mixers are easy to operate, they can consistently be used to produce uniform mashes, they can be used for single or multi-temperature mashes, they can be used to mash-off before transferring to the lauter tun,

Attention Brewers:

MoreBeer!'s New East Coast Distribution Center Now Open!

- Faster Shipping Times
- Orders Still Shipped Free Over \$59
- Same Great Customer Service!

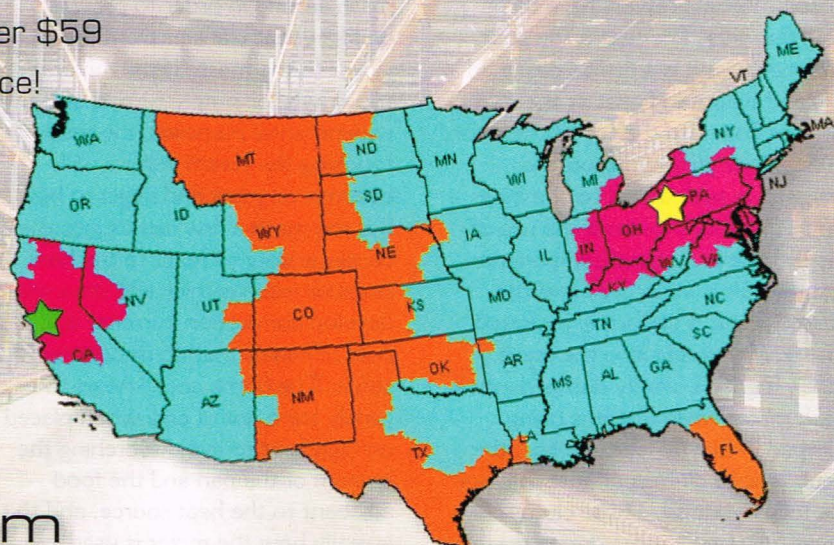
Time In Transit

- 1 DAY
- 2 DAY
- 3 DAY
- ★ PA Warehouse
- ★ CA Warehouse



MoreBeer.Com

Home Brewing Supplies & Equipment • 1-800-600-0033



and they are easy to clean.

Lauter tuns are easier to fill than infusion mash tuns because the mash thins dramatically during mashing, they are used in conjunction with mash mixers to achieve very high extract yield (usually in excess of 92% of laboratory or hypothetical yield), and quickly and efficiently discharge the spent grains after sparging. This is why craft brewers began migrating away from infusion mash tuns as breweries grew in size.

At Springfield Brewing Company we have a 3-vessel brewhouse consisting of a combination mash mixer/brew kettle, lauter tun and whirlpool. We use our mash mixer for a variety of mash types, ranging from long, multi-temperature mashes with the occasional inclusion of rice or corn, to short, single-temperature mashes followed by mash-off at 168 °F (76 °C). Our mashes are pumped to our lauter tun for wort collection and our typical extract yield for brews up to about 15 °Plato (1.061 SG) is right at 94% of laboratory yield. We monitor our wort gravity during wort collection and terminate wort collection when we hit 2 °Plato (1.008 SG).

Q I BATCH SPARGE AND CANNOT SEEM TO FIND AN ANSWER TO A QUESTION I HAVE HAD FOR SOME TIME. WHEN BATCH SPARGING, IS IT THE SPARGE WATER THAT SHOULD BE AT MY MASH OUT TEMPERATURE, OR IS IT THE GRAIN BED THAT NEEDS TO BE AT MY MASH OUT TEMPERATURE? IT SEEMS TO ME IT WOULD BE THE GRAIN BED, BECAUSE MY FRIENDS THAT DIRECT-FIRE THEIR MASH TUN WILL BRING THE GRAIN BED TO THE MASH OUT TEMPERATURE. BUT MY BATCH SPARGE FRIENDS TELL ME IT IS ONLY THE SPARGE WATER THAT YOU ADD THAT SHOULD BE AT THE MASH OUT TEMPERATURE, WHICH WOULD NOT BRING THE GRAIN BED UP TO THE MASH OUT TEMPERATURE.

JESSE MCCONNELL
FORT COLLINS, COLORADO

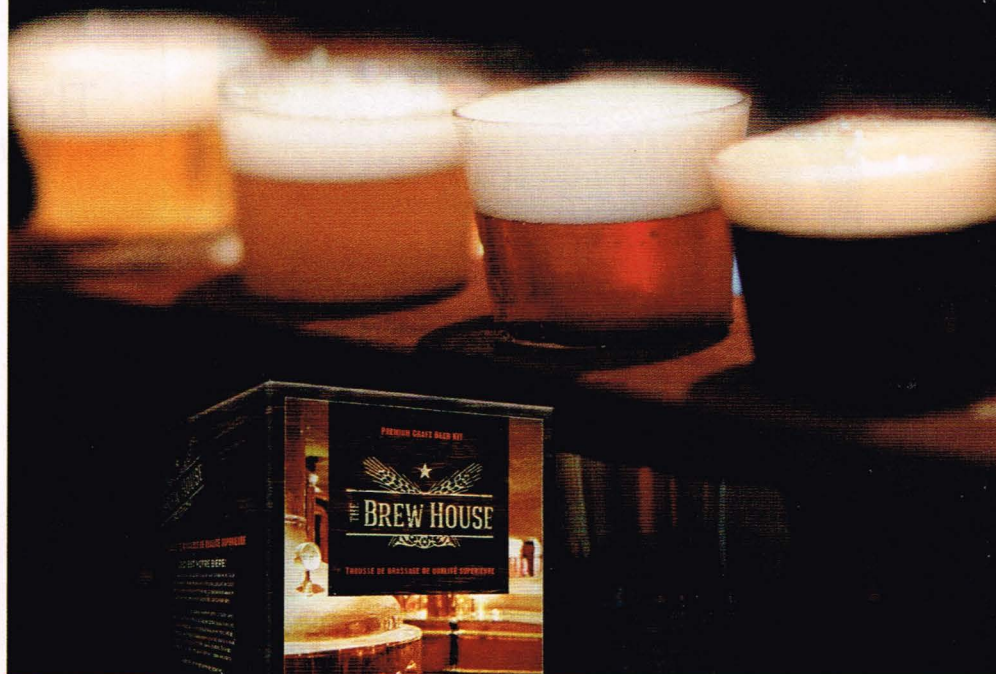


YOUR CRAFT. YOUR BEER.

THE BREW HOUSE MAKES QUALITY CRAFT BREWING SIMPLE!

The Brew House transforms the best barley, malt and hops into small batches of fresh wort by using traditional craft brewery methods. We then immediately package this wort, capturing all of its delicate aromas and flavours. No sugar, no concentrate, no extract. Just pure, fresh, unfermented beer.

Craft your favourite beer style today!



rjscraftwinemaking.com

Please enjoy responsibly



help me mr. wizard

A This question is a bit more about semantics than any real issues with sparge temperature, in my view of things. Bear with me while I explain how commercial brewers normally mash out and sparge. Most commercial brewers use stirred mash mixers for mashing and raise the mash temperature to about 168 °F (76 °C) before pumping the mash to the lauter tun. When sparging ensues, the water temperature is normally controlled to about 168 °F (76 °C). These procedures vary among breweries, but in general this is how things are done. The practical reason for controlling sparge water temperature instead of monitoring the grain bed temperature is because measuring and controlling water temperature is easy and reliable, whereas measuring and attempting to change the grain bed temperature by changing the sparge water temperature is neither easy nor reliable. Lauter tuns have raking machines that cut the grain bed and rarely have temperature probes installed to monitor grain temperature because there really is little use for measuring the grain bed temperature during this relatively short process.

OK, let's move into the homebrewing realm and discuss infusion mashing for a moment. In the infusion mash tun there is no practical way to stir the mash and increase the mash temperature as with a mash mixer. This is why the name "infusion mashing" is often more completely

described as "single-temperature, infusion mashing." Brewers who use infusion mashing often times use the same basic brewing rules as those who use stirred mashing and sparge with 168 °F (76 °C) water because they do not want to run the risk of extracting tannins from the malt husk with hotter water. The truth is that hotter sparge water can be used since it is the temperature of the whole that is important when it comes to solubility.

When you batch sparge you don't control sparge flow rate like the typical continuous sparging set-up, but the temperature control methods are the same; sparge water is heated in a single hot water tank to the desired temperature or very hot water and ambient water are blended in-line as the water flows into the sparge line. If you are an infusion masher (no mash off used) and would like to add a few levels of complexity to your rig, you could measure the wort temperature as it exits your mash tun and use hotter water to bring the wort temperature up to 168 °F (76 °C). After this temperature is hit, you would then want to finish the sparge with 168 °F (76 °C) sparge water. As I write this, the process engineer in me cringes since this is a veritable control logic train wreck for a reason I am not sure the average small commercial brewer or homebrewer is likely to not be able to justify from an economic or flavor perspective. I hope this answer has given you some information to fine-tune your sparging technique. **BYO**



BREW MASTERY

Our custom recipe application, **BrewBuilder™**, allows you to create, edit, share & buy recipes right from one convenient page.

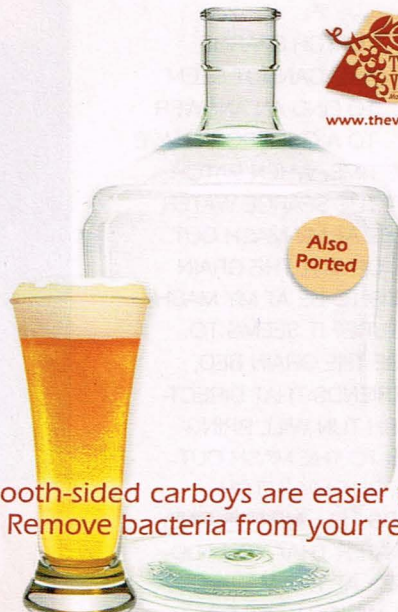
Create one of your own recipes or customize one of **OVER 1,100 HOMEBREW RECIPES** - and then buy it with the click of a button!

Create & buy a **BrewBuilder™** recipe and **SAVE 10%** when you enter: **BBBYO**

Brewmasters
• **WAREHOUSE** •
brewmasterswarehouse.com

The Secret Ingredient

(is the one that's not there)



THE VINTAGE SHOP
www.thevintageshop.ca

Smooth-sided carboys are easier to clean.
Remove bacteria from your recipe.

MADE IN CANADA

BPA FREE

Lighter than glass. 3 sizes to choose from. Easy to clean smooth base. Contact your retailer for more information.

Old Ale

Rich, malty flavor in a glass

I spent a few weeks at a software industry conference in Edinburgh, Scotland, many years back. After the day's events, I wandered around town enjoying the sites and looking for great beer. Eventually, I found a pub with one of my favorite beers on cask, Theakston's Old Peculier. Each evening I would walk over to my new-found local to have a pint or three.

It is difficult to describe the wonder and joy I had drinking Old Peculier on cask. I feel it is the best example of old ale; one that is complex and not sweet. I am a big fan of the smaller, less-sweet, more complex examples of this style, like Old Peculier and Greene King Olde Suffolk. Both have a wonderful vinous quality underlying the beer along with some subtle sourness and other funky stuff. While they may not have the high alcohol described by the BJCP style guide — Old Peculier is 5.6% ABV (alcohol by volume) and Strong Suffolk is 6% ABV — these beers have complex malt and fermentation character that most other examples lack. (As a side note, the locals were shocked that I would drink several pints of such high alcohol ale. It was double the ABV of what everyone else was drinking. Given my location, Old Peculier is a high alcohol beer.)

The BJCP definition of old ale is a bit schizophrenic. It defines old ale as big and rich, with alcohol warming, but goes on to talk about stock ale blended with mild or bitter. Less alcohol than barleywine, but more sweetness. So a poorly attenuated English barleywine? What? No. It only gives a nod to the smaller, more complex old ales such as Old Peculier. To its credit, the BJCP style guide, like great cask ale, is a living thing, even if it sometimes evolves slower than we desire.

Unfortunately, most competitions in the United States still seem to reward only sweet, full, less complex examples of the style. When tasting English barleywine and old ale, one

might ask what is the difference between the two styles? The BJCP style guide says that an old ale is not as big as a barleywine yet it is sweeter than a barleywine. Some might say it is because the old ale is aged and shows complexity from aging. Keep in mind barleywines, stock ales, and old ales each are different, but they are all of similar origin.

If you want to win at competition, you need to focus on bigger beers for this category. The judges do not know you have exceeded the style parameters, so go for it. They expect a beer with warming alcohol, sweet malt complexity, vinous notes, and lots of Sherry-type oxidation. Lean toward a darker beer, but avoid roasted character. Hop bitterness should just barely balance the malt sweetness and late hop character should be non-existent. While I love the hint of tart funk of Old Peculier and Strong Suffolk, don't go down that road if you want to win a competition. If you were to send in a flawless bottle of Old Peculier, you would get more than a few judges telling you about "sanitation and lack of malt character." (They mean malt sweetness, which is not the same as malt character.) *Grumble, grumble.*

Old ale, like English barleywine, has rich malty flavors, and much of that comes from proper base malt selection. To brew an award-winning example of this style, start with British pale ale malt as the base. It provides that background biscuit-like malt character that is a key component in fine British beers. British pale ale malt is kilned a bit darker (2.5 to 3.5 °L) than the average American two-row or pale malt (1.5 to 2.5 °L) and this higher level of kilning brings out the malt's biscuity flavors. Some brewers use domestic pale ale malt or domestic two-row with the addition of 5–10% Munich malt when they cannot source British pale ale malt. This will not produce the same beer as using British pale ale malt, but it can pro-

style profile

by Jamil Zainasheff



OLD ALE by the numbers

OG:	1.060–1.090 (14.7–21.6 °P)
FG:	1.015–1.022 (3.8–5.6 °P)
SRM:	10–22
IBU:	30–60
ABV:	6.0–9.0%



Photo by Charles A. Parker/Images Plus

Continued on page 21

Old Ale**(5 gallons/19 L, all-grain)**

OG = 1.093 FG = 1.022

IBU = 66 SRM = 21 ABV = 9.0%

Ingredients

17.4 lbs. (7.9 kg) English pale ale malt
 10.6 oz. (300 g) crystal malt (80 °L)
 3.5 oz. (100 g) black patent malt
 (525 °L)
 8.0 oz. (227 g) Lyle's Black Treacle
 (100 °L) (5 min.)
 16.5 AAU Target (60 min.) (1.5 oz./42 g
 at 11% alpha acids)
 1 tsp. Irish moss
 White Labs WLP013 (London Ale) or
 Wyeast 1028 (London Ale) or Danstar
 Nottingham yeast

Notes

When I homebrew I use Crisp Malting's British pale ale malt (made from Maris Otter) as my base grain, but other malts of a similar nature should work well. Remember, the bulk of the flavor comes from the base grain, so try to get British pale ale malt. I like the Thomas Fawcett crystal malts, as they have a huge caramel flavor that is very British. I have used black malt from a number of suppliers over the years and find that those from Britain are still best. Feel free to substitute any high quality malt of a similar flavor and color from a different supplier. My hops are in pellet form and come from Hop Union, Willamette Valley, or Hopsteiner depending on the variety.

Step by Step

Mill the grains and dough-in targeting a mash of around 1.5 quarts (1.4 L) of water to 1 pound (0.45 kg) of grain (a liquor-to-grist ratio of about 3:1 by weight) and a temperature of 152 °F (67 °C). Hold the mash at 152 °F (67 °C) until enzymatic conversion is complete. Infuse the mash with near-boiling water while stirring or with a recirculating mash system raise the temperature to mash out at 168 °F (76 °C). Sparge slowly with 170 °F (77 °C) water, collecting wort until the pre-boil kettle volume is around 6.5 gal-

lons (25 L) and the gravity is 1.072. If you should come up short on the pre-boil gravity, top it off with some dried malt extract. The total wort boil time is 90 minutes. This helps concentrate the wort and aids in the development of flavor compounds. You should check the gravity of your wort before you add your first hop addition. If the boil is not tracking according to plan, keep boiling until you are at the right gravity, and then add your first hop addition. The first hop addition comes with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil and the treacle during the last couple of minutes (stir thoroughly).

Chill the wort to 68 °F (20 °C) and aerate thoroughly. The proper pitch rate is 16 grams of properly rehydrated dry yeast, 3 packages of liquid yeast, or 1 package of liquid yeast in a 1.3 gallon (5-L) starter. Ferment at 68 °F (20 °C) to start, raising the temperature gradually to 70 °F (21 °C) for the last ¼ of fermentation. When finished, carbonate the beer to approximately 2 volumes.

Old Ale**(5 gallons/19 L, extract with grains)**

OG = 1.093 FG = 1.022

IBU = 66 SRM = 21 ABV = 9.0%

Ingredients

11.6 lbs. (5.26 kg) English pale liquid malt extract
 10.6 oz. (300 g) crystal malt (80 °L)
 3.5 oz. (100 g) black patent malt
 (525 °L)
 8.0 oz. (227 g) Lyle's Black Treacle
 (100 °L) (5 min.)
 16.5 AAU Target hops (60 min.) (1.5
 oz./42 g at 11% alpha acids)
 1 tsp. Irish moss
 White Labs WLP013 (London Ale) or
 Wyeast 1028 (London Ale) or Danstar
 Nottingham yeast

Notes

Ask your local homebrew shop for an English-style liquid malt extract. If they do not have any, English-style extract

made from 100% Maris Otter malt is available from several online suppliers. Always choose the freshest extract that fits the beer style. If you cannot get fresh liquid malt extract, it is better to use an appropriate amount of dried malt extract (DME) instead. I like the Thomas Fawcett crystal malts, as they have a huge caramel flavor that is very British. I have used black malt from a number of suppliers over the years and find that those from Britain are still best. Feel free to substitute any high quality malt of a similar flavor and color from a different supplier. My hops are in pellet form and come from Hop Union, Willamette Valley, or Hopsteiner depending on the variety.

Step by Step

Mill or coarsely crack the specialty malt and place loosely in a grain bag. Steep the bag in about 1 gallon (~4 L) of water at roughly 170 °F (77 °C) for about 30 minutes. Lift the grain bag out of the steeping liquid and rinse with warm water. Allow the bags to drip into the kettle for a few minutes while you add the malt extract. Do not squeeze the bags. Add enough water to the steeping liquid and malt extract to make a pre-boil volume of 6.5 gallons (25 liters) and a gravity of 1.072. Stir thoroughly to help dissolve the extract and bring to a boil.

The total wort boil time is 90 minutes. This helps concentrate the wort and aids in the development of flavor compounds. You should check the gravity of your wort before you add your first hop addition. If the boil is not tracking according to plan, keep boiling until you are at the right gravity, and then add your first hop addition. The first hop addition comes with 60 minutes remaining in the boil. Add Irish moss or other kettle finings with 15 minutes left in the boil and the treacle during the last couple of minutes (stir thoroughly). Chill the wort to 68 °F (20 °C) and aerate thoroughly. Follow the fermentation and packaging instructions for the all-grain version.

duce a pleasant malt background.

Extract brewers should make the effort to source an extract made from British pale ale malt. If you end up using domestic two-row malt extract, you will need to compensate by partial mashing some additional specialty malts such as Munich or biscuit. For a 5-gallon (19-liter) batch, use about 5–10% of the total base malt.

All-grain brewers should use an infusion mash with a temperature in the range of 149–154 °F (65–68 °C). Use a lower temperature when using lower attenuating yeasts or higher starting gravities. Use a higher mash temperature when using the higher attenuating yeasts or lower starting gravity beers. If you are unsure, a great starting point is 152 °F (67 °C).

Some amount of crystal malt is a good addition, but keep it around 5% or less. I prefer to use darker color crystal malts (60–150 °L), which add rich color as well as some dark caramel, toasty, roasted, and raisin flavors. Lighter color crystal malts (10–30 °L) add sweeter caramel notes, which can make a big beer seem more like hard candy. A touch of highly kilned malts, such as black patent or roasted barley, can add a hint of balancing dryness and the depth of color that judges are looking for. Give the judges what they expect and throw in a tiny bit of highly kilned malt for color and balance.

A friend told me once you could not make old ale without treacle. It adds a distinct flavor and aroma that is apparent in some of the commercial examples. There are many products sold as treacle or molasses and they are all slightly different. Treacle for brewing old ale (sometimes referred to as black treacle) is dark, sweet, and full of highly caramelized notes. Some people say that blackstrap molasses is an acceptable substitute. I prefer Lyle's Black Treacle, which you can find in an English specialty shop if it is not available from your local homebrew store. It comes in small cans of 1 lb. (454 g). Half a can is a good start for a 5-gallon (19-L) batch of old ale. If you cannot find treacle, then you will want to include a portion of very dark

crystal, such as 150 °L or Special B malt instead.

You can add other specialty malts if you are looking for more complexity or want to make up for using a lesser base malt. Wheat malt, Victory®, biscuit, and others are common additions in many recipes, but restraint is important so the beer does not become saturated with non-fermentable dextrins and cloying flavors. In general, keep

the total of all specialty grain additions to less than 15% of an all-grain grist. Keep highly kilned malt additions small, as bold roasted flavors are not appropriate. If you want to develop more color and more melanoidin-based flavors and aromas, start with a larger pre-boil volume so you can boil the wort for two hours or more. This develops a unique character, not possible by grain additions alone.

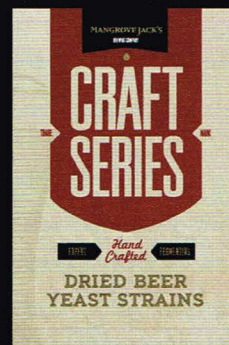


BREWCRAFTUSA

After years of Development, Mangrove Jack's Premium Dried Yeast Strains are Now Available!

Each yeast has been chosen after rigorous testing and trialing, ensuring only the best pure yeast strains for each beer style.

Craft Series Yeasts have been propagated and dried using state of the art manufacturing facilities to ensure optimum sterility, superior shelf stability and ease of use. This breakthrough now gives the brewer the ability to brew a wide range of craft beer styles, previously requiring liquid yeast.



Ask your local homebrew supply store to stock this revolutionary new yeast!

We are Happy to Announce our NEW WAREHOUSE in Hickory, NC



Everything You Need to Make Exceptional
Beer, Wine, Cheese and Spirits.

Call **877-355-BREW** or visit **www.brewcraftusa.com**

style profile

English-style beer is best brewed with English hops, such as East Kent Goldings, Fuggles, Target, North-down, or Challenger. The BJCP lists the bittering level for old ale from 30-60 IBU. You want enough hop bitterness to balance any residual sweetness. One thing to keep in mind is that hop bittering drops significantly over time. A year of aging can result in IBU levels half of what the beer started

with. You want to target a bittering level that is going to balance the beer in the future, so I tend to be aggressive in my hopping for old ale. There are many factors at play in the final impression of balance. The starting and final gravities, the character malts selected, the type of base malt, the yeast strain, the pitching rate, and even the yeast cell size all have an impact on the perceived bittering.

One additional factor is any effect from bacteria or *Brettanomyces*, if you choose to (or accidentally) include them. Both can continue to consume sugars in the beer and increase the acidity. Your balance of hops and residual malt sugars needs to take this into account as well.

A bitterness-to-starting gravity ratio (IBU divided by original gravity) between 0.5 and 0.7, should be close. I target the high end, around 0.7, because I expect to drink the beer after a period of aging, when bittering has dropped in half. As a general rule of thumb, I do not add any late hop additions.

Fermentation creates most of the flavor and aroma in British beers. "English" yeast strains provide a variety of interesting esters and leave some residual sweetness to balance a bitter beer. Many English yeasts tend to attenuate on the lower side (<70%), but for old ale you want to choose one of the more attenuative English yeasts (>70%). While you want some malt sweetness to balance the finish, using a low-attenuating yeast in a big beer will result in a beer that is too heavy and sweet. My favorites for this style are White Labs WLP013 London Ale and Wyeast 1028 London Ale. They both provide a wonderful ester profile without being excessively fruity, and they attenuate a little more than most English yeasts. If you like to experiment with different yeasts, try to select English yeasts with attenuation rates in the mid-70s or higher. If you prefer dry yeast, Danstar Nottingham should produce acceptable results.

At lower temperatures (<65 °F/ 18 °C), these yeasts produce a relatively low level of esters and at high temperatures (>70 °F/21 °C) they produce abundant fruity esters and fusel alcohol notes. I start fermentation in the middle of this range letting the temperature slowly rise a few degrees over a couple days. This creates the expected level of esters, helps the yeast attenuate fully, and keeps the amount of diacetyl in the finished beer to a minimum. Remember, you are looking for a delicate balance

Better Beer in Just One Click!!

Rebel Brewer



HOMEBREW MEGA-MART

154 Varieties of Yeast
170 Different types of Grain (from 75¢/lb.)
67 Varieties of Hops (from 89¢/oz.)
Equipment from Beginner to Insane

Lowest Prices
Fastest Shipping

for a Limited time
FREE SHIPPING
on all **BLICHMANN** products
*mainland US only

Order Online:
RebelBrewer.com

Beer Made Better

Old Ale Commercial Examples

Bad Knees Blanton Barrel Aged Old Ale

Cambridge Brewing Co.
Cambridge, Massachusetts
www.cambridgebrewingcompany.com

Bois

The Bruery
Placentia, California
www.thebruery.com

Founders Curmudgeon

Founders Brewing Co.
Grand Rapids, Michigan
www.foundersbrewing.com

Gentlemen's Club – Rye Whiskey Aged

Widmer Brothers Brewing Co.
Portland, Oregon
www.widmerbrothers.com

Hibernation Ale

Great Divide Brewing Co.
Denver, Colorado
www.greatdivide.com

Old Ale

Zero Gravity Craft Brewery
Burlington, Vermont
www.americanflatbread.com

Old Man

Southern Tier Brewing Co.
Lakewood, New York
www.stbbeer.com

Old Peculier

T&R Theakston Ltd
Masham Ripon,
North Yorkshire, England
www.theakstons.co.uk

Olde Suffolk English Ale

Greene King
Suffolk, England
www.greeneking.co.uk

Ole Dubh

Harviestoun Brewery
Alva, Scotland
www.harviestoun.com

Pumpkin Old Ale

Dogfish Head Brewery
Milton, Delaware
www.dogfish.com

Really Old Brown Dog Ale

Smuttynose Brewing Co.
Portsmouth, New Hampshire
www.smuttynose.com

between bitter and sweet. Lowering the mash temperature or replacing a portion of the base malt with simple sugar should change the balance to a less sweet finish and allow the hop bittering to stand out more.

Serving old ale at cellar temperature, around 50-55 °F (10-13 °C), allows the character of the beer to come out and can improve drinkability. Colder temperatures prevent the

drinker from picking up the interesting fermentation and malt flavors and aromas of this style. Target a carbonation level of around two volumes of CO₂. Once this beer is finished fermenting, a long aging period does wonderful things for the beer. Yes, you might be tempted to drink it after just a couple weeks, but try to set aside some bottles in a cool place and enjoy them over the years. **BYO**

BetterBottle[®]

The recipe for success includes
knowing how to get the most
from your equipment



Check out the [Product Information](#)
and [Technical](#) tabs at our Web site
for a wealth of helpful information.
www.Better-Bottle.com

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 \$14.50 shipping) and receive 5 more issues for **FREE!** Buy 5 and get 5 **FREE!** Choose from these collectible classics still in stock from 1998 through 2012.

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

OCT. 98

- Great Bock Recipes
- Choose the Right Kit

FEB. 99

- Malta Yeast Starter
- Organic Homebrewing

MAR. 99

- Imported Clone Recipes
- Build an Electric Brew Stove

JAN. 00

- 7 Czech Beer Recipes
- Your First Brew

FEB. 00

- High-Gravity Brewing
- Foreign Clone Recipes

MAR. 00

- 8 Tips to Advance your Brewing
- 3 Great U.S. Brewers Share Tips & Recipes

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®

MAY 01

- 20 Extract Recipes for Spring
- Build a Counter Pressure Bottle Filler

JAN./FEB. 02

- 8 Ski Town Clone Recipes
- Thomas Jefferson's Homebrew

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

DEC. 03

- High-Gravity Beers
- Brewing with Spices

MAY/JUNE 04

- Making Low-Carb Homebrew
- Beer Barbecue Recipes

JULY/AUG. 04

- Brewing Bocks — American & German
- Water Tips for Extract Beer

OCT. 04

- Extract Experiments
- Lambic Brewing

MAY/JUNE 05

- 10 Classic Clones: Anchor Steam, Fuller's ESB, Guinness, Sierra Nevada Pale Ale, Orval, Duvel, Paulaner Hefeweizen, Pilsner Urquell, Celebrator, Warsteiner

JULY/AUG. 05

- Brewing Heineken and International Lagers
- Belgian Saison

JULY/AUG. 08

- 6 Belgian Inspired Clones
- Fruit Meads

SEPT. 08

- Low-Hop Recipes
- Dry Stout, Scottish Ale

MARCH/APRIL 09

- Australian Brewing
- Controlling Fermentation Temperatures

OCT. 09

- Imperial German Beers - Take Malty Classics Big and Extreme
- Zombie Clones: Bring 5 British Ales Back from the Dead

NOV. 09

- Small Space Brewing Tips
- Countertop All-grain Brewing System

DEC. 09

- Pro Brewers Who Homebrew
- Rise of Small Hop Farms

JAN./FEB. 10

- Dark Secrets of Porter
- Brewing with Scotland's Brewdogs

MARCH/APRIL 10

- Bicycle Themed Beer Clones
- Master Dry Hopping

MAY/JUNE 10

- Breakfast Beers
- Build Your Own Keg & Carboy Cleaner

SEPT. 10

- 15 Tips from 15 Pro Brewers
- Cooking with Homebrew

OCT. 10

- Extract Brew Day: A Pictorial Guide
- Use Malt Extract Like a Pro

NOV. 10

- Tap Into Kegs
- Barleywine Clones

DEC. 10

- Recipes & Tips from New Belgium Brewing
- Build a Motorized Mill

MAR./APR. 11

- Lagering Techniques
- Build a Multi-Tap Kegerator

MAY/JUNE 11

- Scandinavian Brews
- Make a Viking Ale

JULY/AUG. 11

- Cult of American Saison
- Making Witbier

SEPT. 11

- Cool New Malts
- Welsh Beer

OCT. 11

- Retro Regional Beer Clones
- Cooking with Bock

NOV. 11

- Build the Ultimate Home Bar
- Build a Draft Tower

DEC. 11

- Brew Award-Winning Lagers
- Brooklyn Brewery Tips & Clone Recipes

JAN./FEB. 12

- Foolproof Keys to Brewing Better Beer
- Aphrodisiac Beers

MAR./APR. 12

- Clones of Canned Craft Beer Classics
- Speed Up Your All-Grain Brew Day

MAY/JUNE 12

- Recipes & Tips to Brew a Belgian Tripel
- Grow Your Own Brewer's Garden

JULY/AUG. 12

- Brewing Great Beer with American "C" Hops
- Cask Ales Homebrew Style

SEPT. 12

- Fix Your Beer - Homebrew Troubleshooting
- Four Clones of Collaboration Craft Beers

OCT. 12

- IPA 2.0 - Brewing Black, Wheat, Rye & Belgian IPAs
- Fermented Foods

NOV. 12

- Designing Your Ultimate Homebrewery
- Choosing and Using Pumps

DEC. 12

- Sierra Nevada Tips & Five Clone Recipes
- Filtering Homebrew



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

SPECIAL ISSUES:

GUIDE TO KEGGING

- How to choose & use a draft system
- Maintain & fix your draft set-up
- Build projects for the perfect pour
- Upgrade to add more taps or nitro

30 GREAT BEER STYLES

- Tips, techniques and recipes to brew 30 of the world's best beer styles at home
- Authored by beer style guru and "Style Profile" columnist Jamil Zainasheff

25 GREAT HOMEBREW PROJECTS

- Best projects from 16 years of *BYO*
- Includes parts & tools list as well as detailed instructions & pictures for each build

BUILD BRUTUS TEN

- Build your own single-tier, 10 gal. (38 L) semi-automated brewing system
- Includes plans, photos and step-by-step diagrams
- Special re-print from sold out November '07 issue

HOP LOVER'S GUIDE

- Hopping methods for extract & all-grain brewers to get the most out of your hops
- Comprehensive charts for 102 hop varieties
- Backyard hop growing instructions
- 36 hoppy recipes

250 CLASSIC CLONE RECIPES

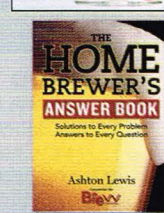
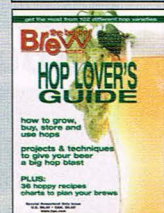
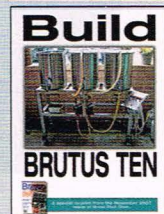
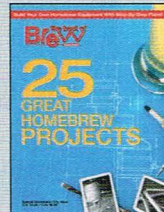
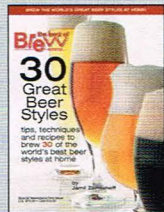
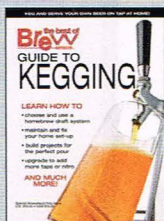
- New edition of our popular special issue now with 100 more recipes
- Brew your favorite commercial beers at home

BEGINNER'S GUIDE

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

THE HOME BREWER'S ANSWER BOOK

- Direct from the pages of *BYO*, this collection of Q&A from our "Mr. Wizard" column is the perfect reference for beginners and advanced brewers — and everyone in between!



THE HOW-TO HOMEBREW BEER MAGAZINE
Brew
YOUR OWN

Mark your 10 choices below.

Qty.	Issue	Qty.	Issue
_____	October 98	_____	November 09
_____	February 99	_____	December 09
_____	March 99	_____	Jan./Feb. 10
_____	January 00	_____	Mar./April 10
_____	February 00	_____	May/June 10
_____	March 00	_____	September 10
_____	January 01	_____	October 10
_____	February 01	_____	November 10
_____	March 01	_____	December 10
_____	May 01	_____	Mar./April 11
_____	Jan./Feb. 02	_____	May/June 11
_____	May/June 03	_____	July/Aug. 11
_____	July/Aug. 03	_____	September 11
_____	September 03	_____	October 11
_____	December 03	_____	November 11
_____	May/June 04	_____	December 11
_____	July/Aug. 04	_____	Jan./Feb. 12
_____	October 04	_____	Mar./April 12
_____	May/June 05	_____	May/June 12
_____	July/Aug. 05	_____	July/Aug. 12
_____	July/Aug. 08	_____	September 12
_____	September 08	_____	October 12
_____	Mar./April 09	_____	November 12
_____	October 09	_____	December 12

* previous issues not listed are sold out; 2013 back issues still cost the full cover price and can be ordered at www.brewyourownstore.com

5 copies	\$25	\$ _____
5 BONUS copies	FREE	FREE
Guide to Kegging _____ x \$10 ea =		\$ _____
30 Great Beer Styles _____ x \$10 ea =		\$ _____
25 Great Homebrew Projects _____ x \$10 ea =		\$ _____
Build Brutus Ten Brewing System _____ x \$3 ea =		\$ _____
Hop Lover's Guide _____ x \$8 ea =		\$ _____
250 Clone Recipes _____ x \$10 ea =		\$ _____
Beginner's Guide _____ x \$8 ea =		\$ _____
Homebrewer's Answer Bk. _____ x \$14.95 ea =		\$ _____
Shipping/Handling (see below).....		\$ _____
1 unit = \$3.50 • 2-9 units = \$8.00		
10-36 units = \$14.50 • 37-72 units = \$28.00		
73+ units = \$42.00		
Orders outside the U.S. please call or e-mail for shipping quote.		
BYO Binders _____ x \$20 ea. (incl. shipping)		\$ _____
(Binders hold 12 issues each)		
Total		\$ _____

Name _____

Address _____

City _____ State _____ Zip _____

E-mail _____

Phone _____

☐ Check Enclosed ☐ MasterCard ☐ Visa

Card# _____

Exp. Date _____

Signature _____

ORDER ONLINE: www.brewyourownstore.com

MAIL ORDER FORM TO:
BYO Back Issues
5515 Main Street
Manchester Center, VT 05255

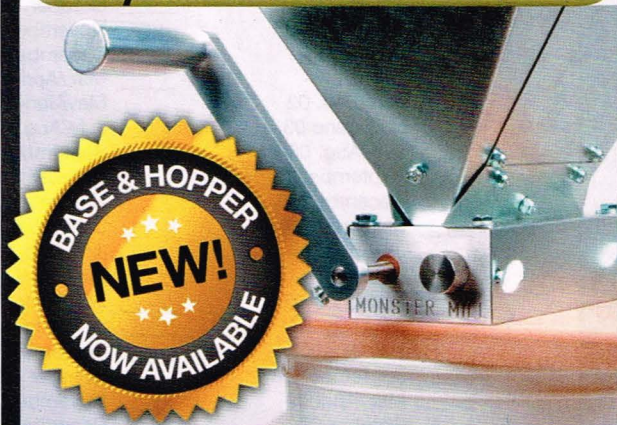
FAX FORM TO:
802-362-2377
or CALL:
802-362-3981

www.brewyourownstore.com



Monster Mills by Monster Brewing Hardware are made in the USA on modern CNC equipment with state of the art accuracy for discriminating home brewers.

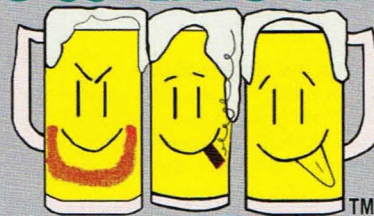
Why settle for second best?



WWW.MONSTERBREWINGHARDWARE.COM

"IT'S ALWAYS BETTER TO HAVE A BIGGER TOOL THAN YOU NEED."
- MONSTER MACHINIST

Brew Brothers



Homebrew Products

PAY LESS, BREW MORE!

Who else has over 220 malts in stock?

Starting at 75¢ per pound

How about over 60 hop varieties?

Starting at \$1.80 for 2 ounces

PLUS, CHECK OUT OUR SELECT HOPS BY THE POUND...YOWSER!

And, remember, free shipping isn't free...please do the math!

WWW.BREWBROTHERS.BIZ

info@brewbrothers.biz

Toll Free (888) 528-8443

"Come join the family!"

MAKE YOUR OWN HOME

800-321-BREW (2739)

We offer a free catalog.

Friendly knowledgeable advice as well.

WWW.HOMEBREWERY.COM

WE SELL EQUIPMENT AND INGREDIENTS FOR MAKING YOUR OWN BEER, WINE, MEAD, CIDER, SODA AND CHEESE.

*In Ozark, Mo
Since 1984*



SouthHillsBrewing.com

ORDER ONLINE FOR SPECIALTY GRAIN BY THE OUNCE

BASE MALT CRUSHED FINER FOR MODERN BREWING TECHNIQUES

Three Convenient Pittsburgh Locations:

North Hills	Greentree	Monroeville
3333 Babcock Blvd.	2212 Noblestown Rd.	2526 Mosside Blvd.
(412) 366-0151	(412) 937-0773	(412) 374-1240

EXPLORING THE WORLD OF BEER YEAST

TABLE OF CONTENTS

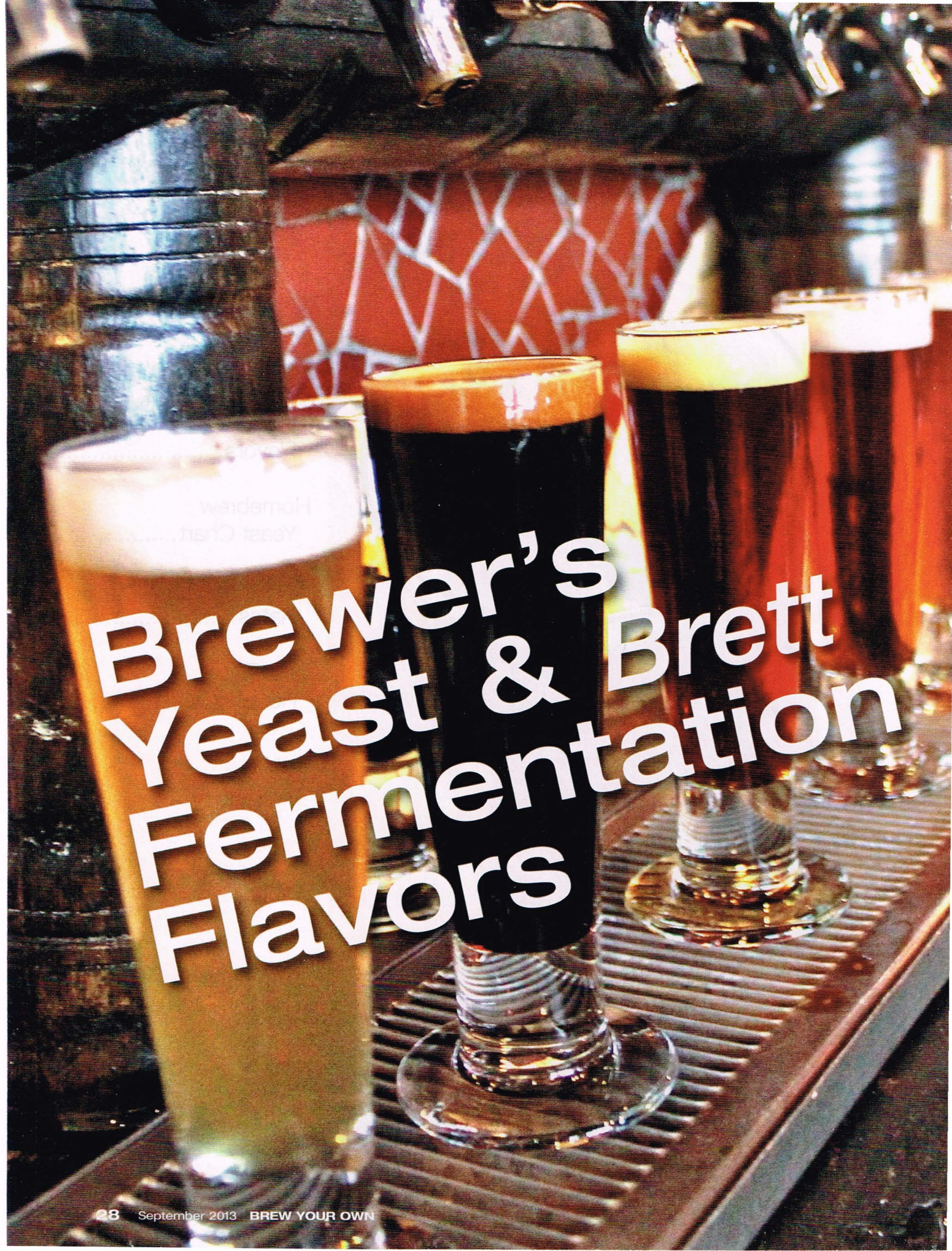


Brewer's Yeast &
Brett Fermentation
Flavors.....28

Homebrew
Yeast Chart.....36

Homebrew Pitching
Rates.....46

Take Two:
Reusing Yeast.....54



Brewer's Yeast & Brett Fermentation Flavors

Yeast cultures have flavor. Ever tried one? An unfiltered beer with yeast in it therefore will have yeast flavor. But what about filtered beers? Yes, those beers have yeast-derived flavors too. Yeasts synthesize flavors during fermentation, and many of these flavors stay in the beer, even when the yeast is removed.

Yeasts do this in all fermentations, whether it is bread, wine, beer, or even other fermented foods such as chocolate. But beer is special! The background flavors of most beers are low, the alcohol is low, and the contact time is long so that beer expresses yeast flavor more than any other fermented food or beverage. Yeast make more than 500 flavor and aroma compounds during beer fermentation.

They don't really do this on purpose; the yeast cells are simply reproducing in the medium they are growing. And in the case of beer the medium is brewer's wort. Yeast grow very similarly to human cells; they absorb simple sugars, break them down into smaller carbon-based pieces and release energy the cell needs to make new cells. This is called carbohydrate metabolism. Yeast has two other metabolic pathways that lead to the formation of flavor compounds; amino acid metabolism and fatty acid metabolism (see Figure 1 on page 30).

Yeasts synthesize fatty acids and sterols, compounds that surround cells and each organelle within cells. Fatty acids are arranged in a bi-layer to create a lipid membrane. These membranes allow cells to remain intact in high water environments. Unsaturated fatty acids (fatty acids containing one or more double bonds) and sterols are made by using Acetyl CoA and oxygen (Figure 1). In order to synthesize new cells, yeasts first need to synthesize fatty acids and sterols.

Sterols give fluidity to the lipid membranes, which is very important to brewer's yeast because they are in a high alcohol environment, and the

membranes need extra fluidity to keep the cells from breaking open. Oxygen is required for sterol production and becomes part of new sterol molecules. During a typical fermentation, the yeast population increases five-fold and the oxygen added to wort during aeration is critical for sterol production. Many homebrewers have heard of supplying fatty acids in the form of olive oil, instead of oxygen, and some reading this are experimenting with this method.

Although this has worked for many brewers, there has been little research outside of the New Belgium Brewery work published in 2005, and most brewers using this method are not using the procedure described by New Belgium, such as dissolving the olive oil in ethanol and incubating with yeast for 24 hours prior to pitching. More interestingly, olive oil does NOT contain sterols. More research needs to be done on the long-term consequences of fermentations fed with olive oil only and no oxygen.

Fatty acid metabolism adds soapy flavors to beer because oxygen drives

unsaturated fatty acid and sterol production. This keeps ester synthesis in check. Fatty acid metabolism also produces acids produced during fatty acid metabolism that become esters in the final beer.

In nature, yeasts also use oxygen for aerobic carbohydrate metabolism, where carbohydrates are completely broken down to carbon dioxide and water, thereby gaining the maximum energy possible. This is commonly

called respiration. In beer fermentation, yeasts are starved from oxygen in two ways; from the lack of its presence, and from the high sugar concentration preventing respiration (called the Crabtree Effect), even when oxygen is present. When the cells cannot respire they limp along creating ethanol by fermentation, and only generate about 10% of the total possible. The remaining 90+% ends locked up in other carbon compounds, some that will be flavor and aroma active.

When brewers keep oxygen out of wort (by not actively adding it) they get two important parts to beer — ethanol and flavor.

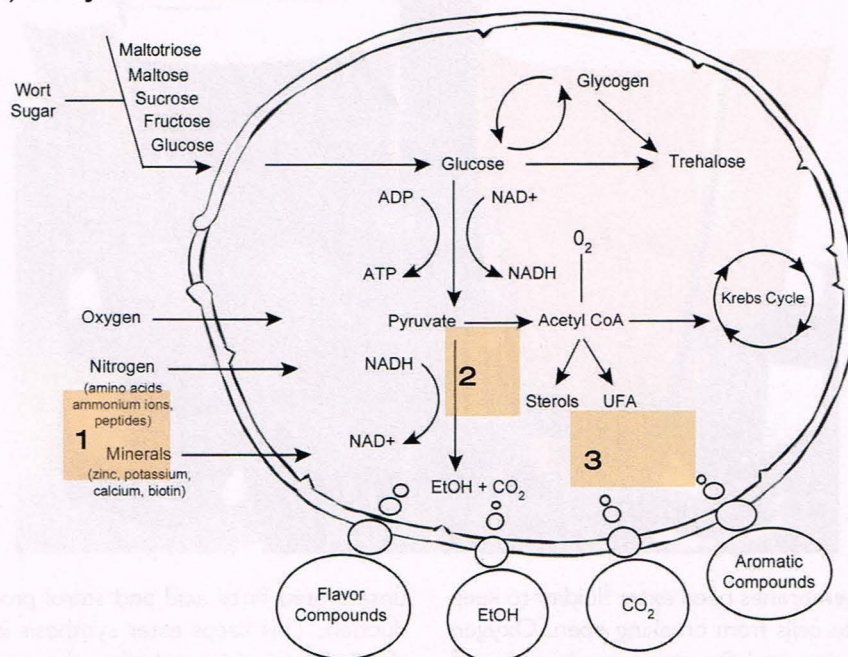
But wait — brewer's yeast is not



YEAST MAKE MORE THAN 500 FLAVOR AND AROMA COMPOUNDS DURING FERMENTATION.

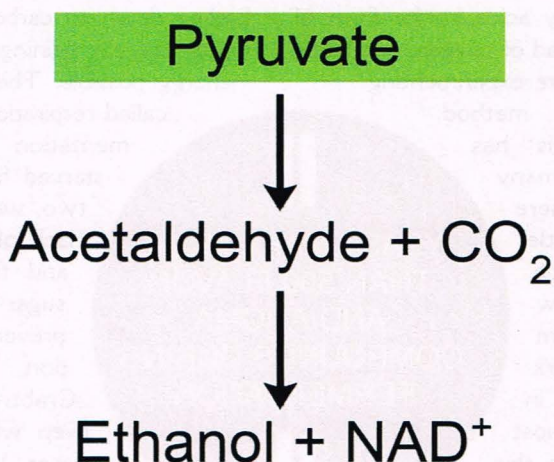
Figure 1: Three pathways for flavor in fermentation:

- 1) Amino acid metabolism
- 2) Carbohydrate metabolism
- 3) Fatty acid metabolism



*modified from fig 2.3 *Yeast: The Practical Guide to Beer Fermentation*, White and Zainasheff (Brewers Publications, 2010)

Figure 2: Pyruvate is converted into ethanol in a two enzyme step process



strictly anaerobic! That means brewer's yeast cannot survive without some oxygen. Brewers have learned that they need to supply oxygen when yeast is pitched into wort. And this oxygen is used in fatty acid metabolism as described previously.

In carbohydrate metabolism, yeast break down sugar first to pyruvate, a process called glycolysis, then pyruvate can go to two different pathways (of

course there are more options – it can also go into fatty acid metabolism and amino acid metabolism). When oxygen is present pyruvate flows through the tricarboxylic acid (TCA) cycle. Without oxygen, pyruvate is broken down first into acetaldehyde, and then acetaldehyde is reduced to ethanol (see Figure 2, above). NAD⁺ is also regenerated in creating ethanol, which the yeast retain in order to keep the

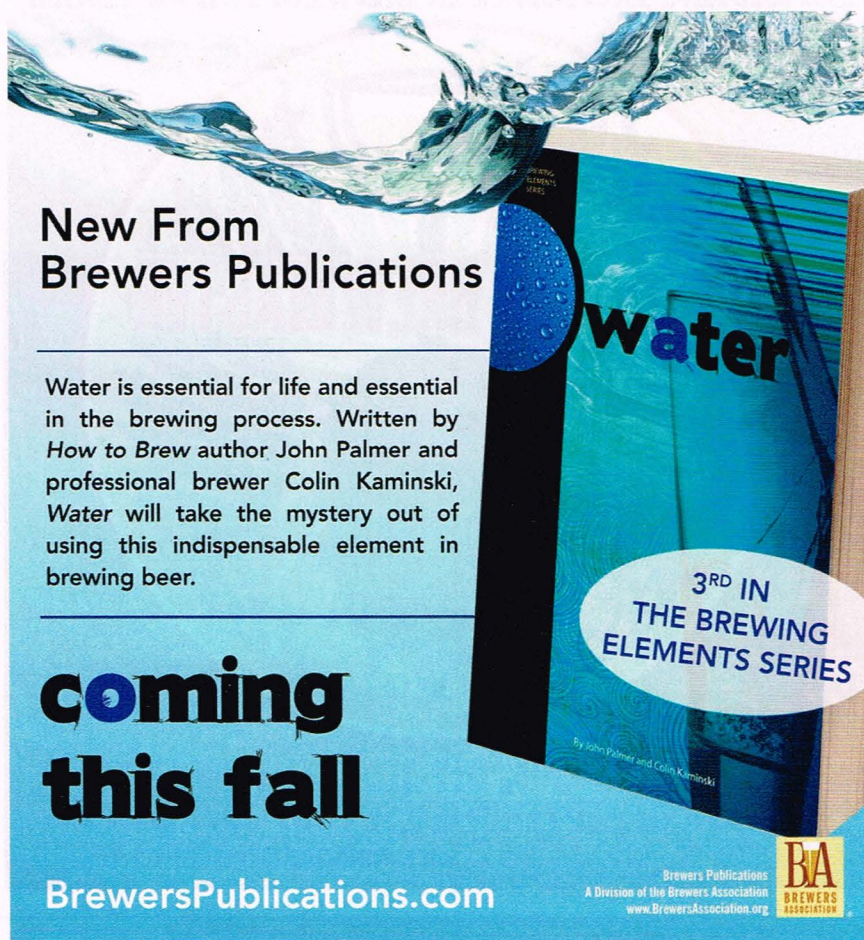
process of glycolysis going, and they dispose of the ethanol by excreting it.

Since acetaldehyde is made in this way, it is not surprising that this is a major flavor compound in beer. Acetaldehyde has a flavor threshold of 10 ppm and tastes of green apples over that level. If you taste it in significant quantities, it becomes dominant and a fault in beer. A lot of homebrewed beer has significant levels of acetaldehyde, and it is rarely talked about, so I will expand on this topic here. The enzyme that makes ethanol, alcohol dehydrogenase, will also convert ethanol back into acetaldehyde under the right conditions (this is the same enzyme in the human liver that breaks down ethanol humans consume). Oxygen promotes acetaldehyde formation. If you continually add oxygen during beer fermentation, rather than just in the beginning, you will promote a lot of acetaldehyde production. High temperatures during fermentation also promote acetaldehyde production, so it is important to not let ales get into the 70s °F (21 °C), and to keep lagers in the 50–55 °F (10–13 °C) range if acetaldehyde production is to be limited. The alcohol dehydrogenase enzyme is a zinc dependent enzyme, meaning it needs zinc in its active site to convert acetaldehyde to ethanol. If your wort has a low availability of zinc, the beer can have high acetaldehyde levels. Many breweries make it a practice of adding food grade zinc sulfate, zinc chloride, or Servomyces (dead yeast loaded with zinc) to their wort at knock out in order to prevent acetaldehyde off-flavors.

Another kind of yeast metabolism that builds flavor compounds is amino acid metabolism. In fact, this might be more important to flavor than carbohydrate metabolism. Yeasts have to synthesize proteins from amino acids; some of these proteins will be enzymes and others will be cellular constituents. Yeasts are reproducing during the early stages of fermentation, so they need to manufacture a new complement of proteins for each new cell. There are 20 different amino acids, and proteins are comprised from a variety of combinations of these building blocks. Yeasts

can synthesize some amino acids, and they also absorb and metabolize the amino acids supplied from brewer's wort. The fact is they get the amino acids they need by a combination of manners. Many flavor compounds such as fusel alcohols, esters, sulfur compounds, and diacetyl come from amino acid metabolism, and the amount supplied from the wort is a big factor in flavor. The acronym brewers use for the available amino acids is FAN or free amino nitrogen. FAN can be measured, and the minimum target for beer is 160 ppm FAN. Most all malt wort contains the minimum, but the number does not tell us which amino acids are supplied. This information is more difficult to determine and a sophisticated lab is needed, so it is not something most brewers will ever know. This is one reason that FAN and its composition is difficult for brewers to control. Brewers who use starchy adjuncts like rice and corn or sugar adjuncts are intentionally diluting FAN and by doing so are reducing flavor compounds associated with amino acid metabolism.

Diacetyl formation in beer is a classic example of a flavor compound derived from amino acid metabolism. Valine is an amino acid that yeast need to synthesize. In order to make valine, yeast convert pyruvate to acetolactate, then acetolactate is converted to valine. As happens throughout metabolism, this is not 100% efficient. Some acetolactate is not converted to valine, but instead goes outside of the cell. Acetolactate is flavorless in the quantities found in beer. However, acetolactate can be converted to diacetyl in a non-enzymatic reaction. If the yeast is still present, diacetyl can go back inside the cell and be converted to acetoin and 2,3 butanediol, both flavorless compounds. This reaction also regenerates NAD^+ which, like NAD^+ regenerated in ethanol formation, the cell can use to create energy for growth. The problem is if the yeast is no longer present when diacetyl is made, the beer will have a permanent butter-scotch flavor if over 100 parts per billion. The brewer can easily be fooled when tasting young beer, because if acetolactate is present, they cannot



New From Brewers Publications

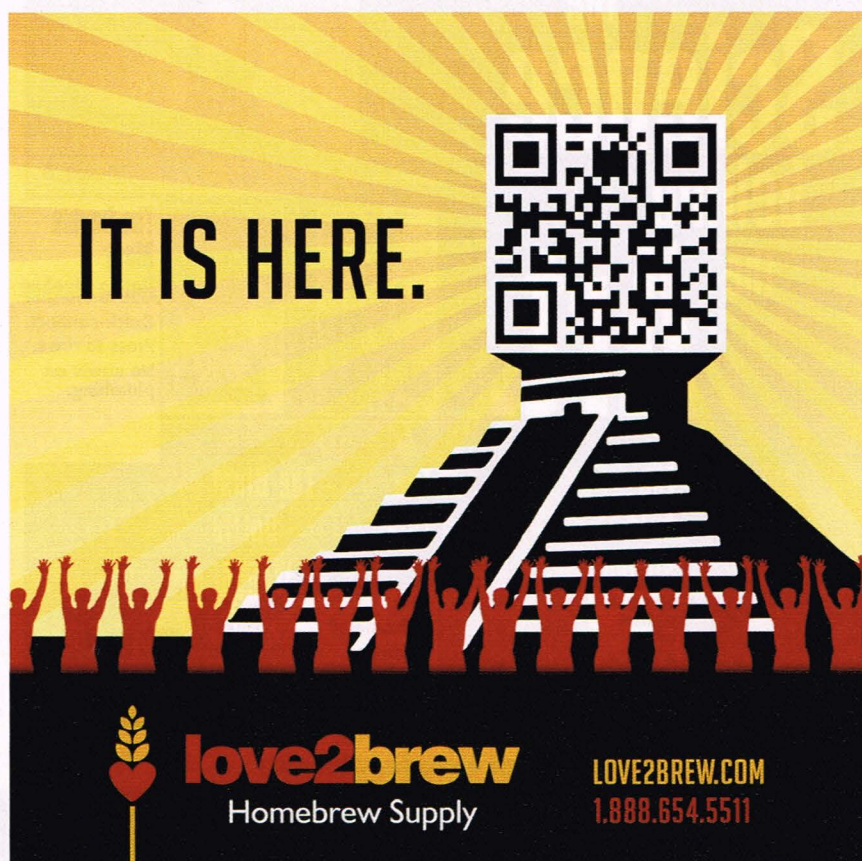
Water is essential for life and essential in the brewing process. Written by *How to Brew* author John Palmer and professional brewer Colin Kaminski, *Water* will take the mystery out of using this indispensable element in brewing beer.

coming this fall

BrewersPublications.com

Brewers Publications
A Division of the Brewers Association
www.BrewersAssociation.org

BA
BREWERS
ASSOCIATION



IT IS HERE.



love2brew
Homebrew Supply

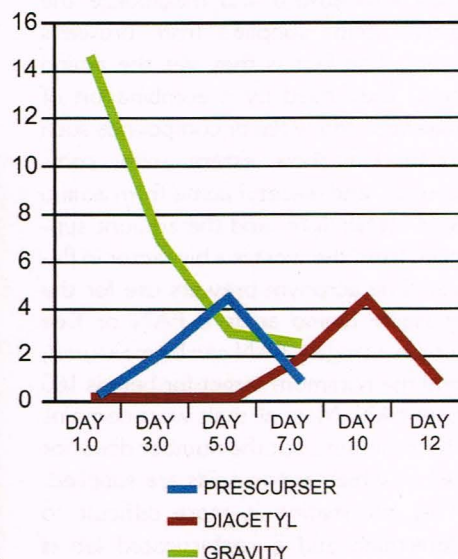
LOVE2BREW.COM
1.888.654.5511

EXTRACTING EXCELLENCE IN BREWING FOR 30 YEARS!



WE'RE TAKING 30% OFF ALL EXTRACT FOR THE MONTH OF SEPTEMBER. USE CODE 30offSEPT.
RALEIGH NC • 919.850-0095 • www.americanbrewmaster.com

Figure 3: The relationship between days of fermentation, gravity of beer ($^{\circ}\text{P}$), and diacetyl formation



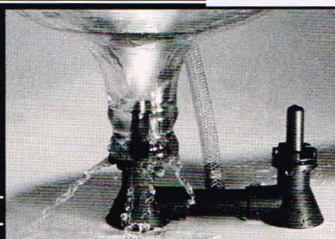
taste it.

As seen in figure 3 (above), the diacetyl peak is highest days after fermentation is complete, so if the brewer is not patient and moves the beer off the yeast too quickly, the beer can have high potential for diacetyl. The diacetyl peak will only go down as shown in Figure 3 if yeast is still present.

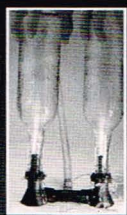
Sulfur compounds are also made from amino acid metabolism. Two of the amino acids yeast make, cysteine and methionine, contain sulfur. During metabolism, the sulfur intended for these two amino acids can get incorporated into other compounds. Depending on the strain, they make more or less sulfur containing compounds, examples being H_2S and low level mercaptans. Lager yeast (*Saccharomyces pastorianus*) is a different species of yeast from ale yeast (*Saccharomyces cerevisiae*) and usually produces more sulfur compounds than ale yeast. Anyone who has made lager beers remembers the first time they did and the sulfur (H_2S) emanating from the fermenter. This is normal. The only thing the brewer needs to do is to raise the temperature at the end of the fermentation (called the diacetyl rest to remove diacetyl potential), and sulfur (if H_2S) will volatilize into the air.

The main flavor compounds brewers speak of in beer are fusel alcohols and esters. Fusel alcohols, all alcohols other than ethanol, are also produced

the Science behind the Art.



The Double Blast Bottle Washer
 Quick-connect. Press to rinse. No stress on plumbing.



The Auto Siphon
 Starts a siphon with a single stroke.



The Thief
 Easy hydrometer readings. Touch tip to return sample.

The Blast Bottle Washer
 Press to rinse. Also rinses siphon. Easy on Plumbing



visit us at www.fermtech.ca

Fermtech Ltd.

Ask your favourite retailer for these products

from amino acid metabolism. An example is isoamyl alcohol, which by itself, like ethanol, is relatively tasteless. But it can be converted to a more flavor active ester, or it can stay as isoamyl alcohol and in combination with other fusel alcohols in the beer, the beer can have a hot, solvent-like taste and aroma. Isoamyl alcohol can come from the amino acid leucine. When wort is low in amino acids, this triggers more amino acid production by yeast, making more fusel alcohols. Fusel alcohols also increase with higher fermentation temperature and higher oxygen levels, because these and other factors increase yeast growth, which in turn increases amino acid syntheses.

Esters are wanted by many brewers and beer drinkers, and even the lighter-tasting American lagers have some esters. Esters give the fruitiness to beers. Fusel alcohols are required to make esters, because esters are made from a combination of a fusel alcohol and an organic acid. Many organic acids are produced during fermentation, and are responsible for the decrease in pH that is observed during fermentation. Fatty acids are the acids that form esters. An example of an ester produced is isoamyl acetate, giving a banana like flavor to beer, most commonly associated with hefeweizen beers. Isoamyl acetate is formed from a combination of Acetyl CoA and isoamyl alcohol. The more oxygen added at the beginning of fermentation, the more yeast growth obtained, and the less esters formed because yeast are using the Acetyl CoA to build lipid membranes instead of making esters such as isoamyl acetate. However, that can be the opposite at times! When you add more oxygen, you are also creating more of the other substrate for esters, fusel alcohols. It is important to keep ester formation in check, because yes we want esters, but too much will make the beer become juicy fruity.

That explanation helps to describe how ale and lager yeast strains make esters, fusel alcohols, sulfur, diacetyl, and acetolactate. But what about Belgian-type strains? The Belgian-type strains I refer to are the ones used to

A castle...

A throne...

A crown...

What more could a King desire?

With the new dual finish bottle from

E.Z. Cap, you can have it all.

32 oz. (1 ltr) and

16 oz. (500 ml.)

in Amber,

Cobalt and

Flint

It's Majestic.



Available from
your local

E.Z. Cap
distributors

www.ezcap.net
(403)282-5972

ANNAPOLIS

HOME BREW

Serving Washington/Baltimore (and shipping nationwide!) since 1997

Complete Blichmann Systems

Famous Beer Kits

Wyeast & White Labs

Over 100 grains

Over 100 hops

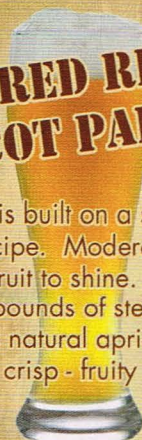
Draft beer & kegging

Lots of wine kits

Mead, soda, & cider

FEATURED RECIPE: APRICOT PALE ALE

This recipe is built on a solid blond pale ale recipe. Moderate hopping allows the fruit to shine. The kit includes 3 pounds of sterile seedless apricot plus natural apricot extract. Delicious & crisp - fruity but not sweet.



\$7.95 Flat Rate Shipping

www.annapolishomebrew.com

800.279.7556

WWW.HOMEBREWSTUFF.COM

REGULATORS \$59

FAUCET SHANK COMBOS STARTING AT \$25.99

\$49 IMMERSION CHILLERS

STAINLESS KETTLES W/ VALVE & THERMOMETER STARTING AT \$99

Questions? Call the Experts 208-375-2559

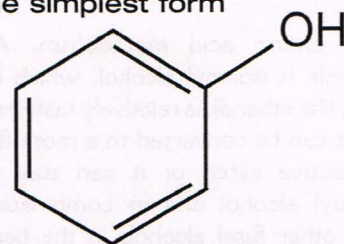
\$7.95 SHIPPING SPECIAL

App Store

Facebook

QR Code

Figure 4: Phenol in the simplest form



make Trappist style beers and Belgian pale ales. These beer styles are yeast flavor dominant. Belgian style yeast strains are technically ale strains, but are more 'wild-type.' They make more esters and fusel alcohols than other ale strains under the same conditions. Most are also phenol negative. But some strains are phenol positive. Phenol (Figure 4) is a type of compound most yeast in the wild make.

They use the basic phenol structure to make many different phenol containing compounds, including 4-vinyl guaiacol (4VG) and 4-ethyl phenol (4EP). Most brewer's yeasts contain mutations, selected by brewers long ago, to inactivate phenol production. Phenol gives a strong antiseptic, Band-Aid like flavor and aroma to beer. Belgian wit style strains, most Saison strains, German weizen style strains, *Brettanomyces*, and a sprinkling of other brewer's yeast, produce noticeable phenolic flavors. We call these strains phenol off flavor positive, POF+. The wheat and wit beer strains make 4VG, and *Brettanomyces* make 4EP.

The genetics of yeast mostly determines how yeast does this metabolism, and each strain of yeast has a similar, but different, complement of DNA. When a strain of yeast ferments a beer, it clones itself in the fermentation, which is why we can get consistent results from yeast. Brewers and yeast labs of the world work hard to keep yeast happy and free from mutations.

The environment a yeast is in will also impact metabolism and the flavors produced. When the environment changes with beer fermentation, i.e. we make different styles of beer, the yeast can behave differently. The main job for a brewer — hobby or commercial — is to control this environment by giving yeast the right amount of oxygen, the right fermentation temperature, and lots of love. (BYO)

Saving money never tasted so good.

Guest Check

453272

5.95

2.00

7.95

AMERICAN HOMEBREWERS ASSOCIATION Official Member

MICHAEL BREWER

123456789

HomebrewersAssociation.org

TAX

Thank You - Call

WITH BUDGET RECEIPT

Join Us

HomebrewersAssociation.org

With more than 850 Member Deals nationwide, your American Homebrewers Association® membership is sure to keep you from going thirsty ... or broke.

AMERICAN HOMEBREWERS ASSOCIATION

BA

AMERICAN HOMEBREWERS ASSOCIATION A Division of the Brewers Association www.BrewersAssociation.org

OFFICIAL CLONE SERIES

HOMEBREWING TO A HIGHER STANDARD

Over 70 time honored and award winning craft homebrew recipe kits available today.

2013 GOLD MEDAL WINNER

Lord Falconer Official Clone

Traditional Oatmeal Stout

A classic English Oatmeal Stout with a strong but smooth roasted flavor, it has hints of coffee and dark chocolate along with a subtle background of smooth and earthy oatmeal. Hops and English yeast add some light fruit notes.
5.4% ABV

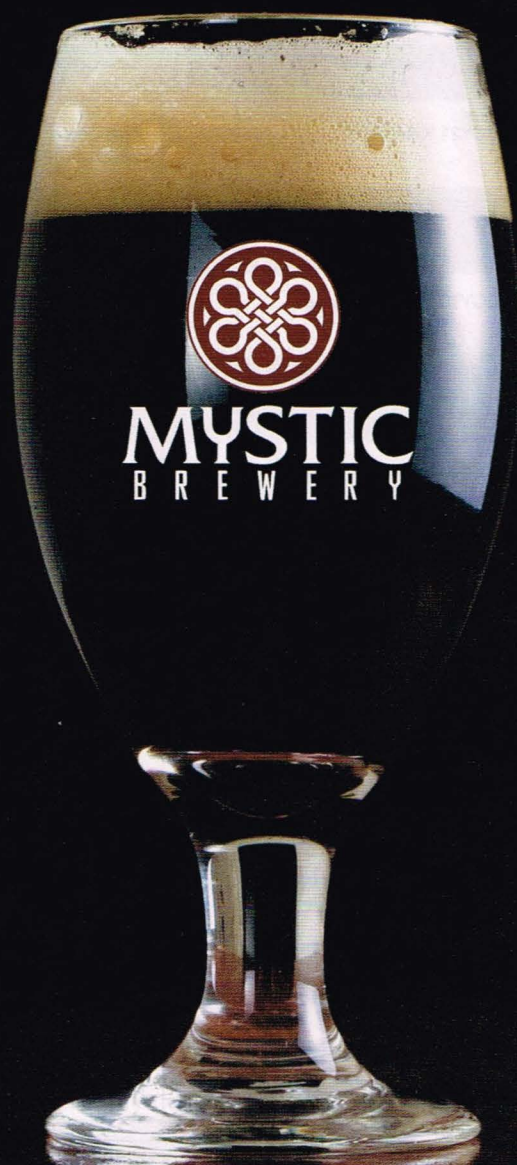
\$ 39⁹⁹

**BEER &
WINE HOBBY**

Beer-Wine.com/AwardWinningKits

155 T New Boston Street, Woburn, MA 01801

1-800-523-5423



Homebrewing Yeast Strains Chart

There are eleven companies manufacturing the majority of yeast strains used for homebrewing in North America: Brewferm, Coopers, East Coast Yeast, Fermentis/Safale, Lallemend/Danstar, Mangrove Jack, Muntons, Real Brewers Yeast, Siebel Institute, White Labs and Wyeast, who supplied the information for this chart — *Brew Your Own's* most up-to-date collection of all the yeast strains that these companies have available for homebrewing. Many of these strains are available through your favorite homebrew supplier, or can be found by contacting any of the companies for more information about where to buy specific strains. We have organized the strains into four basic categories: ale, lager, wheat and lambic/sour. Within each of these categories the strains are listed alphabetically by manufacturer name. For an online version of this list, which allows you to choose strains by beer style, visit www.byo.com/resources/yeast.

Strain	Type	Manuf.	Floc.	Atten.	Temp.	Description
ALE						
Brewferm Top	D	Brewferm	Med./High	N/A	64–77 °F (18–25 °C)	Universal top-fermenting beer yeast.
Coopers Pure Brewers' Yeast	D	Coopers	High	High	68–80 °F (20–27 °C)	Clean, round flavor profile.
ECY09 Belgian Abbaye	L	East Coast Yeast	Medium	74–76%	66–72 °F (19–22 °C)	Produces classic Belgian ales – robust, estery with notes of clove and plum fruit.
ECY18 British Mild	L	East Coast Yeast	Low	66–70%	60–68 °F (16–20 °C)	Complex, woody ester profile. Leaves a malt profile with a slight sweetness.
ECY17 Burton Union	L	East Coast Yeast	Medium	73–75%	64–69 °F (18–21 °C)	Produces a bold, citrusy character which accentuates mineral and hop flavors.
ECY21 Kölschbier	L	East Coast Yeast	High	75–78 %	58–66 °F (14–19 °C)	Produces a clean lager-like profile at ale temperatures.
ECY29 Northeast Ale	L	East Coast Yeast	High	80–82%	65–70 °F (18–21 °C)	A unique ale yeast with an abundance of citrusy esters accentuating American style hops.
ECY10 Old Newark Ale	L	East Coast Yeast	High	Medium	60–68 °F (16–20 °C)	Good for all styles of American and English ales.
ECY12 Old Newark Beer	L	East Coast Yeast	Medium	Medium	58–68 °F (14–20 °C)	Identified as <i>S. cerevisiae</i> , hence it is not a true lager strain, but should ferment at lager temperatures.
ECY08 Saison Brasserie	L	East Coast Yeast	Medium	80%	75–85 °F (24–29 °C)	A combination of several Saison yeasts for both fruity and spicy characteristics accompanied by dryness.
ECY14 Saison Single	L	East Coast Yeast	Medium	76–78%	75–82 °F (24–28 °C)	Leaves a smooth, full character with mild esters reminiscent of apple pie spice.
ECY07 Scottish Heavy	L	East Coast Yeast	Medium	77–80%	60–68 °F (16–20 °C)	Leaves a fruity profile with woody, oak esters reminiscent of malt whiskey.
ECY 13 Trappist Ale	L	East Coast Yeast	Medium	74–76%	66–72 °F (19–22 °C)	Traditional Trappist yeast with a complex, dry, fruity malt profile.
Safale S-04	D	Fermentis/Safale	High	79%	59–75 °F (15–24 °C)	English ale yeast that forms very compact sediment.
Safale US-05	D	Fermentis/Safale	Medium	81%	59–72 °F (15–22 °C)	Produces well-balanced beers with low diacetyl and clean end palate.
Safbrew S-33	D	Fermentis/Safale	Med./High	75%	59–75 °F (15–24 °C)	Versatile strain that can perform in beers up to 11.5% ABV.
Safbrew T-58	D	Fermentis/Safale	Low	75%	59–75 °F (15–24 °C)	Develops estery and somewhat peppery spiciness.
Belle Saison (Belgian Saison Ale)	D	Lallemend/Danstar	Low	High	63 °F (17 °C)	Aroma is fruity, spicy and peppery due to ester and phenol production.
BRY-97 (American West Coast Ale)	D	Lallemend/Danstar	Medium	Med./High	63 °F (17 °C)	Very clean ale flavor.

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Atten. = Attenuation Temp. = Temperature

Strain	Type	Manuf.	Floc.	Atten.	Temp.	Description
CBC-1 (Cask & Bottle Conditioning)	D	Lallemand/ Danstar	Med./Low	N/A	59–77 °F (15–25 °C)	Valued for its refermentation ability.
Nottingham	D	Lallemand/ Danstar	High	High	57–70 °F (14–21 °C)	Neutral for an ale yeast; fruity estery aromas.
Windsor (British Ale)	D	Lallemand/ Danstar	Low	Medium	64–70 °F (18–21 °C)	Full-bodied, fruity English ale.
Belgian Ale Yeast	D	Mangrove Jack	Medium	High	79–90 °F (26–32 °C)	Spicy and peppery characteristics.
British Ale Yeast	D	Mangrove Jack	High	High	57–72 °F (16–22 °C)	Earthy, nutty, orange peel and mild spice.
Burton Union Yeast	D	Mangrove Jack	High	High	62–74 °F (18–23 °C)	Some pear esters, possibly strawberry or kiwi-like aromas.
Newcastle Dark Ale Yeast	D	Mangrove Jack	Medium	Medium	64–72 °F (18–22 °C)	Aromas reminiscent of rich, dark fruit.
US West Coast Yeast	D	Mangrove Jack	High	High	59–74 °F (18–23 °C)	Very neutral strain. Citrus and pine hops will be enhanced.
Workhorse Beer Yeast	D	Mangrove Jack	Medium	High	59–68 °F (15–20 °C)	Neutral and clean aroma suitable for all styles. Imitates lager strain characteristics.
Muntions Premium Gold	D	Muntions	High	High	57–77 °F (14–25 °C)	Clean balanced ale yeast for 100% malt recipes.
Muntions Standard Yeast	D	Muntions	High	High	57–77 °F (14–25 °C)	Clean well balanced ale yeast.
Lucky #7	L	Real Brewers Yeast	High	70–80%	68–75 °F (20–24 °C)	Southern California ale yeast that ferments higher gravity worts up to 10% ABV.
The Monk	L	Real Brewers Yeast	Medium	75–80%	66–72 °F (19–22 °C)	Ferments tripels and high gravity ales to 15% ABV.
The One	L	Real Brewers Yeast	High	70–80%	68–75 °F (20–24 °C)	California ale yeast great for West Coast-style pale ales and IPAs.
Ye Olde English	L	Real Brewers Yeast	Medium	65–75%	65–70 °F (18–21 °C)	Smooth and creamy for English ales.
Alt Ale BRY 144	L	Siebel Inst.	Medium	High	59–68 °F (15–20 °C)	Full-flavored but clean tasting with estery flavor.
American Ale BRY 96	L	Siebel Inst.	Medium	High	64–72 °F (18–22 °C)	Very clean ale flavor.
English Ale BRY 264	L	Siebel Inst.	Medium	High	59–68 °F (15–20 °C)	Clean ale with slightly nutty and estery character.
Trappist Ale BRY 204	L	Siebel Inst.	Medium	High	64–72 °F (18–22 °C)	Dry, estery flavor with a light, clove-like spiciness.
Abbey Ale WLP530	L	White Labs	Med./High	75–80%	66–72 °F (19–22 °C)	Produces fruitiness and plum characteristics.
Abbey IV WLP540	L	White Labs	Medium	74–82%	66–72 °F (19–22 °C)	Authentic Trappist style yeast.
American Ale Yeast Blend WLP060	L	White Labs	Medium	72–80%	68–72 °F (20–22 °C)	Blend celebrates the strengths of California ale strains.
American Whiskey WLP065	L	White Labs	Medium	76–82%	75–82 °F (24–28 °C)	Produces low ester profile and moderate fusel oils. Used in high-gravity beers.
Antwerp Ale WLP515	L	White Labs	Medium	73–80%	67–70 °F (19–21 °C)	Clean, almost lager-like with biscuity ale aroma.
Australian Ale WLP009	L	White Labs	High	70–75%	65–70 °F (18–21 °C)	For a clean, malty and “bready” beer.

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Atten. = Attenuation Temp. = Temperature

Strain	Type	Manuf.	Floc.	Atten.	Temp.	Description
Bastogne Belgian Ale Yeast WLP510	L	White Labs	Medium	74–80%	66–72 °F (19–22 °C)	A high gravity, Trappist style ale yeast.
Bedford British Ale WLP006	L	White Labs	High	72–80%	65–70 °F (18–21 °C)	Good choice for most English style ales.
Belgian Ale WLP550	L	White Labs	Medium	78–85%	68–78 °F (20–21 °C)	Phenolic and spicy flavors dominate the profile.
Belgian Golden Ale WLP570	L	White Labs	Low	73–78%	68–75 °F (20–24 °C)	A combination of fruitiness and phenolic flavors.
Belgian Saison I WLP565	L	White Labs	Medium	65–75%	68–75 °F (20–24 °C)	Produces earthy, spicy, and peppery notes.
Belgian Saison II WLP566	L	White Labs	Medium	78–85%	68–78 °F (20–26 °C)	Fruity ester production, moderately phenolic.
Belgian Saison III WLP585	L	White Labs	Low/Med.	70–74%	68–75 °F (20–24 °C)	High fruit ester, slight tartness.
Belgian Strong Ale WLP545	L	White Labs	Medium	78–85%	66–72 °F (19–22 °C)	Moderate levels of ester and spicy phenolic character.
Belgian Style Ale Blend WLP575	L	White Labs	Medium	74–80%	68–75 °F (20–24 °C)	Blend of Trappist yeast and Belgian ale yeast.
Belgian Style Saison Ale Blend WLP568	L	White Labs	Medium	70–80%	70–80 °F (21–27 °C)	Complex, fruity aromas and flavors.
British Ale WLP005	L	White Labs	Low	67–74%	65–70 °F (18–21 °C)	English strain that produces malty beers.
Burton Ale WLP023	L	White Labs	Medium	69–75%	68–73 °F (20–23 °C)	Subtle fruity flavors: apple, clover honey and pear.
Bourbon Yeast WLP070	L	White Labs	Medium	75–80%	72–77 °F (22–25 °C)	Produces a caramel, malty character with balanced ester profile. Used in high gravity beers.
California Ale WLP001	L	White Labs	Medium	73–80%	68–73 °F (20–23 °C)	Clean flavors accentuate hops; very versatile.
California Ale V WLP051	L	White Labs	Med./High	70–75%	66–70 °F (19–21 °C)	Produces a fruity, full-bodied beer.
Cream Ale WLP080	L	White Labs	Medium	75–80%	65–70 °F (18–21 °C)	A blend of ale and lager strains that creates a clean, crisp, light American lager style.
Dry English Ale WLP007	L	White Labs	Med./High	70–80%	65–70 °F (18–21 °C)	A clean, highly flocculant and attenuative yeast.
Dusseldorf Alt WLP036	L	White Labs	Medium	65–72%	65–69 °F (18–21 °C)	Produces clean, slightly sweet alt beers.
East Coast Ale WLP008	L	White Labs	Low/Med.	70–75%	68–73 °F (20–23 °C)	Very clean and low esters.
East Midlands Ale WLP039	L	White Labs	Med./High	73–82%	66–70 °F (19–21 °C)	British style ale yeast with a very dry finish.
Edinburgh Ale WLP028	L	White Labs	Medium	70–75%	65–70 °F (18–21 °C)	Malty, strong Scottish ales.
English Ale WLP002	L	White Labs	Very High	63–70%	65–68 °F (18–20 °C)	Very clear with some residual sweetness.
English Ale Blend WLP085	L	White Labs	Med./High	69–76%	68–72 °F (18–22 °C)	Moderate fruitiness and mineral-like.
Essex Ale Yeast WLP022	L	White Labs	Med./High	71–76%	66–70 °F (19–21 °C)	Drier finish than many British ale yeasts.
European Ale WLP011	L	White Labs	Medium	65–70%	65–70 °F (18–21 °C)	Low ester production, gives clean profile.
French Ale WLP072	L	White Labs	Med./High	68–75%	63–73 °F (17–23 °C)	Clean strain that complements malt flavor.
German Ale/Kölsch WLP029	L	White Labs	Medium	72–78%	65–69 °F (18–21 °C)	A super-clean, lager-like ale.
Irish Ale WLP004	L	White Labs	Med./High	69–74%	65–68 °F (18–20 °C)	Light fruitiness and slight dry crispness.
London Ale WLP013	L	White Labs	Medium	67–75%	66–71 °F (19–22 °C)	Dry, malty ale yeast for pales, bitters, and stouts.

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Atten. = Attenuation Temp. = Temperature

Strain	Type	Manuf.	Floc.	Atten.	Temp.	Description
Manchester Ale WLP038	L	White Labs	Med./High	70–74%	65–70 °F (18–21 °C)	Clean, dry finish with low esters.
Neutral Grain WLP078	L	White Labs	Medium	77–84%	76–85 °F (24–29 °C)	Clean, fast fermentation used in high gravity beers.
Old Sonoma Ale WLP076	L	White Labs	Medium	70–74%	66–70 °F (19–21 °C)	Traditional British-style yeast. Neutral and versatile.
Pacific Ale WLP041	L	White Labs	High	65–70%	65–68 °F (18–20 °C)	A popular ale yeast from the Pacific Northwest.
San Diego Super WLP090	L	White Labs	Med./High	76–83% +	65–68 °F (18–20 °C)	Versatile, super-fast, super-clean strain.
Scotch Whiskey WLP045	L	White Labs	Medium	75–80%	72–77 °F (22–25 °C)	Used for Scotch whiskey production from the early 1950s. Used in high-gravity beers.
Super High Gravity Ale WLP099	L	White Labs	Medium	80+%	65–69 °F (18–21 °C)	High gravity yeast, ferments up to 25% alcohol.
Tennessee Whiskey WLP050	L	White Labs	Medium	75–80%	75–79 °F (24–26 °C)	Creates rich, smooth flavors. Used in high gravity beers.
Trappist Ale WLP500	L	White Labs	Low/Med.	75–80%	65–72 °F (18–22 °C)	Distinctive fruitiness and plum characteristics.
Whitbread Ale WLP017	L	White Labs	High	67–73%	66–70 °F (19–21 °C)	British style slightly fruity, with a hint of sulfur.
Yorkshire Square WLP037	L	White Labs	High	68–72%	65–70 °F (18–21 °C)	Toasty with malt-driven esters.
American Ale 1056	L	Wyeast	Low/Med.	73–77%	60–72 °F (16–22 °C)	Well balanced. Ferments dry, finishes soft.
American Ale II 1272	L	Wyeast	Medium	72–76%	60–72 °F (16–22 °C)	Slightly nutty, soft, clean and tart finish.
Belgian Abbey 1214	L	Wyeast	Medium	72–76%	58–78 °F (14–26 °C)	Abbey-style, top-fermenting yeast for high gravity.
Belgian Abbey II 1762	L	Wyeast	Low/Med.	74–78%	68–78 °F (20–26 °C)	Slightly fruity with a dry finish.
Belgian Dark Ale 3822-PC	L	Wyeast	Medium	74–79%	65–80 °F (18–27 °C)	High acid producer with balanced ester and phenol production
Belgian Saison 3724	L	Wyeast	Low	76–80%	70–95 °F (18–35 °C)	Very tart and dry with spicy and bubblegum aromatics.
Belgian Schelde Ale 3655-PC	L	Wyeast	Medium	73–77%	62–74 °F (18–22 °C)	Produces complex Belgian flavors and aromas.
Belgian Stout 1581-PC	L	Wyeast	Medium	70–85%	65–75 °F (18–24 °C)	Ferments to dryness and produces moderate levels of esters.
Belgian Strong Ale 1388	L	Wyeast	Low	74–78%	64–80 °F (18–27 °C)	Fruity nose and palate, dry, tart finish.
Biere De Garde 3725-PC	L	Wyeast	Low	74–79%	70–84 °F (21–29 °C)	Low to moderate ester production with mild spiciness.
British Ale 1098	L	Wyeast	Medium	73–75%	64–72 °F (18–27 °C)	Ferments dry and crisp, slightly tart and fruity.
British Ale II 1335	L	Wyeast	High	73–76%	63–75 °F (17–24 °C)	Malty flavor, crisp finish, clean, fairly dry.
British Cask Ale 1026-PC	L	Wyeast	Med./High	74–77%	63–72 °F (17–22 °C)	Produces a nice malt profile and finishes crisp and slightly tart.
Canadian/Belgian Ale 3864-PC	L	Wyeast	Medium	75–79%	65–80 °F (18–27 °C)	Banana and fruit esters complemented with mild phenolics and hints of acidity.
Denny's Favorite 50 1450	L	Wyeast	Low	74–76%	60–70 °F (15–21 °C)	Good for almost any beer style. Accentuates malt, caramel, or fruit.
English Special Bitter 1768-PC	L	Wyeast	High	68–72%	64–72 °F (18–22 °C)	Produces light fruit and ethanol aromas along with soft, nutty flavors.

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Attn. = Attenuation Temp. = Temperature

Strain	Type	Manuf.	Floc.	Attn.	Temp.	Description
Farmhouse Ale 3726-PC	L	Wyeast	Medium	74-79%	70-84 °F (21-29 °C)	Complex esters balanced with earthy/spicy notes.
French Saison 3711	L	Wyeast	Low	77-83%	65-77 °F (18-25 °C)	Versatile strain for Saisons and other Belgian styles that are aromatic, estery, and spicy.
German Ale 1007	L	Wyeast	Low	73-77%	55-68 °F (10-20 °C)	Ferments dry and crisp with a mild flavor.
Irish Ale 1084	L	Wyeast	Medium	71-75%	62-72 °F (17-22 °C)	Slight residual diacetyl and fruitiness.
Kölsch 2565	L	Wyeast	Low	73-77%	56-70 °F (56-21 °C)	Malty with a subdued fruitiness and a crisp finish.
Kölsch II 2575-PC	L	Wyeast	Low	73-77%	55-70 °F (10-21 °C)	Rich flavor profile which accentuates a soft malt finish.
Leuven Pale Ale 3538-PC	L	Wyeast	High	75-78%	65-80 °F (18-27 °C)	Produces a spicy character and mild esters.
London Ale 1028	L	Wyeast	Low/Med.	73-77%	60-72 °F (15-22 °C)	Bold and crisp with a rich mineral profile.
London Ale III 1318	L	Wyeast	High	71-75%	64-74 °F (18-23 °C)	Very light and fruity, with a soft, balanced palate.
London ESB Ale 1968	L	Wyeast	Very High	67-71%	64-72 °F (18-22 °C)	Rich, malty character with balanced fruitiness.
Northwest Ale 1332	L	Wyeast	High	67-71%	65-75 °F (18-24 °C)	Malty, mildly fruity, good depth and complexity.
Ringwood Ale 1187	L	Wyeast	High	68-72%	64-74 °F (18-23 °C)	A malty, complex profile that clears well.
Scottish Ale 1728	L	Wyeast	High	69-73%	55-75 °F (10-24 °C)	Suited for the strong, malty ales of Scotland.
Thames Valley Ale 1275	L	Wyeast	Low/Med.	72-76%	62-72 °F (17-22 °C)	Clean, light malt character with low esters.
Thames Valley Ale II 1882-PC	L	Wyeast	High	72-78%	60-70 °F (15-21 °C)	Produces crisp, dry beers with rich malt profile and moderate stone fruit esters.
Trappist High Gravity 3787	L	Wyeast	Medium	74-78%	64-78 °F (18-26 °C)	Ferments dry, rich ester profile and malty palate.
West Yorkshire Ale 1469	L	Wyeast	High	67-71%	64-72 °F (18-22 °C)	Produces full chewy malt flavor and character. Expect moderate nutty and stone-fruit esters.
Whitbread Ale 1099	L	Wyeast	Med./High	68-72%	64-74 °F (18-22 °C)	Mildly malty and slightly fruity.
LAGER						
Brewferm Lager	D	Brewferm	High	High	50-59 °F (10-15 °C)	Develops witbeer aromas like banana and clove.
ECY22 Baltic Lager	L	East Coast Yeast	Medium	75-78%	46-54 °F (8-12 °C)	Full malt flavor and clean finish.
ECY15 Munich Festbier	L	East Coast Yeast	Medium	74-76%	46-54 °F (8-12 °C)	Recommended for German lagers.
Saflager S-23	D	Fermentis/Safale	Med./High	80%	48-59 °F (9-15 °C)	Produces a fruit esterness in lagers.
Saflager W-34/70	D	Fermentis/Safale	High	83%	54-59 °F (12-15 °C)	Good balance of floral and fruity aromas, clean flavor.

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Attn. = Attenuation Temp. = Temperature

Strain	Type	Manuf.	Floc.	Atten.	Temp.	Description
Bohemian Lager Yeast	D	Mangrove Jack	High	High	50–59 °F (10–15 °C)	Earthy spiciness of both noble hops and Pilsner malt will be enhanced and supported by moderate to full body.
American Lager BRY 118	L	Siebel Inst.	High	Medium	68–72 °F (20–22 °C)	Produces slightly fruity beer; some residual sugar.
North European Lager BRY 203	L	Siebel Inst.	Low	High	68–72 °F (20–22 °C)	Well balanced beer, fewer sulfur compounds.
American Lager WLP840	L	White Labs	Medium	75–80%	50–55 °F (10–13 °C)	Dry and clean with a very slight apple fruitiness.
Belgian Lager WLP815	L	White Labs	Medium	72–78%	50–55 °F (10–13 °C)	Clean, crisp with low sulfur production.
Cry Havoc WLP862	L	White Labs	Low	66–70%	55–58 °F (13–14 °C)	Can ferment at ale and lager temperatures.
Czech Budejovice Lager WLP802	L	White Labs	Medium	75–80%	50–55 °F (10–13 °C)	Produces dry and crisp lagers, with low diacetyl.
German Bock Lager Yeast WLP833	L	White Labs	Medium	70–76%	48–55 °F (9–13 °C)	Produces well-balanced beers of malt and hop character.
German Lager WLP830	L	White Labs	Medium	74–79%	50–55 °F (10–13 °C)	Malty and clean; great for all German lagers.
Mexican Lager Yeast WLP940	L	White Labs	Medium	70–78%	50–55 °F (10–13 °C)	Produces clean lager beer, with a crisp finish.
Munich Helles WLP860	L	White Labs	Medium	68–72%	48–52 °F (9–11 °C)	Clean and strong fermenter.
Oktoberfest/Märzen WLP820	L	White Labs	Medium	65–73%	52–58 °F (11–14 °C)	Produces a very malty, bock-like style.
Pilsner Lager WLP800	L	White Labs	Med./High	72–77%	50–55 °F (10–13 °C)	Somewhat dry with a malty finish.
San Francisco Lager WLP810	L	White Labs	High	65–70%	58–65 °F (14–18 °C)	Produces “California Common” style beer.
So. German Lager WLP838	L	White Labs	Med./High	68–76%	50–55 °F (10–13 °C)	A malty finish and balanced aroma.
Old Bavarian Lager Yeast WLP920	L	White Labs	Medium	66–73%	50–55 °F (10–13 °C)	Finishes malty with a slight ester profile. Use in beers such as Oktoberfest, bock, and dark lagers.
Zurich Lager Yeast WLP885	L	White Labs	Medium	70–80%	50–55 °F (10–13 °C)	Swiss style lager yeast with minimal sulfur and diacetyl production.
American Lager 2035	L	Wyeast	Medium	75–77%	48–58 °F (9–14 °C)	Bold, complex and aromatic; slight diacetyl.
Bavarian Lager 2206	L	Wyeast	Med./High	73–77%	46–58 °F (8–14 °C)	Produces rich, malty, full-bodied beers.
Bohemian Lager 2124	L	Wyeast	Low/Med.	73–77%	45–68 °F (7–20 °C)	Ferments clean and malty.
Budvar Lager 2000	L	Wyeast	Med./High	71–75%	48–56 °F (9–13 °C)	Malty nose with subtle fruit. Finishes dry and crisp.
California Lager 2112	L	Wyeast	High	67–71%	58–68 °F (14–20 °C)	Produces malty, brilliantly clear beers.
Czech Pils 2278	L	Wyeast	Med./High	70–74%	50–58 °F (10–14 °C)	Dry but malty finish.
Danish Lager 2042	L	Wyeast	Low	73–77%	46–56 °F (8–13 °C)	Rich Dortmund style with crisp, dry finish.
European Lager 2247-PC	L	Wyeast	Low	73–77%	46–56 °F (8–13 °C)	Exhibits a clean and dry flavor profile found in aggressively hopped lagers.
Hella Bock 2487-PC	L	Wyeast	Medium	70–74%	48–56 °F (8–13 °C)	Attenuates well while still leaving plenty of malt character and body.

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Attn. = Attenuation Temp. = Temperature

Strain	Type	Manuf.	Floc.	Atten.	Temp.	Description
Munich Lager 2308	L	Wyeast	Medium	70–74%	48–56 °F (8–13 °C)	Very smooth, well-rounded and full-bodied.
Munich Lager II 2352-PC	L	Wyeast	Medium	72–74%	52–62 °F (11–16 °C)	Low diacetyl and low sulfur aroma. Great for malt-driven lagers.
North American Lager 2272-PC	L	Wyeast	High	70–76%	52–58 °F (11–14 °C)	Mild malty profile, medium ester profile, well balanced.
Octoberfest Lager Blend 2633	L	Wyeast	Low/Med.	73–77%	48–58 °F (8–14 °C)	Plenty of malt character and mouthfeel. Low in sulfur.
Pilsen Lager 2007	L	Wyeast	Medium	71–75%	48–56 °F (8–13 °C)	Smooth malty palate; ferments dry and crisp.
Rasenmäher Lager 2252-PC	L	Wyeast	Low	73–77%	48–68 °F (9–20 °C)	Produces clean lagers at low temperature fermentations, but also yields slight ester at higher temperatures.
Rocky Mountain Lager 2105-PC	L	Wyeast	Med./High	70–74%	48–56 °F (9–13 °C)	Mild malty profile, medium esters, well balanced.
Staro Prague Lager 2782-PC	L	Wyeast	High	70–74%	50–58 °F (10–14 °C)	Will create moderate fruit and bready malt flavors in lagers.
Urquell Lager 2001	L	Wyeast	Med./High	72–76%	48–56 °F (8–13 °C)	Mild fruit and floral aroma. Very dry with mouthfeel.
WHEAT						
Brewferm Blanche	D	Brewferm	Low	High	64–73 °F (18–23 °C)	Ferments clean with little or no sulfur.
EYC11 Belgian White	L	East Coast Yeast	Low	74–78%	70–76 °F (21–24 °C)	Produces flavors reminiscent of witbiers.
Safbrew WB-06	D	Fermentis/Safale	High	86%	64–75 °F (18–24 °C)	Produces subtle estery and phenol flavor notes typical of wheat beers.
Munich (German Wheat Beer)	D	Lallemand/Danstar	Low	Med./High	63 °F (17 °C)	Estery to both palate and nose with typical banana notes.
Bavarian Wheat Yeast	D	Mangrove Jack	Low	Medium	59–86 °F (1–30 °C)	Lots of classic banana and clove esters, balanced with clove and cinnamon-like phenolic aromas.
Bavarian Weizen BRY 235	L	Siebel Inst.	High	Medium	50–57 °F (10–14 °C)	A very estery beer with mild clove-like spiciness.
American Hefeweizen Ale WLP320	L	White Labs	Low	70–75%	65–69 °F (18–21 °C)	Produces a slight amount of banana and clove notes.
Bavarian Weizen Ale WLP351	L	White Labs	Low	73–77%	66–70 °F (19–21 °C)	Moderately high, spicy phenolic overtones of cloves.
Belgian Wit Ale WLP400	L	White Labs	Low/Med.	74–78%	67–74 °F (19–23 °C)	Slightly phenolic and tart.
Belgian Wit II Ale WLP410	L	White Labs	Low/Med	70–75%	67–74 °F (19–23 °C)	Spicier, sweeter, and less phenolic than WLP400.
Hefeweizen Ale WLP300	L	White Labs	Low	72–76%	68–72 °F (20–22 °C)	Produces banana and clove nose.
Hefeweizen IV Ale WLP380	L	White Labs	Low	73–80%	66–70 °F (19–21 °C)	Crisp, large clove and phenolic aroma and flavor.
American Wheat 1010	L	Wyeast	Low	74–78%	58–74 °F (14–23 °C)	Produces a dry, slightly tart, crisp beer.
Bavarian Wheat Blend 3056	L	Wyeast	Medium	73–77%	64–74 °F (18–23 °C)	Produces mildly estery and phenolic wheat beers.
Bavarian Wheat 3638	L	Wyeast	Low	70–76%	64–75 °F (18–24 °C)	Balanced banana esters with apple and plum esters.

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Attn. = Attenuation Temp. = Temperature

Strain	Type	Manuf.	Floc.	Atten.	Temp.	Description
Belgian Ardennes 3522	L	Wyeast	High	72–76%	65–85 °F (18–29 °C)	Mild fruitiness with complex spicy character.
Belgian Wheat 3942	L	Wyeast	Medium	72–76%	64–74 °F (18–23 °C)	Apple- and plum-like nose with dry finish.
Belgian Witbier 3944	L	Wyeast	Medium	72–76%	62–75 °F (17–24 °C)	Alcohol tolerant, with tart, slight phenolic profile.
Forbidden Fruit 3463	L	Wyeast	Low	72–76%	63–76 °F (17–24 °C)	Phenolic profile, subdued fruitiness.
German Wheat 3333	L	Wyeast	High	70–76%	63–75 °F (17–24 °C)	Sharp, tart crispness, fruity, Sherry-like palate.
Weihenstephan Weizen 3068	L	Wyeast	Low	73–77%	64–75 °F (18–24 °C)	A unique, rich and spicy weizen character.
LAMBIC/ SOUR						
ECY06 Berliner Blend	L	East Coast Yeast	N/A	N/A	70–74 °F (21–23 °C)	For lactic sourness. Contains a Kölsch ale yeast and two <i>Lactobacillus</i> strains.
ECY04 Brett Anomala	L	East Coast Yeast	N/A	N/A	N/A	Very estery with some light funk and acidity.
ECY05 Brett Bruxelensis	L	East Coast Yeast	N/A	N/A	N/A	Quite funky with barnyard notes accompanied by esters.
ECY19 Brett custersianus	L	East Coast Yeast	N/A	N/A	60–74 °F (16–23 °C)	Displays an ester profile of mango and peach esters with limited to no barnyard funk.
ECY24 Brett nanus	L	East Coast Yeast	N/A	N/A	N/A	Reveals a spicy saison-like profile with none to low esters.
ECY01 BugFarm	L	East Coast Yeast	N/A	N/A	60–74 °F (16–23 °C)	A large complex blend of cultures to emulate sour beers.
ECY20 BugCounty	L	East Coast Yeast	N/A	N/A	N/A	Contains the largest mix organisms for Lambic-style brewing.
ECY03 Farmhouse Brett	L	East Coast Yeast	N/A	N/A	N/A	Saison brasserie blend (ECY08) with a pure <i>Brettanomyces</i> isolate. Produces a fruity and funky profile with some acidity gradually increasing over time.
ECY23 Oud Brune	L	East Coast	N/A	75–78%	68–74 °F (20–23 °C)	For those who prefer sourness without the presence of <i>Brett</i> .
ECY02 Flemish Ale	L	East Coast Yeast	N/A	N/A	60–74 °F (16–23 °C)	Dry, sour, leathery and notes of cherry stone.
American Farmhouse Blend WLP670	L	White Labs	Medium	75–82%	68–72 °F (20–21 °C)	Consists of a traditional farmhouse strain and <i>Brettanomyces</i> .
Belgian Sour Mix WLP655	L	White Labs	Med./Low	70–80%	80–85 °F (27–29 °C)	Includes <i>Brettanomyces</i> , <i>Saccharomyces</i> , and the bacterial strains <i>Lactobacillus</i> and <i>Pediococcus</i> .
Berliner Weisse Blend WLP630	L	White Labs	Medium	73–80%	68–72 °F (20–22 °C)	Creates a subtle, tart, drinkable beer.
Brettanomyces Bruxellensis WLP650	L	White Labs	Low	70–85%	85+ °F (29+ °C)	Classic strain used in secondary for Belgian styles.
Brettanomyces Bruxellensis Trois WLP644	L	White Labs	Low	85% +	70–85 °F (21–29 °C)	Produces a slightly tart beer with delicate characteristics of mango and pineapple.
Brettanomyces Clausenii WLP645	L	White Labs	Low	70–85%	85+ °F (29+ °C)	Low intensity <i>Brett</i> character. More aroma than flavor.

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Attn. = Attenuation Temp. = Temperature

Strain	Type	Manuf.	Floc.	Atten.	Temp.	Description
Brettanomyces Lambicus WLP653	L	White Labs	Low	70–85%	85+ °F (29+ °C)	High Brett character. Horsey, smoky and spicy flavors.
Flemish Ale Blend WLP665	L	White Labs	Low/Med.	80–85%	68–80 °F (20–27 °C)	Creates a complex, dark stone fruit characteristic.
Belgian Lambic Blend 3278	L	Wyeast	Variable	70–80%	63–75 °F (17–24 °C)	Rich, earthy aroma and acidic finish.
Berliner-Weisse Blend 3191-PC	L	Wyeast	Low	73–77%	68–72 °F (20–22 °C)	Includes a German ale strain and <i>Lactobacillus</i> .
Brettanomyces bruxellensis 5112	L	Wyeast	Medium	Very High	60–75 °F (16–24 °C)	Produces classic “sweaty horse blanket” characteristic.
Brettanomyces lambicus 5526	L	Wyeast	Medium	Very High	60–75 °F (16–24 °C)	Pie cherry-like flavor and sourness.
Flanders Golden Ale 3739-PC	L	Wyeast	Med./Low	74–78%	64–80 °F (18–27 °C)	Will produce moderate fruity esters and spicy phenols.
Lactobacillus 5335	L	Wyeast	N/A	N/A	60–95 °F (16–35 °C)	Lactic acid bacteria produces moderate acidity.
Pediococcus 5733	L	Wyeast	N/A	N/A	60–95 °F (16–35 °C)	Lactic acid bacteria.
Roeselare Ale Blend 3763	L	Wyeast	Variable	80% +	65–85 °F (18–30 °C)	Produces a dry beer with a complex, earthy profile and distinctive pie cherry sourness.
Trappist Blend 3789-PC	L	Wyeast	Medium	75–80%	68–85 °F (20–30 °C)	A unique blend of Belgian <i>Saccharomyces</i> and <i>Brettanomyces</i> .

D = Dry L = Liquid Manuf. = Manufacturer Floc. = Flocculation Attn. = Attenuation Temp. = Temperature

Home Beermaking

by William Moore

Home Beermaking has sold over 485,000 copies since first being published in 1980. This completely rewritten 4th edition includes updated recipes for everything from Honey Cream Ale to Belgian Triple. A classic beginner's book. Available now at fine home brewing retailers.

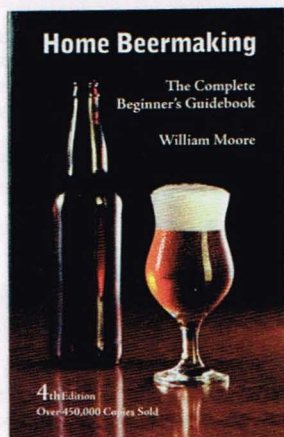
As seen in the White House YouTube® home brewing video!

Distributed to retailers by:

L.D. Carlson Company
800-321-0315
ldcarlson.com

Brewmaster Inc.
800-288-8922
brewmasterinc.com

New 4th edition



Brewcraft USA
877-355-2739
brewcraftusa.com
Crosby & Baker
877-675-9463
crosby-baker.com

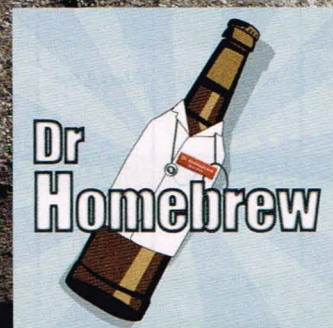
Northwest Specialty Co.,
253-581-0537
nwspecialtyco.com

Check out the new
HOP GRENADE varietals!



BREWING
WITH **STYLE**

Two new
Shows!
One new
Growler!



Dr
Homebrew



**THE
BREWING
NETWORK.com**

Double-walled
stainless steel
keeps your beer
cold for hours!

CAN DO!

Developed by Dr G.D.H Bell and his team at Cambridge, England in the 1960s, *Maris Otter* is a two-row barley with unrivalled heritage in the UK brewing industry.

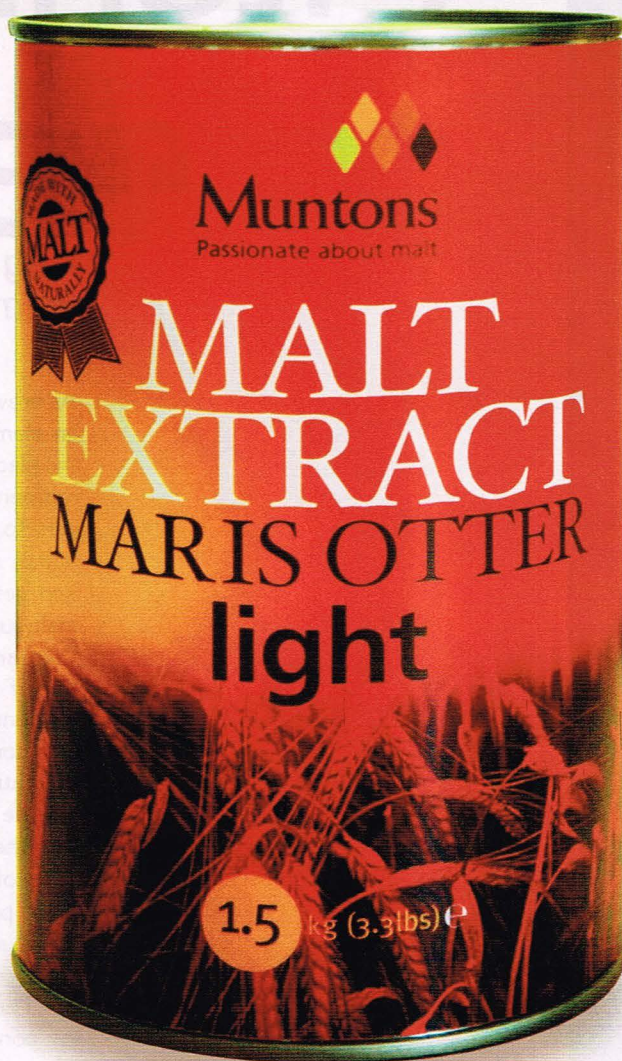
Dr Bell bred *Maris Otter* barley from a cross of *Proctor* and *Pioneer* - two top quality traditional malting barley varieties. To this day, *Maris Otter* seed is only sold to a select group of farmers who are specially chosen to grow the variety.

Soon after its introduction, *Maris Otter* barley malt became a favourite with brewers due to its excellent malting characteristics, low nitrogen content and forgiving brew-house performance.



Maris Otter is still highly prized in today's craft brewing industry providing independent brewers with a rare opportunity to create beers of unparalleled individuality and quality.

And now you can benefit from the unique characteristics of *Maris Otter* in your home brewed beers. Muntons *Maris Otter* liquid Malt Extract is a new addition to the Muntons Malt Extract range available in both 3.3lb cans and bulk malt.



Muntons

Made using the finest East Anglian *Maris Otter* barley malted to perfection by Muntons in the UK, this light malt extract contains a blend of premium Brewing malt with at least 60% *Maris Otter*, making it an ideal base ingredient for any beer recipe.

MADE WITH
**GREAT
BRITISH
MALT**

Find out more from Terry McNeill email: sales@muntons-inc.com

800 Bellevue Way NE • Suite 435 • Bellevue • WA 98004 • Office: 425 372 3082 www.muntons.com



Homebrew Pitching Rates

“Brewers make wort, yeast make beer.” It’s a saying I’ve cited so many times over the years, I’d have stopped repeating it long ago if I didn’t like the sound of my own voice so much. But it’s still very, very true.

By **Michael Dawson**

As brewers, our job is similar to that of an elementary school custodian: keep the place clean and make sure the environment is conducive for the little buggers to do what they need to do . . . which in this analogy is not learning and getting socialized but converting malt sugars into alcohol and CO₂ gas. We can ensure post-boil surfaces are free of contaminants, provide a quality, nutrient-rich wort, and foster favorable conditions (dissolved oxygen, fermentation temperature control, etc.) but the biggest determining factor that tips the balance between gallons or liters of awesome homebrew or pint after pint of blah homebrew is the health and happiness of the yeast doing the work of fermentation.

There are many factors to manage in conducting a good, healthy fermentation, but the first and most fundamental factor is inoculating the wort with a population of healthy yeast cells at the right dosage or pitching rate.

Pitching rate is basically the amount of yeast one uses to inoculate cooled wort (pitching, in brewers’ parlance), expressed as a ratio of the number of yeast cells to wort volume.

A Baseline

A good baseline pitching rate is 6 million cells of healthy yeast per milliliter

of wort. This rate is recommended for ales of average strength, which is what many homebrewers make most of the time. The rule most commercial brewers use (most meaning lager) is 1 million cells/°Plato/ml wort, or about 12 million cells per milliliter. Ale brewers do often times pitch at lower rates.

Most homebrewers make 5-gallon (19-L) batches. There are 18,927 (give or take) mL in 5 gallons (19 L), which works out to a target pitching rate of 113.5 billion cells for 5 gallons (19 L) of standard-gravity (<1.060 SG) wort that will be inoculated and fermented at ale temperatures (~65 °F/18 °C or so).

It’s important to note that this is a guideline rather than a rule — there is room for variation and adjusting this number up or down depending on the style you’re brewing and the temperature you use to ferment the beer (more on that later on in this article).

Another formula you’ll come across, if you’d care to double down on both the metric system and wort gravity in Plato, is x million cells per milliliter of wort per °Plato. For me, the nice features of working the numbers this way are that it’s easily scalable by wort gravity, regardless of beer style; and because of the linear nature of metric, it’s also easily scalable by volume —

One of the most crucial keys to brewing beer at home (and commercially) is pitching the right amount of yeast cells to run a healthy, robust fermentation. Both underpitching and overpitching can create off flavors or adverse effects in your homebrew. The term "pitching rate" is the ratio of the number of yeast cells to wort volume.

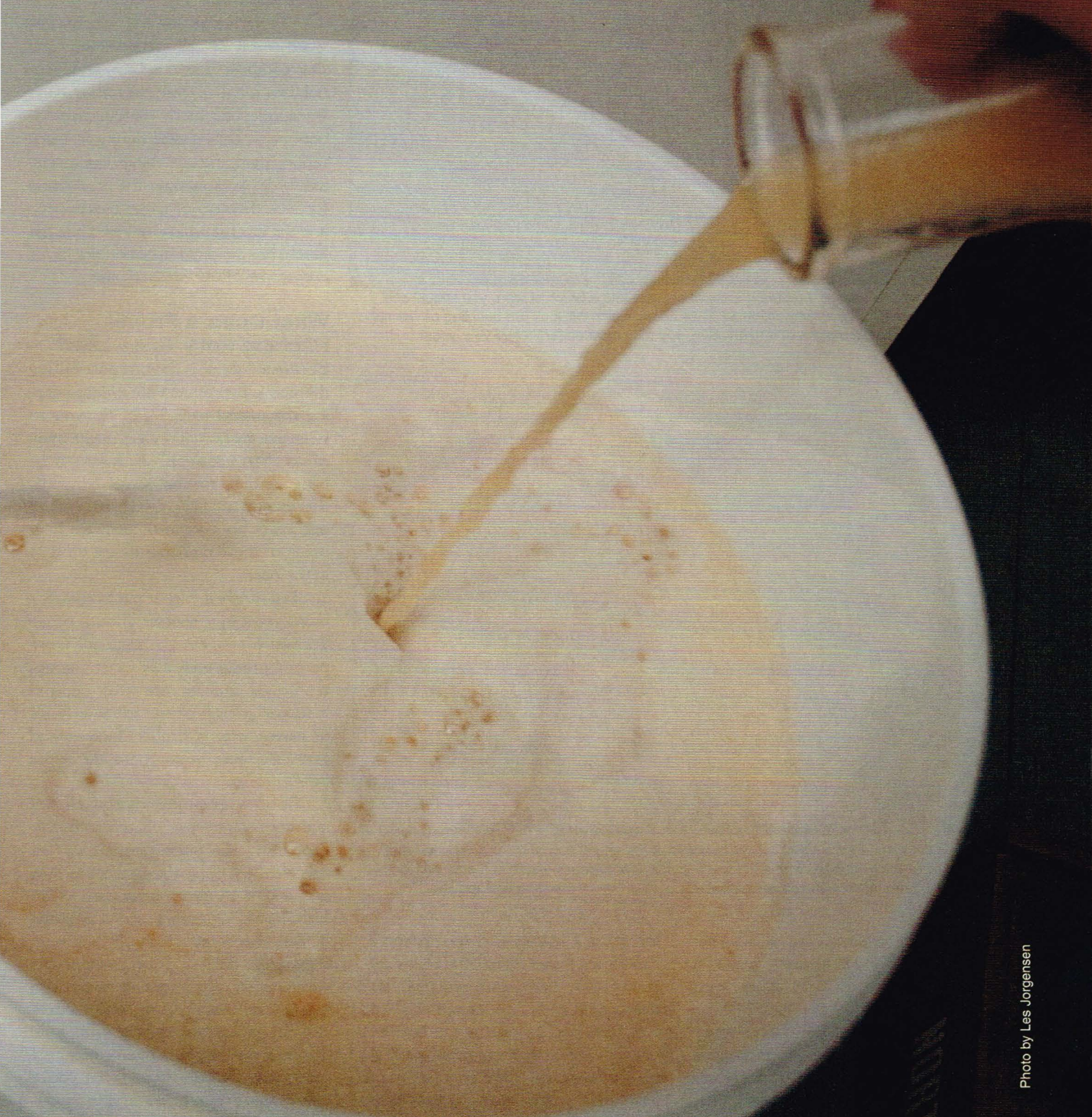


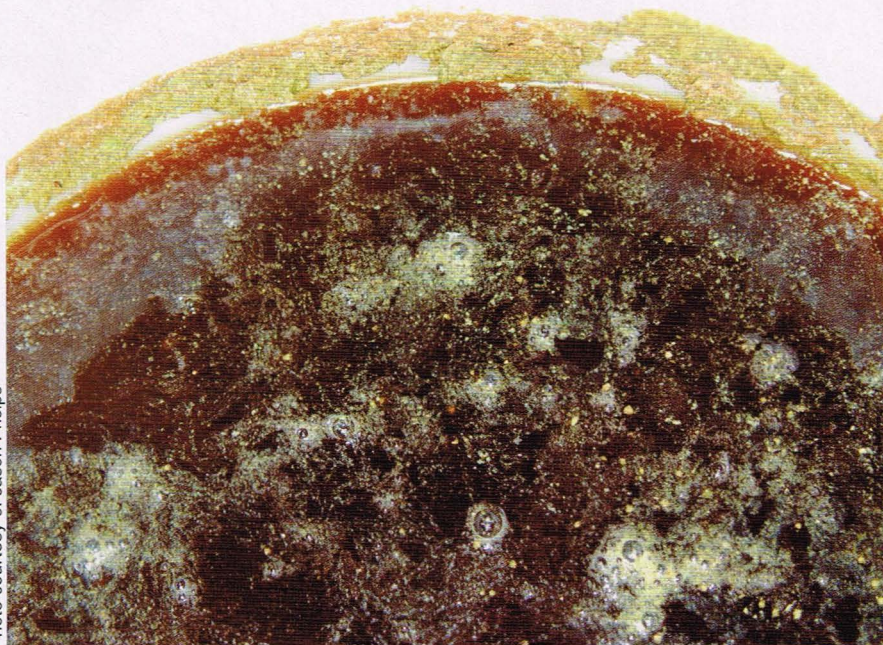
Photo by Les Jorgensen

Photo courtesy of Jason Phelps



When you have pitched the proper amount of yeast into a batch of wort, you should see signs of fermentation activity within 12 to 24 hours, which will look like bubbling on the surface. If you don't see signs of fermentation, you may have underpitched your yeast.

Photo courtesy of Jason Phelps



Here is the same beer as the first photo above at the end of fermentation (a London ale). When a beer is inoculated with a healthy population of brewer's yeast, at the proper temperature, the fermentation should not slow down or stop before reaching final gravity.

x million per milliliter is also x billion per liter, which (for me at least) makes it easier to relate to both liquid yeast packaging and my batch size. (These reasons are also why many large-scale homebrewers and commercial brewers use metric/Plato for calculating recipes and pitching rates.)

What's Going On In There?

Before we move on to other considerations and theory-into-practice, let's take a step back . . . or rather a step way, way closer, and get a layman's overview of what happens when yeast meets wort, to help us understand why pitching rate is so important to the

finished product.

A very simplistic perspective is that our brewers' yeast produces three things while colonizing its new home in our carboys and buckets: it makes more yeast cells, catabolic waste and various metabolic byproducts through its use of wort resources like malt sugars and dissolved O_2 .

"More yeast" is the straightforward result of cell reproduction, and that catabolic waste is CO_2 and alcohol (one fungus's trash is another man's treasure). The many various byproducts yeast cells create during fermentation, then, include things like esters, aldehydes and phenols; the production (or lack thereof) of these byproducts, and the level at which they pervade the batch, has a direct impact on the flavor and aroma of our finished beer.

What Does A Proper Pitching Rate Taste Like?

Because those flavor-contributing metabolic byproducts are created during the period of cell growth prior to what we lay homebrewers might think of as "fermentation" (kräusen, bubbling airlock, maybe some blowoff), the extent of the growth required of our yeast population determines how much of these compounds are present in the beer.

In a nutshell, higher pitching rate = more yeast in = shorter growth phase = lower esters, etc., = "cleaner," more neutral profile with less yeast character. Lower pitching rate = less yeast in = longer growth phase = higher levels of esters, etc. = fruitier, funkier, and generally more yeast character in the beer's profile.

Besides ensuring reproducibility and consistency from batch to batch, controlling the pitch rate means we can also fine-tune the sensory profile of our pint. A clean, crisp Pils, where high levels of esters are a stylistic defect, mandates a high pitching rate; likewise a Belgian Tripel, where the combination of high-gravity wort with highly expressive yeast strains could get out of control quickly with fusel alcohols and high concentrations of esters and phenols. But maybe you're brewing a session bitter, or a weissbier

with a hankering for a strong isoamyl acetate “banana” nose — a pitching rate on the lower end of the spectrum (without actually going out of the spectrum and underpitching) will help the yeast strain stand forward and put an authentic stamp on styles like these.

The Golden Mean

Too much of anything is too much, as the man said — but not enough of anything isn’t much good either.

Underpitching a batch of homebrew, even for styles that benefit from some yeast character, can lead to higher-than-desirable levels of esters, fusel alcohols, or sulfur compounds, as well as more serious problems like excessive amounts of diacetyl and higher-than-planned final gravity. Underpitching is a very common flaw in homebrewed beers. In the September 2010 issue of *Brew Your Own*, Brooklyn Brewery Brewmaster Garrett Oliver, who has judged a great many homebrew competitions, said, “The most important factor to brewing any style, at home or professionally, is making sure you start from the very beginning with a healthy population of yeast. You should see the fermentation take off sooner rather than later. For example, for most ales, you ought to see a very active fermentation in under twelve hours. A beer from a struggling fermentation has a certain flavor. It’s one of the main things that tends to distinguish what a professional might say is a homebrew flavor.”

Overpitching, which might not seem like such a big deal on paper, can in practice significantly reduce ester production, cause overshooting of target final gravity and speed fermentation up to create its own set of problematic flavors from yeast autolysis, and can throw the beer out of style.

So to repeat myself (one of my other favorite hobbies, besides homebrewing): a good baseline pitching rate for standard-gravity (less than 1.060) wort that will be inoculated and fermented at ale temperatures (~65 °F/18 °C) is 6 million cells of fresh yeast

per milliliter.

High-Gravity and Lager Fermentations: What’s Different?

But what if you’re going to be brewing north of 1.060 SG? Or if you’re going to be fermenting south of 60 °F (16 °C)? Better bring more yeast cells.

In addition to the considerations of flavor and aroma impact, high-gravity

brewing creates added environmental stress for the yeast; the greater density of the wort means increased osmotic pressure on the cell walls, and the higher concentrations of alcohol as fermentation progresses becomes increasingly toxic to the yeast. For this reason, successful fermentation of a strong beer calls for starting out with more yeast than a standard-gravity brew.

The cool fermentation tempera-

Continued on page 52

Same **superior** specialty malts available in **extract** or **whole kernel** form.

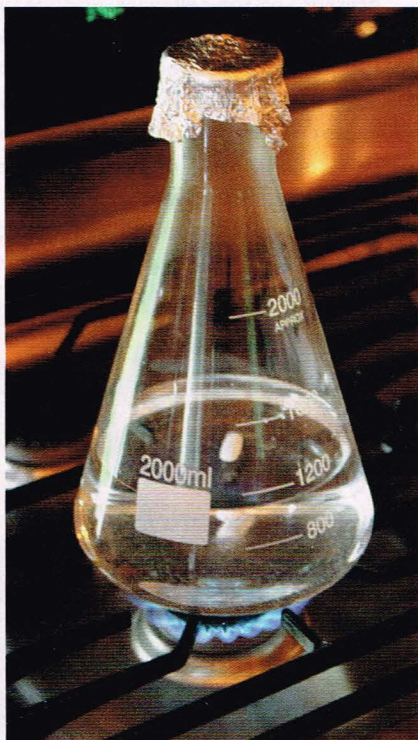
The advertisement displays a variety of Briess malt products. On a wooden shelf, there are two rows of jars. The top row includes jars for 'CW Bavarian Wheat', 'CW Munich', 'CW Sparkling Amber', and 'CW Traditional Dark'. The bottom row includes 'CW Pilsen Light', 'CW Golden Light', 'CW Rye', 'CW Porter', and 'CW Special Dark'. Below the jars, there are several wooden bins filled with different types of whole kernel malt, ranging from light to dark. In the foreground, a Briess logo is visible, featuring a wheat stalk and the text 'BRIESS MALT & INGREDIENTS Co. All Natural Since 1876'. At the bottom left, contact information is provided: 'Chilton, WI, USA | 920.849.7711' and a Facebook icon with the website 'www.BrewingWithBriess.com'. At the bottom right, a call to action reads: 'Ask your local homebrew store for handcrafted Briess malts and malt extracts today!'. The copyright notice '©2013 Briess Industries, Inc.' is at the bottom center.

Chilton, WI, USA | 920.849.7711
f | www.BrewingWithBriess.com

©2013 Briess Industries, Inc.

Ask your local homebrew store for handcrafted Briess malts and malt extracts today!

Propagating a Starter Culture



An Erlenmeyer flask can go directly on the stovetop when making a starter.

Many brands of yeast for homebrewing are designed to directly inoculate 5 gallons (19 L) of standard ale wort (OG less than 1.060, fermentation temperature 65–72 °F/18–22 °C). However, high gravity worts (OG greater than 1.060) or cold fermentation temps (less than 65 °F/18 °C for lagers or hybrid ales) require a higher pitch rate than can be achieved with a single pack of yeast. Making a starter culture prior to brew day is an economical way to increase pitching rate and ensure consistent results in your brewing.

Determining Pitching Rate

First, determine the appropriate pitching rate for your beer (see the chart on the next page).

Once you have a target pitching rate, plug the numbers into Wyeast's Pitch Rate Calculator (www.wyeastlab.com/hb_pitchrate.cfm) or another calculator to determine the starter volume needed to achieve the target pitching rate.

Timing a Starter Culture for Brew Day

Because starter cultures are inoculated at high cell densities, growth is usually maximized within 24–36 hours. Preparing the starter one to two days prior to brew day is ideal.

Starter cultures should be used immediately, or stored refrigerated for up to one week. Cell viability will decrease rapidly if the starter culture sits unused, especially if left at ambient temperatures for extended time.

Preparing a Starter Culture

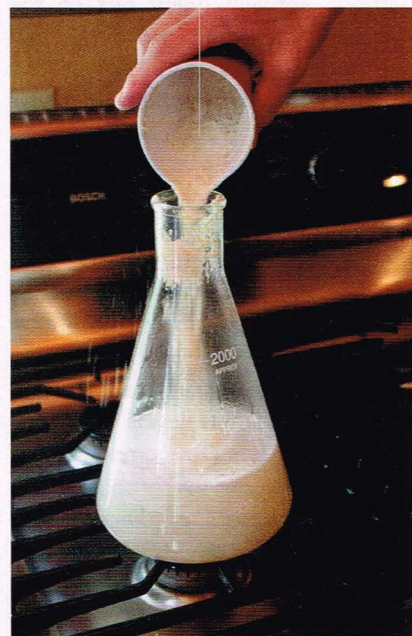
The optimal media for cell growth and health is a malt-based wort of about 1.040 OG, fortified with yeast nutrients. Dried malt extract is ideal for starter culture wort, since it's readily available, easy to measure, and the leftovers store well for use in future starters.

Equipment Needed

- Sanitized Erlenmeyer flask or jar, sized for the required volume of starter culture (optional) (see photo, left)
- Sanitized cover for the flask or jar — aluminum foil, foam stopper or loose-fitting lid
- Oven mitts for handling hot liquid
- Magnetic stir plate and bar (stir bar pictured in the photo at left in the bottom of the Erlenmeyer flask) (optional)
- Foam control drops, such as Fermcap, (optional)



Measure your dried malt extract into a pliable container, such as a plastic cup.



Add the malt extract to the water in the flask and bring to a boil.

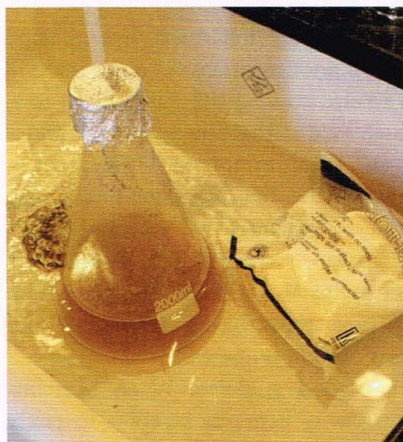
Basic Recipe (scale as needed)

- 3.5 oz./100 g plain dried malt extract (DME) (approx. ½ cup). Tip: measuring into a plastic cup (as pictured above) makes transfer into the flask easier as you can crease the side of the cup (see photo above right).

- ½ tsp. yeast nutrient
- 1 qt. (1L) H₂O

Basic Procedure

1. Mix DME, nutrient and water. Shake or stir to dissolve.
2. Boil starter wort 20 minutes to sterilize. Use a saucepan on a kitchen stove; if using a laboratory-grade glass flask, you may be able to boil directly in the flask (as pictured at top left) — double check with your supplier or the manufacturer first. Use foam control drops (optional) to prevent foam from boiling up in the flask.
3. Cool to 70 °F (21 °C). A cold-water bath will help speed things along (see photo at top left on the next page).
4. Transfer to sanitized flask or jar. Carefully pour the cooled starter wort into the sanitized flask or jar.
5. Add yeast pack. Cover loosely with sanitized aluminum foil, a foam stopper, or a loose-fitting lid.



Chill the starter wort down to yeast pitching temperatures after boiling.

or the jar's lid and swirl gently to mix (see photo at right).

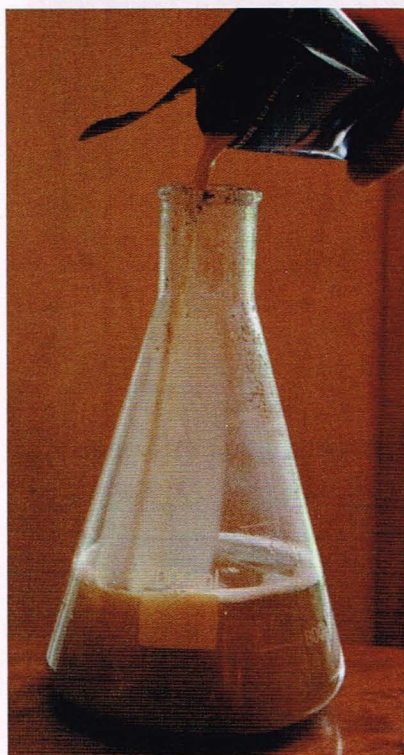
6. Incubate 24–36 hours at 70 °F (21 °C). Agitate the starter culture periodically, or use a stir plate for constant, steady agitation and aeration.

7. Pour the starter culture into the cooled, aerated wort in your fermenter; the entire volume of starter may be added to the main batch, or you may prefer to decant some of the spent wort first: chill the starter during brew day to encourage cells to settle, then decant the top layer into the sink, pouring just the yeasty bottom layer into the fermenter.

Propagating a Starter Culture

Any yeast strain, including lagers, should be incubated at 70 °F (21 °C) to ensure rapid growth. It's not uncommon for a starter culture to display less visible fermentation activity (kräusen, etc.) than a full 5-gallon (19 L) batch; due to the

high pitching rate of a starter culture, fermentation can more or less happen while we're not looking. Just as with a full-sized batch of homebrew, the best indicator of activity is a gravity reading; also look for CO₂ bubbles coming out of solution (especially if using a stir plate), "yeasty" rather than "worty" aromas, and turbidity — starter cultures will usually look milky or cloudy while fermenting, and clear with a layer of whitish-tan sediment when finished.



Add the contents of your yeast package to the chilled wort in the flask and stir.

Stirring and O₂

Agitation of the culture aids in removing inhibitive CO₂ from suspension as well as adding small amounts of oxygen. Small additions of oxygen periodically throughout the growth of a starter will replenish sterols and improve cell yield.

Stirring or shaking the starter periodically, or using a stir plate, will improve cell growth in a starter culture. The use of stir plates has been shown to increase cell growth 25–50% over a non-stirred starter.

Two-Stage Propagation

To increase cell count even further, brewers making strong lagers or very high-gravity beers, or those brewing 10-gallon (38-L) (or larger) batches can opt to make a two-stage starter culture:

Allow an extra 24–36 hours before brew day and follow the basic procedure; when the initial culture is fermented out, chill and decant the spent wort, then replenish the flask or jar with another volume of fresh starter wort and repeat the incubation process.

Caution

Sound sanitation practices are critical when propagating a starter culture. It is important to understand that creating a starter can increase the risk of infection by undesirable organisms. A small level of contamination in a starter culture can multiply to unacceptable levels in the main batch, creating undesirable effects in the finished beer.

- This content appears courtesy of Wyeast Labs.

For further info

• https://www.wyeastlab.com/hb_makingastarter.cfm

Target Pitching Rates

STYLE	GRAVITY	PITCHING TEMPERATURE (°F/°C)	FERMENTATION TEMPERATURE (°F/°C)	PITCH RATE (Million Cells/ml.)
Ale	<1.060 (15 °P)	>65 °F (18 °C)	>65 °F (18 °C)	6.00
Ale	1.061-1.076 (15–19 °P)	>65 °F (18 °C)	>65 °F (18 °C)	12.00
Ale	>1.076 (19 °P)	>65 °F (18 °C)	>65 °F (18 °C)	>18.00
Lager	<1.060 (15 °P)	>60 °F (16 °C)	>60 °F (16 °C)	12.00
Lager	1.061-1.076 (15–19 °P)	>60 °F (16 °C)	>60 °F (16 °C)	18.00
Lager	>1.076 (19 °P)	>60 °F (16 °C)	>60 °F (16 °C)	>24.00

Free! BEER COLLARS

WITH BEER LABEL PURCHASE

FOR A LIMITED
TIME ONLY

evermine
BEER

inspired by My Own Labels

waterproof vinyl beer labels | myownlabels.com/beer



Continued from page 49

ture of lagers and many hybrid beer styles is another source of environmental stress, slowing cell metabolism to a crawl. Add to that the stylistic requirement to minimize the ester levels in the finished beer and we're suddenly asking a lot of our yeast. For these reasons, cold-fermented beer styles also require a higher pitching rate than beers fermented at warmer temperatures.

A good guideline when brewing high-gravity beers or lagers is to pitch double or triple the baseline pitching rate of 6 million cells/mL for ales — 12 to 18 million cells per mL. And for a high-gravity lager, like a doppelbock operating under the weight of both high OG and low temperatures, a quadrupling of the pitching rate — 24 million cells/mL — wouldn't be out of order. (For more on brewing high-gravity beers, visit *BYO* on the Web at <http://byo.com/story1882>.)

What's Your Pitching Rate?

Given that today's homebrew-sized liquid yeast packages (known as activator packs or smack packs, depending on the manufacturer), as well as sachets of dry yeast, from the major yeast labs contain roughly 100 billion cells when fresh, those of us brewing smaller-volume batches can brew even fairly high-gravity beers and some lagers without any extra preparation — the quantity of yeast right out of the package will be sufficient, or more than sufficient, for the needs of brew lengths like these.

For those of us brewing the traditional 5-gallon (19-L) batches, low- to moderate-gravity ales can also often be pitched directly from the package. But as gravity goes up and temperatures go down (or batch sizes increase), our target pitch rates will represent multiple packages' worth of cells for a batch. Alternately, we could propagate one pack of yeast in a starter culture prior to brew day to build up our pitch rate (see the sidebar in this story on making a yeast starter on page 50 and 51). A starter culture is a great idea regardless of what you're brewing, since it ensures maximum viability and health of the yeast population, and is



Shop 24/7/365
HomeBrewIt.com

Retail Store Hours:
W - F: 10-6 / Sat: 10-4

Quality Products - Expert Advice - HomeBrewIt.com
Sponsor of the Indiana State Fair Brewers Cup

Homebrewing Supplies & Equipment for
Beer - Cheese - Soda - Liquor - Wine

www.HomeBrewIt.com

Retail: 108 S. Elkhart Ave., Elkhart, IN 46516
Office: 530 E. Lexington Ave. #115, Elkhart IN 46516 ~ (574) 295-9975

an especially good practice if your yeast pack is out of date or was purchased through mail order and shipped in hot weather or other adverse conditions.

More Information

I'm happy to relate that it's easier than ever to dial in your pitching rate for each batch (back in my day, uphill both ways through snow, etc. etc.) with the preponderance of calculators available online and onboard in many brewing software programs. Below is just a small selection of the excellent resources out there:

- Brew Your Own pitching rate chart for fresh yeast: www.byo.com/resources/pitching
- Wyeast Labs online pitching rate calculator: www.wyeastlab.com/hb_pitchrate.cfm
- Mr. Malty pitching rate calculator: www.mrmalty.com/calc/calc.html

Disclaimer: It's been said before, but it bears repeating: when most homebrewers talk about cell counts, it's a ballpark estimate, and not an actual head count of our yeast. Pro brewers and lab types use hemacytometers and a microscope to get a more accurate count of their pitching population (see the December 2003 issue of *Brew Your Own* for more information), but for our purposes as homebrewers, the horseshoes-and-hand grenades approach to estimated cell counts will still yield great beer. (Using a hemocytometer is not a real head count either, by the way, but it is better than guessing!)

For homebrewing, you're pretty safe with using an estimated target range from *BYO's* pitching chart in the link I provided above, or by punching your numbers into Mr. Malty's pitching rate calculator. (In case you didn't know, Mr. Malty is actually *BYO's* own "Style Profile" columnist Jamil Zainasheff, who is also the co-author of *Yeast: The Practical Guide to Beer Fermentation* (Brewers Publications, 2010), which is an excellent resource

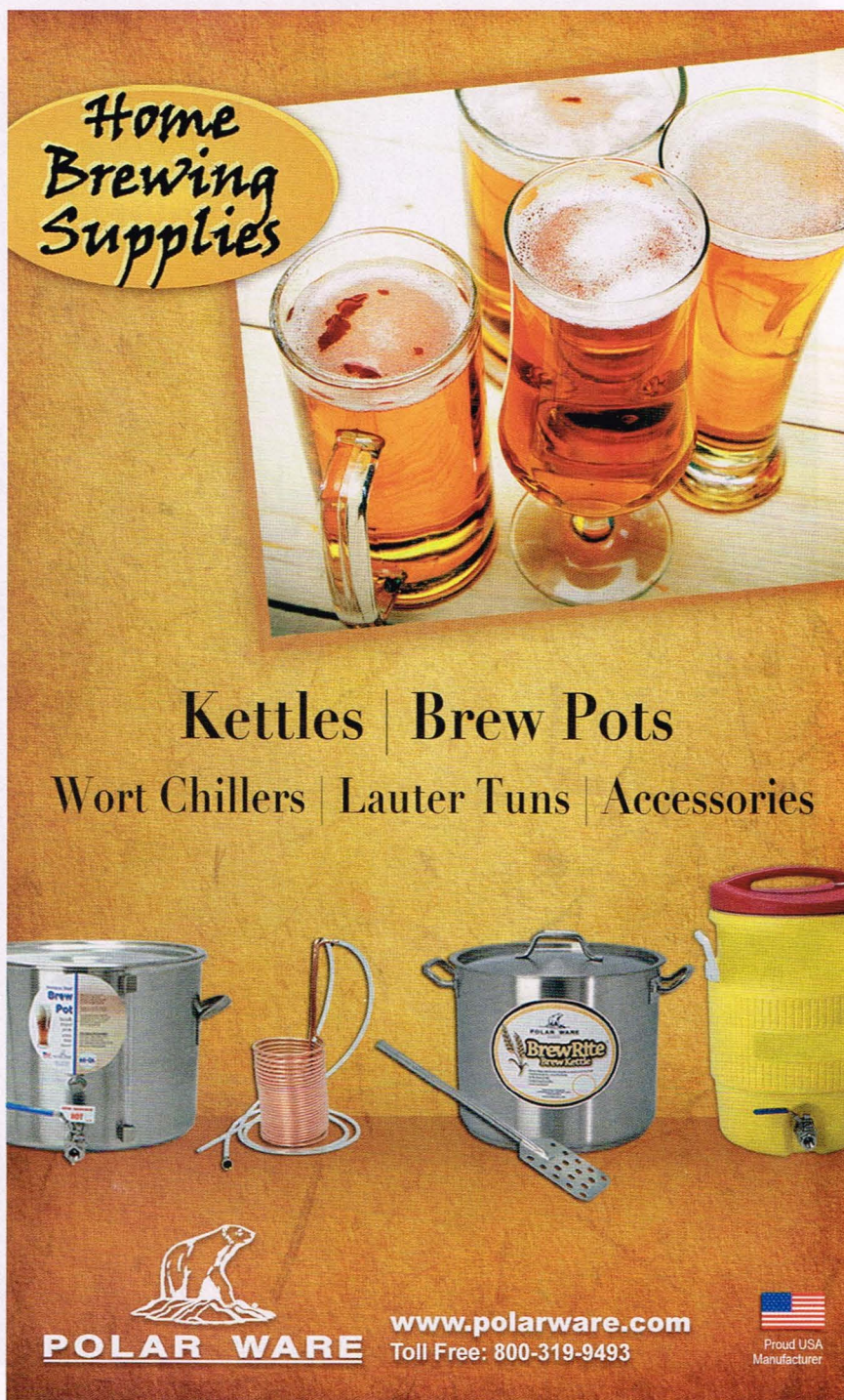
for questions about yeast.) **BYO**

Related Links

• How does a professional brewer consistently produce the same beer batch after batch? By producing consistent fermentations. How does a professional brewer produce consistent fermentations? By consistently managing the yeast so that each fermentation produces the same rate of

yeast growth and the same total amount of growth. John Palmer discusses why pitching rates are crucial to brewing beers with consistency: <http://byo.com/story1717>

• *BYO* and *Basic Brewing Radio* team up with readers and listeners to experiment with various pitching rates: www.byo.com/blogs/entry/pitching-rate-experiment



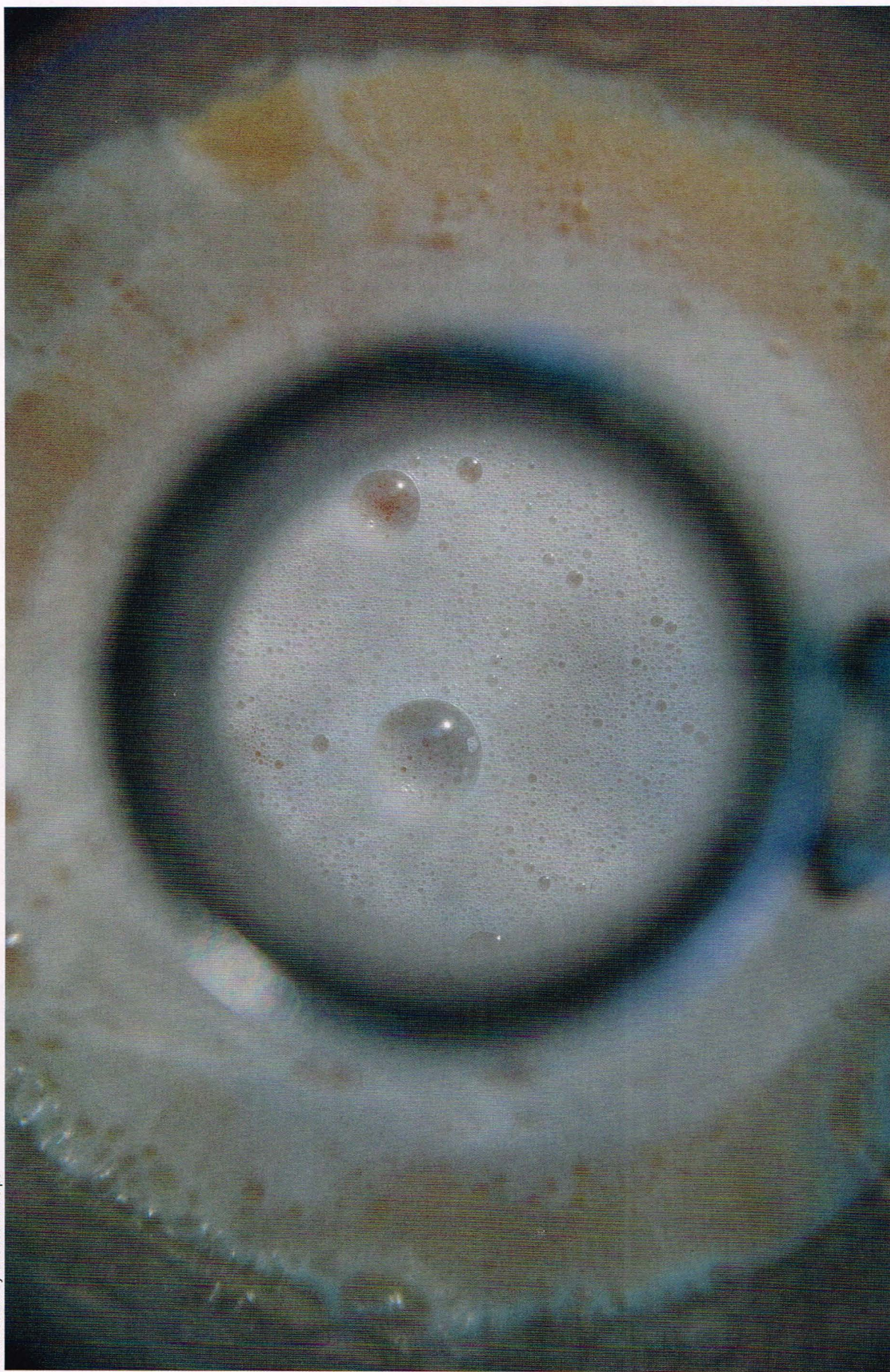
Home Brewing Supplies

Kettles | Brew Pots
Wort Chillers | Lauter Tuns | Accessories

POLAR WARE
www.polarware.com
Toll Free: 800-319-9493

Proud USA Manufacturer

Photo courtesy of Jason Phelps



TAKE TWO:

Reusing Homebrew Yeast

By **Gretchen Schmidhausler**

As the popularity of homebrewing has grown over the last 20 to 25 years, so has the availability of quality brewing ingredients, especially yeast. Gone are the days when old school hobbyists had a choice between only packets of dry ale or lager yeast. You want to make a dry Irish stout? There's a yeast for that. A Belgian abbey? There's a yeast for that, too. Munich lager, lambic, Czech Pilsner? You get the picture. While homebrewing is a great hobby that can be

also a great way to learn some professional brewing techniques.

To Reuse or Not to Reuse

Cost considerations aside, who should consider reusing yeast? If you're a hobbyist who brews a few times a year you'll want to stick with buying yeast for one batch at a time. If you brew frequently, but like to try something different each time — high gravity, highly hopped or flavored beers, then best stick to yeast strains appropriate to your brewing style. If you don't have a lot of time (or are a little lazy), you'll likewise want to pitch a one-shot yeast and be done with it. But, for brewers who labor over their kettles frequently, tend to brew similar styles several times a month, would like to lower their costs a bit, or who tend to share recipes, ingredients and tips with fellow homebrewers, then read on.

One big reason the pros, particularly some brewpubs, reuse (repitch) a particular yeast strain is to give their beers a signature character — reusing the same strain of yeast over and over develops a house flavor — the beers all seem to be from the same family. Over time, a versatile strain becomes accustomed to the environment (temperatures, equipment, fermentation, schedules) in a particular brewery and acclimates itself to those conditions.

Selecting Yeast to Reuse

Although professional brewers may use the same yeast workhorse for months before replacing it, expect to reuse your yeast from three to five times, and only under ideal conditions. Choosing the right yeast

“Reusing the same strain of yeast over and over develops a house flavor . . .”

pursued at any level, if you brew frequently, the cost of ingredients for even a 5-gallon (19-L) batch sure can add up. And aside from the initial investment in equipment, yeast is probably one of the costliest brewing ingredients.

Reusing yeast is a simple technique any intermediate or advanced homebrewer can master quickly and something that professional brewers do on a regular basis. Why reuse your yeast if you're not trying to save money? Maybe you really nailed a beer and you want to replicate it exactly. Or maybe you feel it's time you developed your own “house beers.” Reusing yeast is

YEAST WASHING

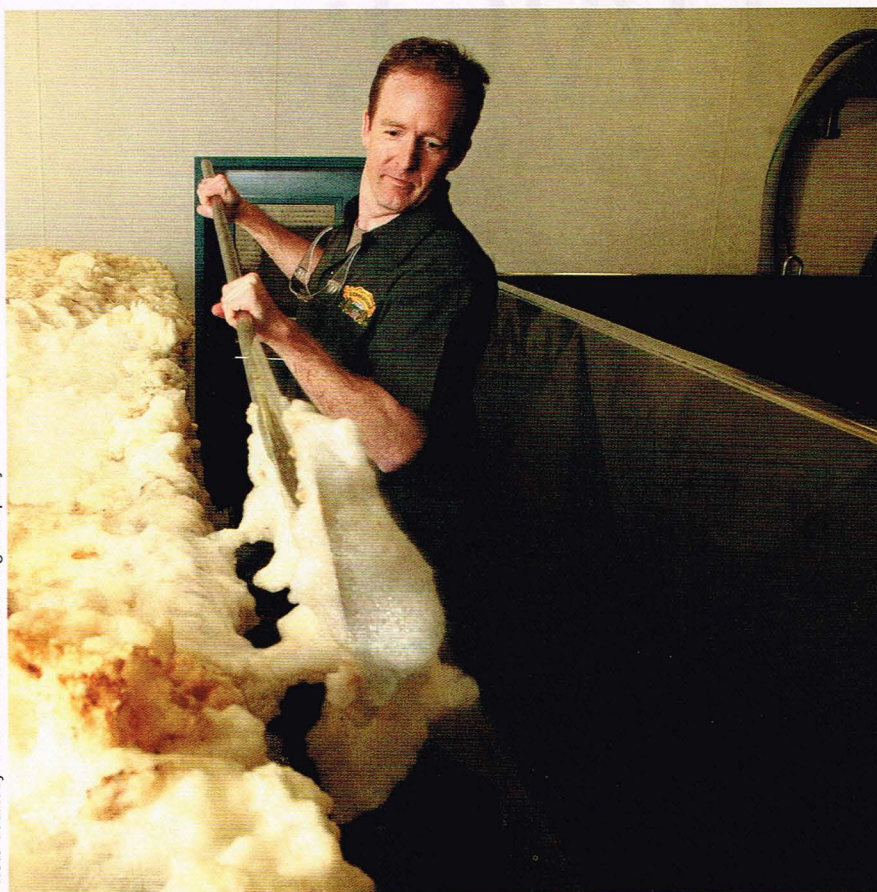
Yeast washing is a procedure involving the separation of viable, healthy yeast cells from old, dead cells, trub and hop particles. Over time, these undesirable components will become more prevalent in your yeast. By removing them, you've prolonged the life of your yeast and can now store it for longer periods of time with more confidence (although remember that storing yeast for too long is not ideal). Here is a simple method for washing yeast:

1. Transfer the wort from your carboy or bucket, leaving enough liquid to cover the yeast cake. Swirl the mixture around to loosen the yeast. Carefully pour what you can into a large sanitized glass container such as a 1-gallon (3.8-L) carboy, flask or two 2-quart mason jars. The mixture may be chunky; that's fine. By using a large enough container, you will be able to fill multiple jars for future use.

2. Add sterile water to at least double the volume of the slurry. Cover and set aside for 15 to 30 minutes. After that time, you'll see the liquid has separated; the heavier trub, dead yeast and other unwanted matter has fallen to the bottom, while the creamy, healthy, yeast forms the top layer. Carefully decant the top layer into a sanitized container(s).

3. Screw lids on loosely, venting CO₂ daily for several days. Tighten on third or fourth day. When storing yeast, it's a good practice to label the jar with the date, type of yeast and generation. When the time comes to reuse yeast that has been stored for more than a week or so, use a simple yeast starter to get your pitching population healthy and ready for brewing (see page 50 of this issue for the steps to making a simple yeast starter).

Photo courtesy of Sierra Nevada Brewing Company



Many commercial brewers harvest their yeast by a method known as "top cropping." This is done by skimming the yeast off the surface of the beer during the most active time of fermentation — high kräusen — and repitching the active yeast into a new batch of wort.

and the complementary styles you'll be brewing is the first step. Select a good, versatile yeast for your needs. Your brews — whether ales or lagers — should not be high gravity or strong (6.0% or up) beers, should not utilize a lot of hops, and should not be dry-hopped, flavored with herbs, spices, fruit, coffee, etc. Excess alcohol and hops will stress your yeast, possibly with undesirable results. Other ingredients may impart flavors you don't want in subsequent batches. The exception to this rule is if you plan to add these specialty ingredients to a secondary fermenter or keg, as you will be harvesting yeast from the primary. The other exception is if you plan on making three successive batches of the same beer — raspberry wheat, for example.

Schedule Brewing for Reusing Yeast

The second step is drawing up a sched-

ule for your anticipated brews. Ideally, you will pitch the yeast from one batch directly into a second, but this does take planning; it is something much easier to achieve in a commercial brewery with a more structured production schedule. In addition to the timing, you'll want to have an idea of what styles you will brew. For example, you might start with a golden ale, then an amber, followed by a stout. If you're only going to try for three generations, it doesn't really matter that much what that last batch is — an IPA, a coffee porter or whatever.

Also, if you know you'll be reusing yeast from a particular batch, try to ensure the transferred wort is as clean as possible, with as little trub or other residue as possible left behind in the brew kettle.

There are three methods for reusing yeast that we will discuss: Batch-to-batch pitching if racking or transferring and brewing on the same

day; harvesting yeast for use at a later date, within one to two weeks, and yeast washing (if you plan to store yeast for a longer period of time).

But first, a refresher course in sanitation is in order. If this seems off topic, think again. When reusing yeast, the goal is to harvest the healthiest, most viable yeast possible. Proper sanitation, that tedious but necessary practice that comes up all the time when discussing homebrewing, is perhaps the most important part of the equation when working with brewer's yeast.

Sanitation

For the most part, brewers, both pros and hobbyists, utilize the practice of sanitization, not sterilization. In nearly every case, with proper attention to detail, this is sufficient. Every brewer should already have his or her own procedures in place. Everything, repeat, everything that comes in contact with the wort and the yeast must be sanitized. You probably already have a sanitizer of choice — whether it's a powdered chemical, an iodine-based liquid, etc. Whatever your preference, be sure to have it ready to go and conveniently located in a bucket, filled sink or spray bottle. Many sanitizers are the no-rinse type, but still be careful not to overuse, and follow the manufacturer's directions carefully.

Make sure equipment to be sanitized is free of all surface dirt — that means dust, wort, bits of dried yeast, etc. Periodically discard and replace any old, grungy and/or scratched plastic buckets and hoses.

It may sound obvious, but make sure your hands are clean. Roll up long sleeves and tuck loose shirts into pants while you're at it. Whatever room or area of your home you are working in, make sure the work surfaces are clean, pets (and their hair) are elsewhere, windows are closed, and ceiling fans are off. A nice breeze is a perfect vehicle for contaminants looking to hitch a ride into your homebrew.

Preparation

Make sure your sanitized equipment (hoses, fittings, spoons, containers,

etc.) are placed within easy reach, on a clean cloth or paper towel. Keep a spray bottle of non-rinse sanitizer handy at all times. Some brewers like to use a pure alcohol and flame sample ports and jar lids; whatever works for you.

Glass or other containers that are easily sanitized work best. Quart-sized canning or mason jars are perfect for harvesting and storing yeast

(see the photo on page 58). Durable mason jars can be sterilized by boiling and have two-part lids that can be screwed on loosely while still protecting the contents from outside contaminants. Boiled, sterile water can be poured into jars, covered and cooled if you are planning on washing your yeast. Have at least one half gallon in reserve. As with any glass, avoid sudden changes in temperature; never

B
EST. BEST 1992

ALL INCLUSIVE...
TRUE - TO - STYLE...
OVER 50 VARIETIES...

Why mess with perfection?

BREWER'S BEST
Beer Ingredient Kit
Everything You Need To Craft Your Best Brew

American Light
Ingredients: Malt, Hops, Yeast, Water
Instructions: 1. Boil water for 10 minutes. 2. Add malt and hops. 3. Boil for 60 minutes. 4. Add yeast. 5. Ferment for 7 days. 6. Bottle and enjoy.

Irish Stout
Ingredients: Malt, Hops, Yeast, Water
Instructions: 1. Boil water for 10 minutes. 2. Add malt and hops. 3. Boil for 60 minutes. 4. Add yeast. 5. Ferment for 7 days. 6. Bottle and enjoy.

Classic
Ingredients: Malt, Hops, Yeast, Water
Instructions: 1. Boil water for 10 minutes. 2. Add malt and hops. 3. Boil for 60 minutes. 4. Add yeast. 5. Ferment for 7 days. 6. Bottle and enjoy.

LD Carlson Co., Kent OH 800-321-0315
www.ldcarlson.com - www.brewersbestkits.com



If you need to store your harvested yeast, you can store it for up to two weeks in the refrigerator. You can prolong your yeast's viability by separating it from any dead cells, trub and hop particles left over from the last batch. This process is known as "yeast washing."

immerse a cold jar in hot water or vice versa. Have a pair of tongs handy if you intend to boil your jars. As an alternative to the standard lids, plastic wrap and a rubber band works well as a cover.

Harvesting

How you harvest your yeast will depend on your fermentation vessel. If you're lucky enough to own a stainless steel fermenter with a conical bottom all you have to do is pull yeast gently from the bottom port. Open the valve gently and fill the sanitized container quietly with no splashing. Remember to discard the initial yeast plug, the darker, grittier matter — mostly dead yeast cells and trub — that appears first. Ideally, target the middle layer of yeast, which is the healthiest and most viable. Harvest enough yeast to fill a quart jar, leaving a little headroom.

If you're fermenting in a tried and true plastic bucket, you have two options. Top fermenting ale yeast can

be cropped from the top of the bucket during active fermentation (see photo of commercial top cropping on page 56). Gently and carefully remove the lid of the fermenter and skim the yeast off the top with a sanitized spoon. Discard the dirty layer on the very top and scoop up the healthy yeast just below. The best time to harvest your yeast this way is when fermentation is most active — high krausen — when there is a thick, rocky head of yeast on the surface of the beer. This means that your window of harvest opportunity is time sensitive — you may have only a few hours or a day or two. A word of caution — this yeast is also freshest and therefore more volatile. If you harvest this way, it is best to pitch it into a new batch of a similar beer as soon as possible. If you want to harvest yeast with the intent to store it for a few days, read on.

The second and probably the easiest method for harvesting both ale and lager yeast is to remove it from the pri-

mary fermenter immediately after you've bottled or racked your beer to a secondary vessel. Leave a little liquid on top of the yeast cake — just enough to cover it. You'll need it to gently rouse the yeast that's settled and get it back into suspension by swishing the mixture around a bit. (You can always add a little sterile water if you need to loosen it further.) Then, it's simply a matter of pouring the slurry you've created into a sanitized container. Use this method if your fermenter is a carboy, but first re-sanitize the mouth of the bottle by spritzing with a no-rinse sanitizer.

Some homebrewers will reuse the yeast cake in its entirety, transferring a fresh batch of wort directly on top, into the old fermenter. This is a terrible idea and is contrary to everything we know about proper sanitation procedures. They will argue that they have never had an issue with this method. My response: If you haven't had an issue yet, it's just a matter of time.

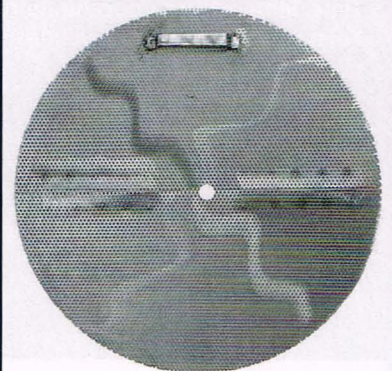
NOR CAL BREWING SOLUTIONS



Keg & Cooler Conversion Kits

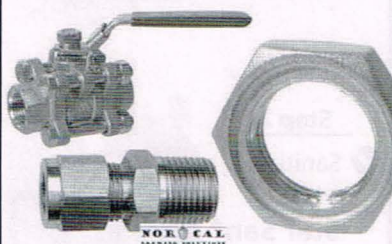


Dip Tubes



Exclusive
Manufacturer

"Jaybird" Custom False Bottoms



Lowest hardware prices

530-243-BEER

NorCalBrewingSolutions.com

High Gravity

Homebrewing & Winemaking Supplies



Brew In a Bag
Electric Brewing
System!



See the video

Turn it up
to 11 with
the EBC III



See the video



**Brew Electric and
outperform gas
at a lower cost.**



Electric Brewing

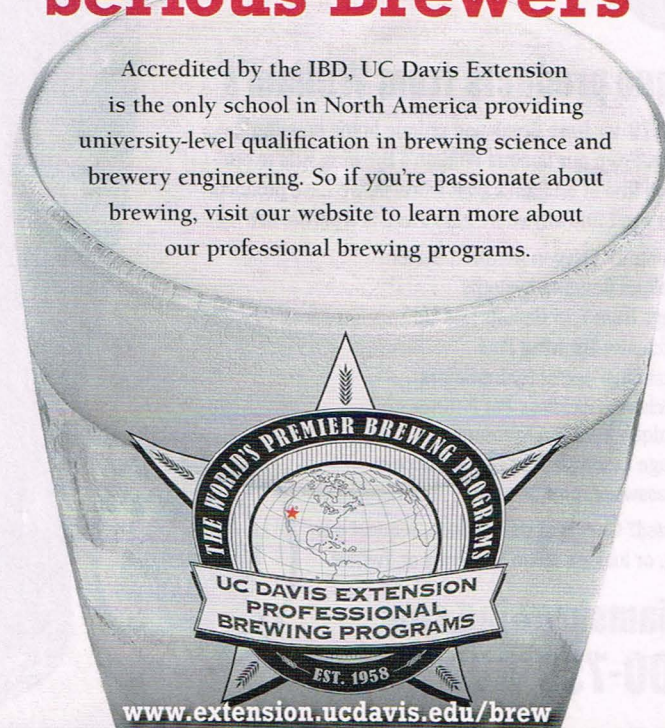


Our mascot,
Pippin

www.highgravitybrew.com
918-461-2605

Serious Programs for Serious Brewers

Accredited by the IBD, UC Davis Extension
is the only school in North America providing
university-level qualification in brewing science and
brewery engineering. So if you're passionate about
brewing, visit our website to learn more about
our professional brewing programs.



www.extension.ucdavis.edu/brew

VICTORY AT ALL COSTS

OG: 1.055 FG: 1.015 ABV: 5.3% ABW: 4.3% IBU: 22 COLOR(L): 26

DESCRIPTION: You ask, what is the aim of this brown ale? Victory! A bold, nutty, biscuity flavor is achieved through a prolific Victory® Malt addition. **Recipe for 5 US gallons (19L)**



The best
handcrafted beer
starts with the **finest**
handcrafted malt.

www.BrewingWithBriess.com

QUANTITY	INGREDIENTS	COMMENT
9 lbs	Briess Pale Ale Malt	
1 lb	Briess Victory® Malt	
1 lb	Briess Caramel Malt 60L	
4 oz	Briess Carabrown® Malt	
2 oz	Briess Chocolate Malt	
1.0 oz	Fuggle (5.0%AA hop)	60 min boil
0.5 oz	Fuggle (5.0%AA hop)	10 min boil
0.75 oz	Liberty (3.5%AA hop)	10 min boil
1 vial	White Labs WLP011 European Ale Yeast	
1 capsule	Servomyces Yeast Nutrient	10 min boil

BREWING PROCEDURES:

1. Mash grains at 148-152°F for 45 minutes
2. Heat to 170°F
3. Lauter
4. Boil with bittering hops for 50 minutes
5. Add second hop addition, boil 10 minutes
6. Cool to 60°F, oxygenate wort
7. Pitch 1 vial WLP011 European Ale Yeast

FERMENTATION:

Primary: 2-3 weeks at 68°F
Bottle condition with cane sugar or force carbonate

TOUCH OF RYE LAGER

OG: 1.055 FG: 1.014 ABV: 5.4% ABW: 4.3% IBU: 16 COLOR(L): 12

DESCRIPTION: Subtle notes of rye project through the caramel sweetness and noble-hop aroma of this dark American Lager. **Recipe for 5 US gallons (19L)**

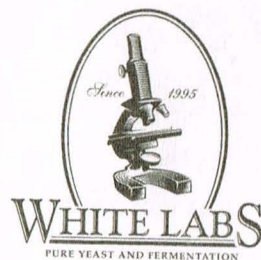
QUANTITY	INGREDIENTS	COMMENT
3.3 lbs	Briess CBW® Rye LME	
3.3 lbs	Briess CBW® Pilsen Light LME	
1.0 lb	Briess CBW® Pilsen Light DME	
2 oz	Briess Caramel Malt 60L	
1.0 oz	Tettnang (5%AA)	60 min boil
0.5 oz	Tettnang (5%AA)	1 min boil
.5 oz	Saaz (4.0%AA)	1 min boil
2 ¼ vial	White Labs WLP838 Southern German Lager	
1 capsule	Servomyces Yeast Nutrient	10 min boil

BREWING PROCEDURES:

1. Steep Briess Caramel Malt at 170°F for 30 minutes
2. Bring water to boil
3. Remove from heat and add first hop addition
4. Boil 50 minutes
5. Dissolve dry malt extract in cool water
6. Remove from heat add dissolved DME and LME
7. Boil 9 minutes
8. Add final hop addition
9. Boil 1 minute
10. Cool to 56°F, oxygenate wort
11. Pitch 2 vials WLP838 Southern German Lager

FERMENTATION:

Primary: 2 weeks at 74°F • Secondary: 4 weeks (preferably at 36°F) • Bottle condition with cane sugar or force carbonate



**BREW A WORLD
OF GREAT BEERS!**

www.whitelabs.com



Brew-Magic™ by SABCO



Chill-Wizard



Process & Storage



Rims-Wizard

Brew-Magic
V350MS
Pilot System



Brew-Magic.com

**Pro-Level Equipment
+ Pro-Level Passion
= Pro-Level Brewer**

U IS FOR UNIQUE

Unique products from William's

Since 1979, we have developed unique home brewing products. From our famous William's Brewing Kits to our exclusive line of William's Malt Extracts, we have products you just can't find anywhere else. Here is a partial list:

- William's Oxygen Aeration System
- Unique Kegging Systems
- Kegs from 1.75 Gallons and Up
- Exclusive Brewing Pots
- Exclusive line of Hydrometers
- Exclusive Weldless Pot Fittings
- Unique Aeration Systems
- Huge assortment of Bottle Cappers
- Glassware from Belgium

Interested? Checkout our website, request our catalog, or look us up on Facebook or Twitter.

williamsbrewing.com
1-800-759-6025



**Homebrewing Legal
In All 50 States!**

The 8 Rules of Cleaning & Sanitizing

1. You can only sanitize CLEAN equipment
2. Dirty equipment will ALWAYS contain bacteria
3. Cleaners are NOT sanitizers
4. Sanitizers are NOT cleaners
5. Time, Temperature, Concentration, Follow printed label instructions
6. Do not overuse cleaners or sanitizers
7. Cleaners and sanitizers can only do their job if they come in direct contact with the soils
8. ALWAYS add cleaning or sanitizing chemicals to water, NEVER add water to the chemicals

Proper Brewing Sanitation Requires 2 Steps

Step 1

- ✓ Clean with
PBW®



Step 2

- ✓ Sanitize
with
Star San®



**Five Star Chemicals
& Supply, Inc.**

www.fivestarchemicals.com

Storage

If you've timed your brews just right, you can pitch your newly harvested yeast directly into a second batch (and you should, indeed, pitch immediately if you harvest by top cropping as I mentioned earlier). No need to refrigerate your yeast if it will be pitched within an hour or so. Give it a gentle stir (with a sanitized spoon) if you feel it needs it and you're good to go.

If you plan to use the yeast at a later date — ideally within a week — you'll need to immediately store the yeast in the back of a cold refrigerator. Yeast will become dormant as it cools, but that doesn't mean it will stop producing CO₂ right away. Cover the jar with the lid screwed on loosely to prevent it from rupturing. Vent the jar once a day for several days and it should be fine. Another option is to forego the lid for the first few days and cover the jar with plastic wrap and a tight fitting rubber band. Replace with the sanitized lid screwed on tightly on the third day.

Although sooner is better than later, the newly harvested yeast should be fine for up to two weeks. If you are unsure of how viable your harvested yeast is after a period of storage, you can test its viability by adding some of your yeast to a small amount of wort in a sanitized plastic water bottle. Lightly crush the middle of the bottle to allow for some expansion and put the cap back on. Allow the bottle to sit at around 70 °F (21 °C) and watch for any activity and for the bottle to expand. If you don't see much going on in the bottle, your yeast isn't very viable.

As I mentioned at the beginning of this story, however, reusing yeast is best for brewers who brew frequently enough that they don't need to hang on to their yeast for very long. If you don't brew often enough that you need to store your harvested yeast longer than a week or so, you should probably stick with buying fresh yeast. Also, don't reuse yeast if your original batch was sluggish or had off flavors. You've spent

time and money on your batch of brew, why would you jeopardize it by using old yeast?

Pitching

If you're not immediately pitching after top cropping, remove your container of yeast from the refrigerator an hour or so before you need it and let it warm up. Avoid any sudden changes in temperature, which could shock the yeast.

When you're ready to add the yeast to your wort, remove the cover of the fermenter and give the yeast a quick checkup before pitching. What does it look like, how does it smell, how does it taste? By now, you should know the characteristics of healthy yeast. It's never a bad idea to keep a packet of dried yeast in reserve, just in case.

Spritz the outside rim of the jar with a little no-rinse sanitizer and gently rouse the yeast by stirring with a sanitized spoon, then add the yeast to your wort as you would normally with any pre-packaged yeast. **BYO**

Brew Your Own
IPA, STOUT, PORTER, WHEAT BEER, BELGIAN ALE AND SO MUCH MORE



and wine
myLocal-Home-Brew-Shop
Your Ultimate Hobby Headquarters!

CHECK OUT OUR WEBSITE FOR A FULL LISTING

www.myLHBS.com • 703-241-3874 • info@mylhbs.com
6201 Leesburg Pike #3 & 4, Falls Church, VA 22044

PLASTIC BEER CASES
WATERPROOF, DURABLE
LONG-LASTING
FOR 12oz. AND 22oz. BOTTLES
CARRY YOUR BEER WITH CONFIDENCE



BEER CASES FOR 12 22oz. BOTTLES **MADE IN THE U.S.A.** BEER CASES FOR 24 12oz. BOTTLES

AVAILABLE AT

★ C & W ★
CRATE CO

WWW.CWCRAVE.COM INFO@CWCRAVE.COM



MAKING IT LEGAL

Alabama and Mississippi homebrewers celebrate as the 49th and 50th states to legalize homebrewing

Story By **Dawson Raspuzzi**

Craig Hendry is completing his 45-minute commute to work through interstate traffic in Jackson, Mississippi by the time 8 a.m. rolls around most Monday mornings. But this July 1 — the day a law legalizing homebrewing in the state of Mississippi took effect — was no ordinary Monday for homebrewers in Mississippi. Instead of work, it was a day of celebration for Hendry and others who spent countless hours lobbying legislators the past eight years. Two hours after the sun rose over Mississippi on this morning, Hendry's home shop/brewery was already filling with the aroma of steeping grains as he monitored the water temperature inside his brew kettle.

"It fell on a Monday so we're like, 'well heck, I'm going to just burn a vacation day and brew some beer. It's too big of a day not to celebrate and to be able to say, 'yeah, I brewed on July 1st, the first day it was legal,'" said Hendry, the President of Raise Your Pints, a statewide grassroots

group of homebrewers and supporters who began fighting for the change in 2008.

Hendry's desire to brew on July 1 — which was a historic occasion nationwide as it marked the first day homebrewing was legal in every state since Prohibition — was matched by many in the state who have been brewing beer in their basements, garages and kitchens out of sight from authorities for years. The change in Mississippi took effect just seven weeks after Alabama became the 49th state in which homebrewing was legal.

Laws against homebrewing may seem foreign in some parts of the country. Homebrewing was legalized on the federal level in 1979, but many states maintained statutes outlawing homebrewing for years. By the time Oklahoma legalized homebrewing in 2010, the only two states left to do so were Mississippi and Alabama.

Raise Your Pints was a force in getting the law changed in Mississippi since the group's formation in 2007. The fol-

lowing year, Right to Brew, a group with a similar mission in Alabama, began advocating for homebrewers there. Also advocating on behalf of, and alongside, homebrewers in each state has been the American Homebrewers Association, which began taking a more active role in pursuing legislative changes in 2007, according to Director Gary Glass. Much of the AHA's efforts were focused on educating lawmakers and citizens about the safety of homebrewing, who homebrewers are, and the potential economic benefits of legalizing homebrewing. It took years to evoke change, however on July 1 homebrewing was legal no matter where in the United States you called home.

"There were lots of misperceptions about homebrewing, with people thinking homebrewing and moonshining were the same thing," Glass said. "These are upstanding citizens that are not doing anything that's going to cause any harm to their local communities."

Shortly after noon, Hendry's household shop was filled with nearly a dozen friends who share his passion for homebrewing and the day's first batch — an all-grain Belgian strong — was complete. After lunch, Hendry marked the day by brewing a commemorative #BIGCASCADE IPA (named after a trending hash tag local homebrewers use on Twitter), that members of Raise Your Pints created and marketed at a local homebrew store as an unofficial celebratory homebrew recipe.

Simultaneously, a friend brewed an extract batch of beer in Hendry's homebrewery, all the while friends drank up homebrew and their favorite commercial beers, and enjoyed an array of barbecued meats bought special for the occasion. "It was a celebration," Hendry said by phone the following day, still joyful from the experience.

Continued on page 66

Craig Hendry brews his first legal batch of beer at his house on July 1, the day a law legalizing homebrewing in Mississippi went into effect. Hendry is President of Raise Your Pints, a non-profit, grassroots group of homebrewers in the state who fought for years to legalize homebrewing in Mississippi.



Photo by Gary Haygood

MISSISSIPPI AND ALABAMA

Miss'ippi #BIGCASCADE

Pale Ale

by Raise Your Pints

(5 gallons/19 L, all-grain)

OG = 1.047 FG = 1.010

IBU = 37 SRM = 5 ABV = 4.8%

Ingredients

9.25 lbs. (4.2 kg) 2-row pale malt
0.5 lbs. (0.23 kg) crystal malt (40 °L)
0.5 oz. (14 g) Cascade hops (mash)
3.25 AAU Cascade hops (first wort hopping) (0.5 oz./14 g at 6.5% alpha acids)
6.5 AAU Cascade hops (20 mins.) (1 oz./28 g at 6.5% alpha acids)
6.5 AAU Cascade hops (10 mins.) (1 oz./28 g at 6.5% alpha acids)
2 oz. (56 g) Cascade hops (0 mins.)
1 oz. (28 g) Cascade hops (dry hop)
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) or Fermentis Safale US-05 yeast

Step by Step

Add 0.5 oz. (14 g) of hops to the mash and mash at 152 °F (67 °C) for 60 minutes. Mash out at 170 °F (77 °C) for 10 minutes. Add 0.5 oz. (14 g) of Cascade while collecting the wort in the kettle for boil. Boil for 60 minutes, adding the remaining hop additions per ingredients list. Ferment at 62–68 °F (17–20 °C) for two weeks. Transfer to secondary and dry hop for seven to ten days.

Extract option:

Replace the 2-row malt with 5 lbs. (2.27 kg) light dried malt extract or 6.5 lbs. (3 kg) light liquid malt extract. Steep 0.5 pounds (0.23 kg) of the crystal malt for 30 minutes at 150 °F (66 °C). Add extract and bring to a boil. Use 0.6 oz. (17 g) of bittering hops at 60 minutes instead of the mash and first wort hops. Follow remainder of the all-grain version.

inSANTIAM IPA

by Mark Murray

Bay Saint Louis, Mississippi

(5 gallons/19 L, all-grain)

OG = 1.072 FG = 1.014

IBU = 64 SRM = 5 ABV = 7.4%

Ingredients:

10 lbs. (4.5 kg) Pilsner 2-row
4 lbs. (1.8 kg) 2-row pale malt
1 lb. (0.45 kg) dextrine malt
11 AAU Santiam hops (60 mins) (2 oz./57 g at 5.5% alpha acids)
11 AAU Santiam hops (15 mins) (2 oz./57 g at 5.5% alpha acids)
11 AAU Santiam hops (5 mins) (2 oz./57 g at 5.5% alpha acids)
2 oz. (57 g) Santiam hops (dry hop)
0.5 oz. (14 g) Irish moss (15 min)
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) or Safale American US-05 yeast

Step-by-Step

This is a single step infusion mash. Mash the grains at 156 °F (69 °C) for 40 minutes, then raise mash to 168 °F (76 °C) over 10 min and rest at 168 °F (76 °C) for another 10 minutes. Sparge with 175 °F (79 °C) water. Collect 7 gallons (26.5 L) of wort in boil kettle. This will be a 90-minute boil due to the amount of Pilsner malt to help drive off DMS. Add other ingredients as indicated. Once the boil is complete, chill the wort to 75 °F (24 °C) and transfer to fermenting vessel. Aerate the wort and pitch the rehydrated yeast. Ferment at 68 °F (20 °C) for 7 days and then add dry hops. For kegging I leave dry hops for 14 days, cold crash the beer and transfer to keg on 12 psi. For bottling, transfer to secondary fermenter after 7 days and then bottle with priming sugar. Allow beer to carbonate and age for 2 more weeks.

inSANTIAM IPA

by Mark Murray

Bay Saint Louis, Mississippi

(5 gallons/19 L, extract with grains)

OG = 1.072 FG = 1.014

IBU = 64 SRM = 5 ABV = 7.4%

Ingredients

6.6 lbs. (3 kg) Pilsen liquid malt extract
2.2 lbs. (1 kg) light dried malt extract
1 lb. (0.45 kg) dextrine malt
11 AAU Santiam hops (60 mins.)

(2 oz./57 g of 5.5% alpha acids)
11 AAU Santiam hops (15 mins.)
(2 oz./57 g of 5.5% alpha acids)
11 AAU Santiam hops (5 mins.)
(2 oz./57 g of 5.5% alpha acids)
2 oz. (57 g) Santiam hops (dry hop)
0.5 oz. (14 g) Irish moss (15 min.)
Wyeast 1056 (American Ale) or White Labs WLP001 (California Ale) or Safale American US-05 yeast

Step-by-Step

Place crushed grains in a steeping bag and soak in 1 gallon (3.8 L) of 156 °F (69 °C) water for 30 minutes. Remove the grain from the wort and place in a colander over the brewpot. Rinse grain bag with 2 qts. (1.9 L) of 170 °F (77 °C) water. Bring 6 gallons (22.7 L) of wort to a boil. This will be a 60-minute boil, making sure the liquid malt extract is added off heat to avoid scorching. Add other ingredients as indicated in the ingredients list.

Once the boil is complete, chill the wort to 75 °F (24 °C) and transfer it to the primary fermenting vessel. Aerate the wort and pitch the rehydrated yeast. Ferment at 68 °F (20 °C) for seven days and then add dry hops. For kegging I leave the dry hops in for 14 days, cold crash the beer and transfer to keg on 12 PSI. For bottling, transfer to secondary fermenter after seven days and then bottle with priming sugar. Allow beer to carbonate and age for two more weeks.

Amarillo Amber Ale

by Kimbrell and SunAe

Thomson • Pelham, Alabama

(5 gallons/19 L, all-grain)

OG = 1.050 FG = 1.012

IBU = 40 SRM = 12 ABV = 4.7%

Ingredients

9.3 lbs. (4.2 kg) Pilsner malt
4 oz. (113 g) aromatic malt
4 oz. (113 g) Weyermann CaraAmber®
4 oz. (113 g) Weyermann CaraRed®
4 oz. (113 g) Weyermann Cara Munich II®
8 AAU Warrior hops (0.5 oz./14 g at 16% alpha acids) (30 min.)

HOMEBREW RECIPES

9.5 AAU Amarillo® hops (1 oz./28 g at 9.5% alpha acids) (10 min.)
9.5 AAU Amarillo® hops (1 oz./28 g at 9.5% alpha acids) (5 min.)
0.5 oz. (14 g) Amarillo® hops (dry hops)
White Labs WLP023 (Burton Ale),
Wyeast 1275 (Thames Valley Ale) or
Safale S-04 yeast

Step by Step

Mash grains at 153 °F (67 °C) for 60 minutes. Sparge to collect roughly 6.5 gallons (25 L) of wort. Boil for 90 minutes adding hops at times indicated. Cool wort to pitching temperature as quickly as possible, 65–75 °F (18–24 °C). Transfer wort to sanitized fermenter then pitch the yeast. Ferment at 65–68 °F (18–20 °C). Dry hops are added loose to the carboy and soaked for two weeks after primary fermentation is complete. Bottle as usual.

Amarillo Amber Ale by Kimbrell and SunAe Thomson • Pelham, Alabama (5 gallons/19 L, extract with grains)

OG = 1.050 FG = 1.012
IBU = 40 SRM = 12 ABV = 4.7%

Ingredients

6.6 lbs. (3 kg) Pilsen liquid malt extract
4 oz. (113 g) aromatic malt
4 oz. (113 g) Weyermann CaraAmber®
4 oz. (113 g) Weyermann CaraRed®
4 oz. (113 g) Weyermann Cara
Munich II®
8 AAU Warrior hops (0.5 oz./14 g at
16% alpha acids) (30 min.)
9.5 AAU Amarillo® hops (1 oz./28 g at
9.5% alpha acids) (10 min.)
9.5 AAU Amarillo® hops (1 oz./28 g at
9.5% alpha acids) (5 min.)
0.5 oz. (14 g) Amarillo® hops (dry hops)
White Labs WLP023 (Burton Ale),
Wyeast 1275 (Thames Valley Ale) or
Safale S-04 yeast

Step by Step

Heat 3 gallons (11 L) of water to 160 °F (71 °C). Steep grains in a grain bag, stirring every 5 minutes for 15 minutes total.

Remove grain and either let grains drain by gravity or rinse the grains in a colander with 1 qt. (1 L) of hot water to extract more color and flavors. Add Warrior hops in a hop bag and bring to a rolling boil for 30 minutes. Remove from heat, and discard the hop bag. Add malt extract to the pot and mix well. Return to a boil. Add the remaining hops boiling for 10 minutes longer. Cool wort to pitching temperature as quickly as possible, 65–75 °F (18–24 °C). Transfer wort to sanitized fermenter and top off to make 5 gallons (19 L), then pitch the yeast. Ferment at 65–68 °F (18–20 °C). Follow the remainder of the all-grain recipe.

Weizenbock by Paul Simms Mobile, Alabama (5 gallons/19 L, all-grain)

OG = 1.077 FG = 1.020
IBU = 19 SRM = 19 ABV = 7.3%

Ingredients

9.25 lbs. (4.2 kg) pale wheat malt
6 lbs. (2.7 kg) Pilsner malt
0.33 lb. (0.15 kg) chocolate malt
4 AAU Perle hops (60 mins)
(0.5 oz./14 g at 8% alpha acids)
8 AAU Perle hops (5 mins)
(1 oz./28 g at 8% alpha acids)
Wyeast 3068 (Weihenstephan Weizen) or
WLP300 (Hefeweizen Ale) yeast

Step by Step

Single infusion mash at 153 °F (67 °C) for 60 minutes. Boil for 60 minutes adding hops at times indicated. Cool wort to pitching temperature as quickly as possible, 64–75 °F (18–24 °C). Transfer the wort to a sanitized fermenter and pitch the yeast. Ferment seven to eight days, then bottle or keg.

Extract option:

Replace wheat malt and Pilsner malt with 11 lbs. (5 kg) liquid wheat extract. Steep crushed chocolate malt at 152 °F (67 °C) for 30 minutes. Add liquid extract and boil for 60 minutes. Cool wort to pitching temperature as quickly as possible, 64–75 °F (18–24 °C). Transfer the wort

to a sanitized fermenter and pitch the yeast. Ferment seven to eight days, then bottle or keg.

Ruthie's Rye P.A. by Dennis Smith Semmes, Alabama (5 gallons/19 L, extract with grains)

OG = 1.062 FG = 1.014
IBU = 51 SRM = 11 ABV = 6.0%

Ingredients

6 lbs. (2.7 kg) light dried malt extract
13 oz. (0.37 kg) rye malt
11 oz. (0.31 kg) crystal malt (45 °L)
6 oz. (0.17 kg) pale ale malt
1.5 oz. (42.5 g) chocolate malt
6.5 AAU Magnum hops (90 mins)
(0.5 oz. /14 g at 13% alpha acids)
9.8 AAU Magnum hops (15 mins)
(0.75 oz. /21 g at 13% alpha acids)
11 AAU Chinook hops (5 mins)
(0.75 oz. /21 g at 14% alpha acids)
1.0 oz. (28 g) Citra® hops (dry hop)
0.5 oz. (14 g) Chinook hops (dry hop)
Wyeast 1056 (American Ale), White Labs
WLP001 (California Ale) or Fermentis
US-05 yeast

Step by Step

Steep crushed grains in 1 gallon (3.8 L) water at 152 °F (67 °C) for 45 minutes. Remove the grains from the wort and rinse with 2 qts. (1.9 L) of hot water. Top off with water to 3 gallons (11 L) and bring to a boil. Boil 90 minutes total, adding 3 lbs. (1.36 kg) of the malt extract at 90 min. and 3 lbs. (1.36 kg) with 15 minutes left in the boil. Add hops at times indicated. Fermentation should take about seven days. Transfer to a secondary fermenter, add the dry hops and let the beer sit for five days. Bottle or keg.

All-grain option:

Replace the dried malt extract with pale ale malt so that there is a grand total of 11.25 lbs. (5.1 kg) pale ale malt in the recipe. Mash at 154 °F (68 °C). Lauter with enough sparge water for a 90-minute boil.



About a dozen homebrewers who fought to legalize the hobby in Mississippi celebrated at the home of Craig Hendry on the day the change in law took effect. Pictured here are (left to right) Eric Gordon, Brad "Thile" Justice, and Andrew Oswalt relaxing with some homebrew.

Mississippi

After passing both houses earlier in the year, on March 19 Mississippi Governor Phil Bryant signed into law Senate Bill 2183, which closely mirrors federal law and allows single-adult households to brew up to 100 gallons of beer a year and households with multiple adults to brew up to 200 gallons a year.

Debate around beer laws has taken place in the Mississippi Legislature each of the past five years, with the previous four sessions coming to a close without revisions to the homebrewing laws. Momentum was gained in 2012 when the Legislature approved a bill dubbed the "craft beer bill" that upped the allowed alcohol by weight (ABW) of beer made by commercial brewers from 5 to 10 percent. In addition to established breweries — including some of the country's heavyweights — advocating for that bill was the non-profit group Raise Your Pints, which Hendry and three others formed in 2007 with a focus on the ABW laws. The following year, RYP began pushing for homebrewing reform as well.

"In year two, because two out of the four of us were also homebrewers, we said, 'Let's work on (legalizing

homebrewing) too, in addition to the ABW bill.' So we made that our second goal," Hendry said.

Reform wasn't easy. RYP received little acknowledgment in the Capital the first couple of sessions. Each year, however, RYP grew larger and larger (it has 2,500 members to date) and with the help of a lobbyist, more and more members of the legislature got on board with its mission.

"We said, 'here's what it's going to do; it's going to create new jobs, 89 percent of commercial brewers started out as homebrewers, . . . and it's going to increase tourism through homebrew competitions,'" Hendry said. "Now we can include homebrew at beer festivals and that adds another aspect of it that's going to attract more people. If I'm at a beer festival and I know there's homebrew there, then I know that's the line I'm going to stand in."

The state has already seen positive changes from an economic standpoint since the bill's passage. "A year ago we had no places locally to buy homebrew stuff, everybody was ordering off the internet. Now we've got four places scattered across the state. That's four new small businesses."

For Hendry, who has been home-

brewing for a dozen years or so, the motivation was two-fold. Legalization in Mississippi was about state pride (hell, nobody wants to be part of the last state to reform), and also to advocate for a hobby he is passionate about.

"I wanted to do something good for the state. Homebrewing is partial to me because I'm a longtime homebrewer. Getting a change in law became a passion and I put a lot of time into it and a lot of work."

While illegal until this year, it's not as if the previous law was strictly enforced. Hendry is unaware of anybody ever being prosecuted for homebrewing in Mississippi. It's not like homebrewing was always kept a secret either. Over the past four years there have been at least 10 homebrew competitions held in Mississippi — none of which drew attention from law enforcement, Hendry said.

The change to Mississippi state law, while signed nearly two months before Alabama's, did not take effect until the new fiscal year — technically making it the last state in which homebrewing was legalized. Well, maybe.

"It came down to us and Alabama, and we've kind of agreed with them to say we are both the 49th-and-a-half state to legalize it. We got it signed first, but it just wasn't in effect yet. We can argue all day who was the last one, that's kind of the running joke here."

Alabama

This spring marked the fifth consecutive year in which a bill to legalize homebrewing was proposed in the Alabama Legislature. Each proposal was met with some resistance, largely from religious groups that oppose alcohol in general, but after undergoing rounds of tweaking, language was written to garner enough support to ratify the bill this past session.

"In the Deep South, both in Alabama and Mississippi, every legislator's district has constituents that are very much anti-alcohol," Glass explained.

It was not as much resistance as it was a lack of knowledge about homebrewing that dragged the process out so many years, however, according to

50 POUND SACK

HOPS AND GRAIN BY THE ASSLOAD



Grain by the Bag ONLY!!

All your favorite Maltsters

Hops by the Pound

30 Varieties to choose from

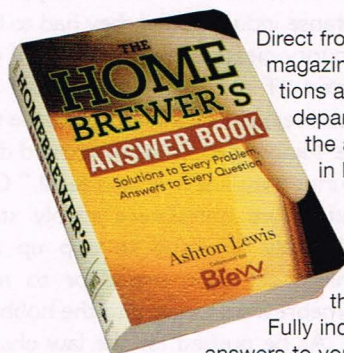
ALWAYS FREE SHIPPING!!!

U.S. MAINLAND ONLY (AK AND HI CONTACT US FOR QUOTE)

www.50PoundSack.com

GOT BREWING QUESTIONS?

The Homebrewer's Answer Book



Direct from the pages of *Brew Your Own* magazine, this comprehensive collection of questions and answers from our popular "Mr. Wizard" department offers advice for both the novice and the advanced hobby homebrewer – and everyone in between!

Covering nearly every situation a homebrewer could encounter, this 432-page guide is the perfect reference for any amateur brewer. Fully indexed and organized by themes. Find answers to your questions and fixes to your problems fast.

**Get
Yours
Today!**

**Available at better brewing
supply retailers and bookstores**

Order your copy now for just \$14.95
online at

brewyourownstore.com

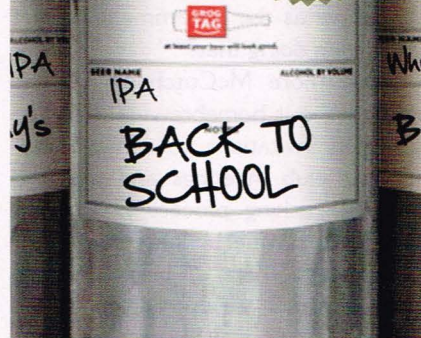
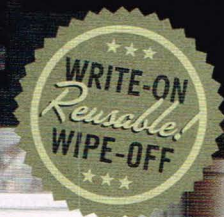
or by calling 802-362-3981

GROG TAG

SEE WHAT EVERYONE WAS
TALKING ABOUT AT THE
NATIONAL HOMEBREWERS
CONFERENCE

**REUSABLE
KEG &
CARBOY
LABELS**

AFFORDABLE
CUSTOMIZABLE
WRITE-ON, WIPE-OFF



grogtag.com

CUSTOM REUSABLE BEER & WINE LABELS

**ENTER 'KEGLABELS' AT
CHECKOUT AND SAVE 10%**

Representative Mac McCutcheon, the sponsor of the bill legalizing homebrewing in Alabama. Between debating more pressing issues, McCutcheon said lawmakers had to familiarize themselves with homebrewing and the existing laws. (McCutcheon said some of his counterparts in the Legislature made comments that their grandparents have been making booze at home for decades, unbeknownst it was against the law).

After reaching a compromise with opponents, McCutcheon's bill allows residents in wet communities who are not convicted felons to make up to 60

neighbors. "We do have a number that have started in the last few years, but we're still playing catch up to other southeastern states," Smith said. "This may change that. Homebrewing is the incubator for (craft brewing) businesses to start."

Smith has seen an uptick in his own sales since the law was changed as well. "I think the publicity around the bill being passed has encouraged a lot of first-time, novice brewers to get started—we've sold an unusually high amount of beginner's kits," Smith said.

Other than potentially attracting more people to the hobby, Smith said

connection with homebrewing. In those instances a violation was a felony. Similarly to RYP in Mississippi, Right to Brew was very active in garnering support for a change with help from the AHA. Grassroots efforts spread beyond state borders too, as the national fraternity of homebrewers united to put pressure on legislators. "It amazed me the attention it's gotten nationwide. I heard from people in California, Washington, Oregon—just a lot of positive comments supporting me in the effort of getting the law passed," McCutcheon said.

At one point leading up to a vote on his bill, McCutcheon said the number of people who contacted him on the subject had eclipsed 700.

While there are positive signs in both Mississippi and Alabama already, it will take years to realize the larger impact the change in law will have, or determine how many more people begin homebrewing because of it. Glass is confident however, particularly in Alabama because the offense had been a felony, that homebrew legalization will lead to more homebrewers. Many people who work in government, he said, shied away from homebrewing due to the risk of prosecution. "A lot of the homebrewers that I work with, they were working for the government, either NASA or supporting defense industry, and they had to have security clearances. If they were convicted of a felony they would lose those security clearances and lose their job. I know people who stopped doing it until they knew it was legal," Glass said. More homebrew supply stores will likely continue to pop up also, which will open the door to more homebrewers to get into the hobby.

As he pushed for the law change, McCutcheon said he became fascinated with the science behind the process of making beer, however the legislator does not expect he will be one to pick up the hobby himself. But, just in case you change your mind, Representative, we've supplied a few recipes submitted by the grateful homebrewers in Alabama and Mississippi for you and other readers to try. Check them out on page 64! 

“Everyone is excited that it is legal now, not that they cared much before—it added to the experience that it was a felony.”

gallons (227 L) of beer, mead, cider or wine a year. The bill was signed into law by Governor Robert Bentley on May 9 and took effect immediately.

"I began to take a special interest because of the constituents in my district who are very good people—family-oriented and community-oriented people—were asking for it," McCutcheon said. "They're not selling it and it's not affecting others, and why should we as the government restrict them from doing that?"

The more McCutcheon said he learned about homebrewing (he even accepted invitations to some homebrewing club meetings and watched the beer-making process first-hand), the more potential benefits he saw.

"There's a lot of brewpubs and breweries that are opening up in our state and a lot of these entrepreneurs who are opening up these types of businesses have homebrewing backgrounds, so I can see (the new legislation) complementing these types of businesses," he said.

Dennis Smith, who owns The Wine Smith beer and wine store in Mobile, said while a few new breweries have opened in Alabama in recent years, the state is still far behind its

the law also allows him to more easily reach homebrewers. Previous laws did not stop Smith from operating his beer and wine supply store over the past 12 years (possibly made easier because winemaking was already legal), but it did prevent him from advertising homebrewing equipment in the state.

McCutcheon also envisions the law will help increase tourism in the state through large-scale homebrewing events.

Enforcement of laws banning homebrewing in Alabama was similar to that in Mississippi. The AHA estimates between 5,000-6,000 homebrewers reside in the Heart of Dixie, and Kimbrell Thomson, who owns AlaBrew Homebrewing Supplies in Pelham, said the law didn't stop most people. "Everyone is excited that it is legal now, not that they cared much before—it added to the experience that it was a felony," Thomson said.

Further proof of how little the laws were enforced are illustrated by the fact that AlaBrew has been in business selling homebrewing supplies for 16 years, while The Wine Smith has been in business a dozen years.

There had, however, been rare cases in which arrests were made in

EVERYONE WILL BE
LOOKING
AT YOUR RACK



ORDER TODAY FOR 10% OFF

www.THEFASTRACK.ca

1-800-549-5763 info@THEFASTRACK.ca

BREWING **HUB**

DON'T **BREW** ALONE

MANAGE RECIPES, BATCHES,
INGREDIENTS, AND EQUIPMENT

IMPORT YOUR RECIPES FROM OTHER
BREWING TOOLS

CLONE RECIPES, TRACK RECIPE
MODIFICATIONS AND BATCH DETAILS

HUGE SELECTION OF STOCK RECIPES
AND INGREDIENTS
AVAILABLE TO ALL BREWERS

SOCIAL NETWORKING FEATURES
INCLUDING FORUMS AND PRIVATE
MESSAGING

WWW.BREWINGHUB.COM

**The best built, most economical
stand on the market today.**

Fully
assembled,
delivered
direct to your
door.

On-board
electrical.



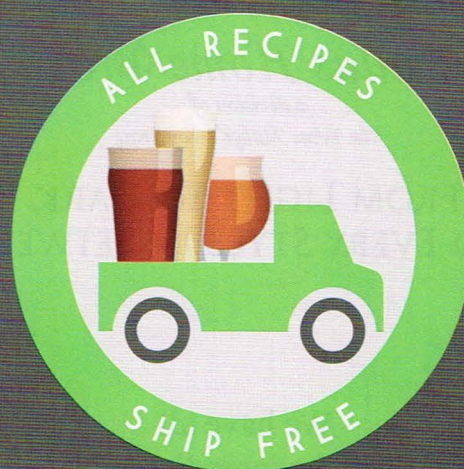
Gas manifold with a pressure gauge for
repeatable results.

Single and two tier frames and brew systems,
5 to 30 gallons, available in your choice of
colors.



Enter "byo"
at checkout for
10% off your
total purchase.

abetterbrewstand.com



**The biggest selection and the
best beer kits now ship FREE**

All 5,000+ variations of recipes from Austin
Homebrew are assembled from fresh ingredients
when your order is placed. Now they ship free.



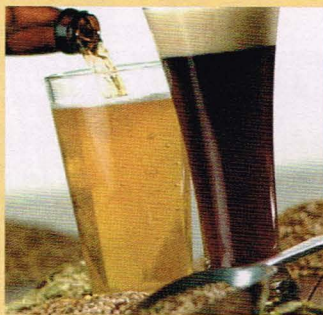
austinhomewbrew.com



THE BEVERAGE PEOPLE

America's Best Homebrew Supply Store
Check out these great ingredient kits:

Nut Brown Ale, Pale Ale, Porter, Stout, IPA, ESB, Imperial Stout, London Mild, Oktoberfest, Altbier, Wheat Beer, Cream Ale, Belgian Ale, Irish Red Ale, Chocolate Porter, Coffee Stout, Honey Wheat Beer, American Light Lager, Strong Scotch Ale, Raspberry Wheat Beer and Imperial IPA or Black IPA.



Have we missed any?

If so, feel free to call us. **800 544 1867**

The Beverage People can help you design your own beer. Shipped fresh from Sonoma County, California.

BREW YOUR OWN BEER

www.thebeveragepeople.com

IT HAS TO BE *CLEAR* TO MAKE GOOD *BEER*

Every homebrewer knows that great beer starts with clean equipment and clean bottles. Straight-A and One Step are ecologically formulated to provide the best and safest cleaning results.

One Step

for easy, single-step cleansing

Straight-A

for heavy-duty cleaning

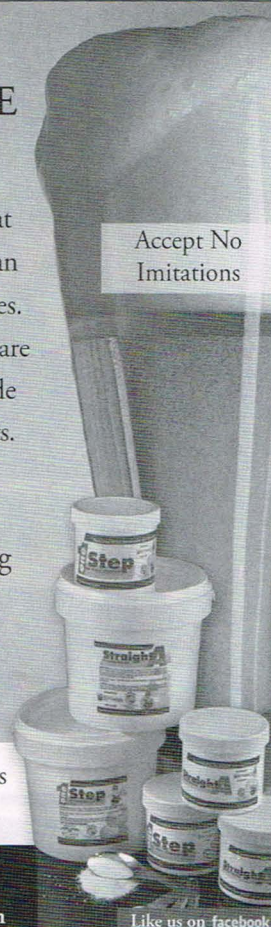
Give Your Brew The Best Grades
- Use One Step and Straight-A



ecologiccleansers.com

608-658-2866

info@ecologiccleansers.com



Like us on facebook

Dallas Home Brew

a division of
The Wine Maker's Toy Store

FROM LIGHT TO DARK
AND EVERY STYLE IN BETWEEN



We have all
of the ingredients,
supplies and
equipment
to make your
favorite brews!



1500 N. I-35E, Suite 116., Carrollton, TX 75006

<http://www.finevinewines.com>

1-866-417-1114

Easily clean Corny kegs, carboys and brew pails



Spend your time brewing beer - not cleaning your equipment!
Clean and sanitize large brewing vessels and tubing as you go. Never have to clean a dry, crusty carboy again!

**MARK'S
KEG WASHER**

Check www.kegwasher.com for a listing of
dealers who stock Mark's Keg Washer.

If your local dealer doesn't carry it, request it.

Play It Again Sam

It's all about consistency

techniques

by Terry Foster



The title quote is often used, but actually was never said in the film *Casablanca* (look it up if you don't believe me). I have used it here because I am going to talk about brewing consistently, which is in part brewing a beer that tastes the same as the beer you last brewed from the same recipe. Many professional brewers will tell you that the biggest weakness homebrewers have is a lack of consistency in their brewing. Of course it is important to them when they are doing the same beer over and over again and it is being widely distributed. A brand will soon lose customers if it doesn't taste just as they expect it to taste, so pros go to great lengths to ensure that the drinker gets exactly what he expects.

You may say, "So what? I brew for fun and I don't sell it so I have no need to worry about the same brew turning out differently every time." In fact, you may say that variations are an important part of the fun of homebrewing. There is something in that argument, and if that is what truly tickles your tonsils, then fine. But suppose you want to make a clone beer, enter a competition, or have a new recipe turn out the way you wanted it to the first time? If you can't brew one recipe with some consistency then you can't predict how a new one will turn out. If we take a fairly obvious inconsistency, such as achieving different extract yields when mashing grains, how can you hope to hit target original gravity (OG) in a new brew? And if you don't do that, you are going to throw it out of balance with other factors such as hop bitterness and the result will be a very different beer from the one you were expecting.

Why do we get variations?

The main reason is that brewing is a complicated process in which many biochemical and chemical reactions occur. These reactions affect the taste of the finished beer and may follow

different directions according to the reaction conditions. The brewer has to get them to go in the direction he wants and to manage those reactions (rather than control them). Every step, from selection of ingredients, weighing, mashing, boiling, standing, cooling, yeast pitching and fermentation can cause variations in the finished product. This means that consistency can only be achieved by careful attention to detail during the process. It also means that you should take careful notes throughout the process and standardize procedures based on these notes.

“If you can't brew one recipe with some consistency then you can't predict how a new one will turn out.”

Minimizing variations

Let's deal with ingredients first, starting with malt. Try not to keep large stocks for long periods, as malt can deteriorate somewhat. This is especially true for base malts (such as pale malt), which have been ground and will easily pick up moisture in storage, becoming "slack" and giving unpredictable extract yields. Grinding is best done no more than a day before brewing to avoid this. If you grind it yourself, check the mill settings each time, and adjust the rollers to a consistent gap. Good retailers will do this for you at a nominal cost, but in that case you should buy only what you need for the brew in hand.

Long storage is not good for malt extracts, either. Opened cans or packs will oxidize and dehydrate so both flavor and the yield obtained from a given weight will vary. Ideally, limit the amount you buy to that required for a specific brew, and if you have some carryover try to use it in another

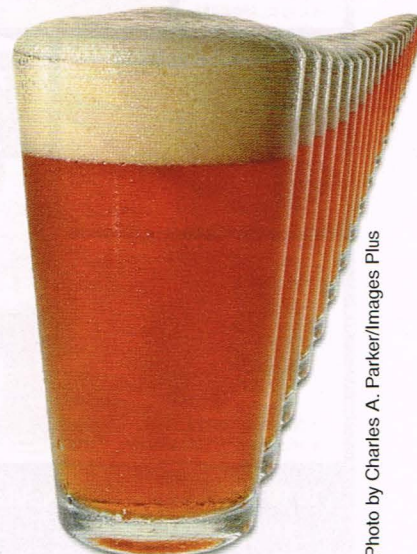


Photo by Charles A. Parker/Images Plus

techniques

brew within a week or three. Dried malt extract degrades less in storage than syrup, providing you are scrupulous in keeping it dry. Continuing this theme, "processed" malts such as crystal, caramel, and medium-roasted malts should not be stored for long periods before use because over time they tend to lose many of the desirable flavors that these malts can confer on a beer such as caramel, bready notes and so on.

Mashing grains can lead to significant beer flavor differences if you are not careful. Pay attention to maintaining a constant grain-to-liquid ratio, usually around 1-1¼ qt. water per pound of grain (2.1-2.6 L per kg). And be scrupulous about the temperature of your strike water so you consistently hit target mash temperature; if it is too high your beer may be more malty and full-bodied than you want, if too low then it may be too dry, or even thin. You should also measure the volume of water as accurately as possible, the best way to do this is to calibrate all brewing vessels with a known volume of water and marking the vessel with the measurements. If you can't mark a vessel, there is always the time-honored route of marking a wooden dip stick as you do the calibration.

You should also know what your extract yield (or brew-house efficiency) is. You can determine that by checking your gravity against the target gravity for any recipe over a series of brews. At *BYO*, we work on the basis of a 65%

efficiency (the complete standardization chart used by *BYO* can be found on page 2 of every edition). If yours is different from that simply use the figure you get and adjust recipes accordingly. Be aware that this may change as your technique improves and adjust grain bills to allow for this. This procedure is analogous to the algorithms so loved by computer programmers, in that it is a loop where you adjust the input on the basis of present data, then adjust again as the end result changes from the value expected. Remember too that your yield will vary according to the amount of sparge water used, so be consistent in this, and try to standardize the sparge volume — calibrate the hot liquor tank as well as the other vessels!

If you are an extract brewer your task will be somewhat easier, since the mashing has been done for you and you have a pretty good idea of what gravity to expect from a given batch of extract. That is, you do if you weigh out the extract carefully, which is not simple with a syrup. If you use a can and accept the weight given for its contents, make sure to rinse it out carefully with hot water so that you get it all into your wort. And if you are repeating a recipe, stick to the same supplier's product. If you do that and get a good base of data from several brews, then you can change to another product and determine whether it results in any differences. If you are doing a partial mash, then the same strictures apply to that as to grain mashing.

PERSONALIZED BEER GEAR!



NEW!

64 & 40 OZ. GROWLERS

Our new line of personalized beer accessories is a one-stop shop for home and craft brewers! We carry everything you need to outfit your brew like the big boys. From bottle labels, caps and openers to barware, taps and signs, we've got it all. We even carry brewer's logs and beer flight samplers! Visit www.121personalgifts.com/byo for details.



BEER FLIGHT SAMPLERS



COLOR & WOOD SIGNS



GLASSWARE, MUGS & STEINS
Including NEW SPIEGELAU IPA GLASS

NEW!



BOTTLE CAPS, OPENERS & COASTERS

WWW.121PERSONALGIFTS.COM/BYO

10% OFF Beer Gear with BYO10 promo code | Custom work welcome. Call 888.203.1045 (9-5 CST)

SPEIDELS Braumeister



Nano or Home Brewer Braumeister



NEW
conical
fermenter

Made in Germany

More information and sales partner on
www.speidels-braumeister.de

Keep the amount of water the same, aim for the same mash temperature, and sparge (rinse) with the same volume of hot liquor.

Naturally, you should adhere to a standard boil time. Make sure it is a vigorous rolling boil and use the same hop variety as in the recipe. But do remember to adjust the weight of hops according to any variation in their alpha acid content if they come from a different batch to that used previously (or quoted in the recipe). And if you use the same batch of hops it should have been kept in the freezer between brews. Then there is the question of cones versus pellets. Some brewers — even one or two large commercial breweries — prefer cones, but they are difficult to sample in a representative manner on a small scale. Pellets, on the other hand, are a much more consistent product and if you use them you can be fairly sure you have the right amount of alpha acid added to the wort.

Late hops added for flavor and aroma should be as fresh as possible. Make sure they are a bright green color (not brown at all). Rub a pellet in your hand and smell them to make sure there are no off odors. If they smell at all cheesy, then it's best to dump them and use something fresher. Make sure late additions are done at the appropriate times. If you have a stand at the end of the boil keep it to the prescribed duration. Similarly, if you use some form of whirlpool, either by stirring or recirculation, keep the action

going for a standard length of time. I recommend conducting the whirlpool very thoroughly as this will aid consistent performance by minimizing wort losses in the trub.

Cooling the wort can introduce some variations, depending upon how you do it and whether your cooling water varies much in temperature from season to season. In this respect, an in-line cooler will give more consistent results than an immersion one, simply because it is more efficient and gives much shorter periods of cooling. And it should be obvious, but at yeast pitching wort temperature

“... remember to adjust the weight of hops according to any variation in their alpha acid content ...”

should be kept as consistent as possible for similar brews.

Use the same yeast strain as previously; make sure that it is not beyond its use by date and make a starter. Keep the starter wort gravity and volume the same and hold it where ambient temperature does not vary significantly. Just how big of a starter you need will vary accord-

aih ADVENTURES IN HOMEBREWING
www.HomeBrewing.org

The Great Pumpkin Ale

5 Gallon Extract Recipe
\$19.99*

Visit **WWW.HOMEBREWING.ORG** for a huge selection of Specialty Beers, including “The Great Pumpkin Ale”, AIH Blueberry Tangerine Porter & the AIH Raspberry Coconut Porter. Our Shipping & Customer Service are second to none, our orders typically ship out the next day.

*Visit **www.homebrewing.org** for details

UNI-STAT II



UNI-STAT II-G

Precise Heating or Cooling controller

- ✓ Accurate microprocessor control within 1°F
- ✓ Adjustable from 10 – 190°F, with bright LED digital display
- ✓ UNI-STAT II-G probe for general use (-W bottle probe optional)

winestat.com

BH Enterprises (800) 973-9707 Since 1984

techniques

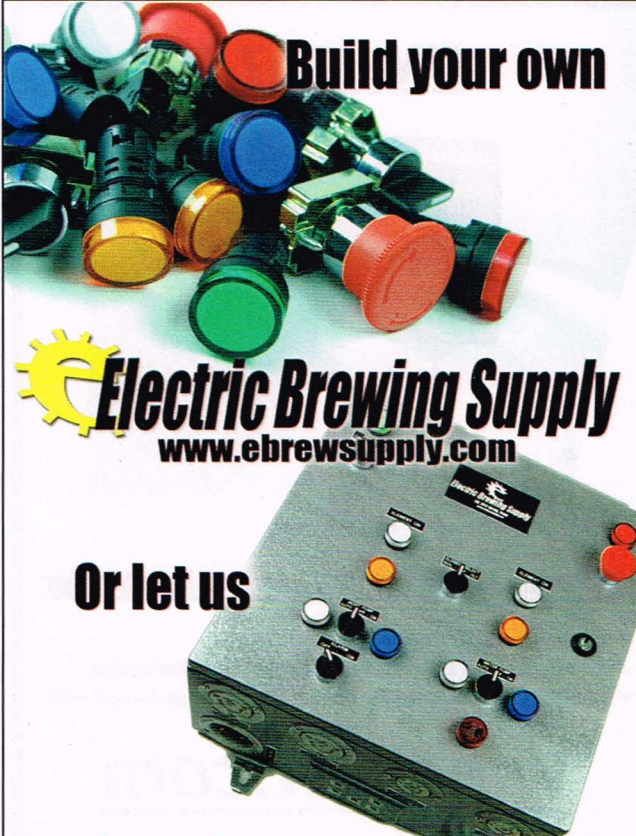
ing to the type of beer. Most homebrewers under-pitch their yeast, and this is a big source of inconsistency in their beer. That's too complicated to go into here, so to find out the starter size you need read the "Techniques" column in the 2012 March-April issue of *BYO*. When the starter is ready, pitch it into the wort while making sure the latter has been properly aerated, either by thorough stirring and splashing, or by oxygenation using a carbonation stone. Oxygenation is best for the most consistent results, but again, try to standardize the time of oxygenation and the flow-rate of the gas (the latter you will probably have to eyeball).

In the case of fermentation, wide variations of temperature during this process lead to wide variations in beer flavor. If the temperature is too high it can lead to over-production of esters and a lower final gravity (FG) than you want, whereas too cold of a fermentation can result in the FG being too high. You can help this by sticking with a "clean" yeast, such as California Ale, but really you need to control this temperature, especially in the early stages when the yeast is working hardest and is evolving heat. Such control is easy for commercial brewers with jacketed, glycol-cooled fermenters, but it can often be a struggle in homebrewing. I can't pretend to give easy answers on how to do it, though our ever-inventive homebrewers have come up with ways.

You have to keep the fermenter in an area where the temperature does not vary much, and preferably one where the ambient temperature is close to that desired for fermentation. If you have to ferment in a warm area then try standing the fermenter in cool water, which may need to be frequently changed. Or, use the time-honored method of draping the vessel with a wet towel, which is kept wet until the main yeast action subsides. If the area is too cold then a simple solution is to build an insulated box warmed by an electric lamp. Or if you want to do cool lager fermentations, then use a dedicated refrigerator or freezer with a controller to hold the desired temperature, which is expensive and takes a lot of space. My own solution is to use a conical stainless steel fermenter fitted with a heating/cooling device and a thermostatic controller. These are available from homebrew suppliers, but run into the high hundreds of dollars.

Finale

Space in this column prevents me from getting into bottling/kegging, storage and serving temperatures, but these are areas that also require attention to detail if you want to achieve consistency. However, if you follow my strictures given above, you will be well on your way to producing beers of consistent high quality. And you do want to be a master brewer, don't you? **BYO**



Build your own

 **Electric Brewing Supply**
www.ebrewsupply.com

Or let us

Low prices, growing selection, DIY Kits, one stop shop
\$5 Flat Rate, Over \$49 Free Shipping
sales@ebrewsupply.com

HOMEBREW HEAVEN

GLASSTASTIC DEALS!

3 GALLON	21.95
5 GALLON	27.95
6 GALLON	29.95
6.5 GALLON	33.95



**LOWEST PRICES
YOU CAN FIND
ON GLASS CARBOYS**

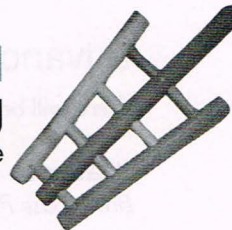
EVERETT WA

OMEBREW HEAVEN.COM

Lautering

Theory and Practice

advanced
brewing
by Chris Bible



Lautering is the act of separating sweet wort from spent grains.

The act of lautering wort is physically very similar to filtration. The flow of wort through a grain bed can be thought of physically as a type of filtration (liquid flowing through a “filter bed” of grain). The basic principles of filtration were established in the 19th century by Henry Darcy. The important parameters for filtration are described by the “Darcy’s Equation”:

$$Q = \frac{KA(h_1 - h_2)}{L}$$

where:

Q = volumetric flow rate of liquid through the filter

K = a constant associated with the specific properties of the fluid and the filter media

A = cross-sectional area of the filter

($h_1 - h_2$) = pressure drop across the height L.

L = height or thickness of the filter medium

Darcy’s equation was later modified in a way better suited for process and brewing applications. The modified version of the equation accounts for important brewing process factors such as wort viscosity, grain bed permeability, and particle size distribution of the grain bed. This modified equation is given by:

$$Q = \frac{KA\Delta P}{\mu L}$$

where:

Q = volumetric flow rate of wort

A = cross-sectional area of grain bed

ΔP = pressure drop across the grain bed

μ = wort viscosity

L = grain bed depth

K = grain bed permeability

Grain bed permeability, K, can further be estimated using:

$$K = \frac{Y^3 d_e^2}{180(1 - Y)^2}$$

With:

Y = bed porosity (wort volume/total mash volume)

d_e = effective particle size diameter of the grain in the bed

It is the interaction of all of the variables in the above equations that determine the total flow rate of wort through the grain bed.

“ The flow of wort through a grain bed can be thought of physically as a type of filtration . . . ”

Brewing process factors that affect lautering

Milling

Milling is the process of crushing grain in order to expose the interior of the grain kernel to the wort. The way that milling is performed directly influences the particle size distribution of the grain bed, and also determines if the grain husk is left mostly intact. Grain bed permeability, K, is a function of the effective particle size diameter, d_e , of the crushed grain. A larger effective diameter means greater permeability. Permeability is also a function of the amount of void space (porosity, Y) within the grain bed, and this is directly related to how “tightly” the grain pieces are packed together in the grain bed. If the grains are milled too finely (small d_e), then it is likely that the pieces will be packed together rather tightly and the void space between the pieces will be reduced. Also, if the grain husks are not mostly intact, then



Photo by Les Jorgensen

advanced brewing

there will be relatively little void space within the grain bed.

Water to grist ratio

Brewhouse Plant Optimisation by R. Wilkinson states that, in a commercial brewery, an overall (mash + sparge) water/grist ratio of 7.5 liters/kg is used (for roller-milled grain) in order to optimize extract yield. Higher gravity beers require that this ratio be reduced for optimal extract yield. Optimized extract yield is a very important consideration for professional brewers, but the ability to lauter the wort is also impacted by the water/grist ratio. At lower water/grist ratios, the concentration of dissolved solids will be higher in the wort. The viscosity, μ , of the wort is directly affected by the presence of dissolved solids. Higher concentrations of dissolved solids in the wort, cause the viscosity to increase. Viscosity directly impacts the rate of run-off during lautering. Higher viscosity leads to a reduced rate of run-off.

Sparging rate

Wort viscosity changes dramatically during the wort collection/sparging phase of the brewing process. Water has a lower viscosity than wort. As water is added to the grain bed during sparging, the overall concentration of dissolved solids within the wort decreases. Decreased viscosity leads to a faster wort run-off rate. Wort run-off rate is usually at

its slowest when sparging is first started and speeds up as sparging continues.

Depth of liquid above grain bed

The depth of liquid above the grain bed is important for two reasons. The height of the liquid directly affects the pressure differential, ΔP , across the grain bed. Higher ΔP means faster wort run-off. Unfortunately, if the liquid level above the grain is too high, the positive effects on ΔP will be offset as the higher pressure begins to compress and compact the grain bed, effectively reducing the permeability of the grain bed and slowing down the rate of wort run-off.

Geometry of the lautering vessel and grain bed depth

Wort run-off rate is directly related to the cross-sectional area, A , and depth, L , of the grain bed. A larger cross-sectional area leads to a faster run-off. Conversely, a deeper grain bed decreases the run-off rate. Ideally, a lauter vessel will have as shallow a grain bed depth and as large a cross-sectional surface area as is practical. Commercial lautering vessels tend to be larger in diameter and shallower in depth than the mash vessel. This allows better brewing performance and allows the commercial brewer to use finer-milled grist. Finer-milled grist results in higher extract rates.





Free Shipping!

**August
&
September**

On orders over \$50

Use Checkout Promo Code: BY08

Blichmann Products drop-shipped free.
Some restrictions apply: no bottles or carboys

www.wineandbeermaking.com

Retail store hours: Mon-Fri 10am-6pm, Weekends 10 am-4pm
231 Lamp & Lantern Village, Chesterfield, MO 63017 • (636) 230-8277



New Classes From the American Brewers Guild...



Our Middlebury Facility!

The American Brewers Guild is excited to announce the addition of condensed 5-week on-site sessions of our IBS & E and CBA programs at our Middlebury, Vermont facility in summer of 2014! Sign up now — spots are sure to fill quickly.

Intensive Brewing Science & Engineering (IBS & E, 5 weeks)
July 7 - August 8, 2014

Craftbrewers Apprenticeship (CBA, 5 weeks)
July 7 - August 8, 2014

Brewing Science for the Advanced Homebrewer
September 14-15 2013
A two-day weekend class aimed at describing the essential brewing science underpinning the process of brewing.

Classes will take place at The American Brewers Guild's 5,600 square foot, modern facility which features a classroom, laboratory and the nation's only full scale brewing facility dedicated to brewing education.

Check our website for upcoming classes.

TRAINING THE BREWERS OF TOMORROW TODAY!

Call us or email for more information (800) 636-1331
www.abgbrew.com • email: info@abgbrew.com

Temperature

The temperature of a liquid directly affects the viscosity of the liquid. The viscosity, μ , of a liquid directly affects the rate of run-off, Q . Increasing temperature causes viscosity to decrease and allows liquids to flow more easily. A graph showing the effect of temperature on viscosity for water is shown in the figure on page 78.

Adjuncts in the grain bed

A high percentage of adjuncts in the mash can negatively impact the rate of run-off. Barley contains grain husks that allow the grain bed to act as a relatively stable filter media. The barley husks cause void space within the grain bed and increase the grain bed permeability (K). This allows the liquid to flow more freely through the grain bed. If the grain bed contains a large amount of grain that does not have a husk (e.g. malted wheat), or contains components that tend to form "gummy" starch complexes (e.g. oats), then the ability of the grain bed to act as a relatively permeable, stable filtration media is compromised. Lauter tuns can usually filter recipes that contain up to 50% adjunct. If the grain bed contains more than 50% adjunct, there will likely be insufficient husk material to form an adequate filter bed.

Practical discussion

There are several options available for the homebrewer to

extract fermentables and separate the wort from the grain. As homebrewers, we are not as concerned with economic efficiencies as commercial brewers, so we may choose to use no-sparge or batch sparge methods, the parti-gyle method, or even the brew-in-a-bag method. Many homebrewers, however, choose to use the more traditional mashing/sparging approach in which grains are rinsed with a slow, continuous sparge. If done properly, a brewer can optimize both extract efficiency and run-off rate using the traditional method.

To optimize the experience using a traditional lautering approach, be sure that grains are milled properly and that the husks are allowed to remain mostly intact. Ensure that sparge water temperature is appropriate (168–176 °F/~76–80 °C). Allow the sparge water to be introduced to the grain bed slowly and ensure that it completely covers the grain. Adjust the flowrate of the sparge water to ensure that there is no channeling of flow through the grain bed. Slow, even coverage of the grain bed by the sparge water is the goal. Additionally, ensure that the flowrate of the sparge water closely matches the flowrate of the wort from the lautur vessel in order to maintain a fairly constant liquid level within the system. Depending upon your lautering equipment configuration, the liquid level above the grain bed should be maintained at a point where run-off speed is adequate and the grain bed does not become agitated by a

**Ruby Street Brewing, LLC**

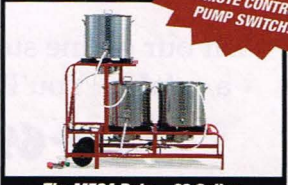
Discover how effortless All Grain brewing can be with professional equipment from Ruby Street Brewing, LLC



**The ALPHA Ruby™
One Barrel System (45 gallon)**



The Ruby Street Brewery - 15 Gallon



The MEGA Ruby - 30 Gallon

ALL SYSTEMS NOW INCLUDE REMOTE CONTROL PUMP SWITCH!

www.RubyStreetBrewing.com

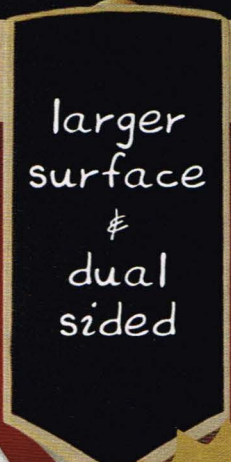
P.O. Box 271722 Ft. Collins, CO, USA 80527 | 970-673-7829



Tap Boards™
WRITE. ERASE. REUSE.
HOMEBREW TAP HANDLES



new
slim
style

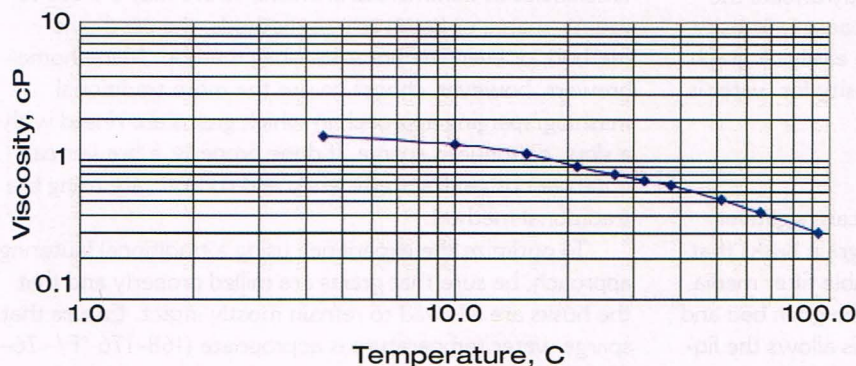


larger
surface
&
dual
sided

Great Gift

www.TapBoards.com
or ask for them at your local homebrew shop

Figure 1: Effect of Temperature on Viscosity of Water



too-fast flow, nor does it become compressed from a too-high liquid level. Experiment with your system in order to determine a liquid height that works well for you using your equipment. If you have the ability to specify the geometry of your lautering vessel, you should select a vessel that has dimensions that are as large "horizontally" as is practical in order to achieve

a reasonably shallow grain bed depth for the range of amounts of grain that you anticipate using when you brew various styles of beer.

Troubleshooting

During the sparging operation you might need to gently stir the grain bed in order to alter the path of flow of the liquid should channeling be

observed. If you must stir, try to stir only the upper part of the grain bed. Leave the grains in the bottom 4–6 inches (10–15 cm) of the bed undisturbed if possible.

If the run-off stops flowing and you experience a "stuck sparge," stir the whole grain bed in order to briefly re-suspend the solids and re-establish flow. If stirring does not fix the problem and allow flow to begin, then you might need to force compressed air backwards through the outlet drain plumbing in order to clear out any obstruction in the line. **BYO**

References

- 1) Leiper, K. & Miedl, M., *Handbook of Brewing*, chapter 10, p. 398 CRC Press, 2006
- 2) Wilkinson, R., *Brewhouse Plant Optimisation*. Part II, Brew. Guard., 130(5):22–28, 2001.
- 3) Crane Technical Paper No. 410, "Flow of Fluids Through Valves, Fittings and Pipes," 1985

www.breworganic.com

Great organic beer starts with great organic ingredients!



28 Organic malts:
From Briess, Crisp, Gambinus, Great Western, & Weyerermann



30 Organic Hop Varieties:

Admiral, American Fuggles, Belgian Cascade, Belgian Saaz, Bravo, Cascade, Centennial, Challenger, Chinook, Fuggles, Hallertaur Tradition, Hersbrucker, Horizon, Ivanhoe, Kent Goldings, Motueka, Nelson Sauvin, New Zealand Hallertaur, Nugget, Opal, Pacific Gem, Palisade, Perle, Pilgrim, Rakau, Saphir, Smaragd, Spalt Select, Summit, Whitbread Goldings Variety.

The world's best selection of organic ingredients to make the world's best organic beer.. whether it's your first brew ever or a 200 gallon batch in your craft brewery.



Green Coffee Too! Fair Trade certified, which supports fair wages for the growers who craft the best organic coffee in the world.

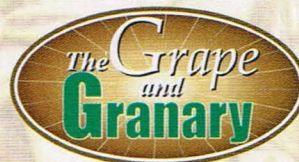
800-768-4409

325A River Street, Santa Cruz, CA 95060

Retail Store Hours:

Mon- Sat 10 am to 6 pm, Sun 12 to 6 pm

7bridges@breworganic.com



THE GRAPE AND GRANARY

**YOUR HOMETOWN BREW SHOP
ON THE WEB**

FEATURING

EXTENSIVE SELECTION

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

WWW.THEGRAPE.NET

AKRON OHIO USA

Double Pipe Chiller

Efficient, and easy to clean

projects
by Walter Diaz



The selection and performance of wort chillers (heat exchangers) is a generally well-documented topic in homebrewing. However, most of the information available on wort chillers applies to the use of immersion, coiled counterflow and brazed plate chillers. An alternative design commonly used industrially that is not widespread in homebrewing is the double pipe heat exchanger.

In double pipe heat exchangers, one fluid flows inside a pipe and a second fluid flows in another pipe that surrounds the first in a concentric tube construction. This arrangement is very similar to the commonly used coiled counterflow chiller; however, there are important differences. Instead of using a continuous length of a double pipe, the length of the heat exchanger is split in short, straight sections interconnected by "return tubes." This configuration allows the opening of the concentric tubes, which in this application carry wort. This means a wort chiller of this style can be cleaned and sanitized using just a pipe brush and mild chemicals. If a recirculation pump is available, then a clean in place (CIP) process can be used, but having a wort chiller that can easily be opened still gives you the ability to verify the effectiveness

of your CIP process. Removable return tubes also allow you to completely drain the liquid for storage. Complete drainage is important; as it has been documented in other *BYO* articles that moisture left in wort chillers may lead to corrosion and microbial growth.

The performance of this double pipe wort chiller is comparable to the coiled-counterflow designs. The total surface area available for heat transfer in this model is 3.6 square feet (0.33 m²). One disadvantage of a double pipe wort chiller may be its bigger size, but mounting it on a wall makes the space it takes up negligible.

“... a wort chiller of this style can be cleaned and sanitized using just a pipe brush and mild chemicals.”

The temperature of the cooled wort after a single pass through this chiller depends on a variety of factors, however, for estimation purposes, an average of 0.9 cooling efficiency can be assumed for the wort chiller presented in this project. This assumes 0.9 gallons per minute of cooled wort (fed by gravity) with cooling water running at 6 gallons per minute.

My wort chiller is constructed of an outer PVC shell that cooling water flows through, which I painted with a plastic compatible paint for aesthetics. Wort flows through a concentric Type M copper tube that is held in place by plastic compression fittings.

The entire assembly may be mounted on plastic unistrut rails using "quick clamps" that attach to each section of PVC pipe. This makes the unit very stable and allows it to be mounted on a wall.

More explanation of this system's cooling efficiency can be found online at <http://byo.com/story2849>

Parts & Tools

- 26 feet (7.9 m) of 1-inch PVC schedule 40 pipe
- 10 PVC T-fittings
- 30 feet (9.1 m) of ½-inch copper tube type M
- 10 plastic compression fittings (¾-inch NPT x ½)
- 5 feet (1.5 m) of ½-inch high-temp food-grade silicone tube
- PVC primer and cement
- Pipe Cleaning Brush
- Tube cutter
- Measuring tape
- Crescent wrench





1. MEASURE AND CUT TUBE LENGTHS

Measure and cut cooling water and hot wort tubes to desired lengths using a regular tube cutter. For my wort chiller, the measurements are 63 inches (160 cm) for the copper concentric tube (for wort), and 58 inches (147 cm) for the outer PVC tube (for cooling water)



2. ASSEMBLE PVC COOLING WATER RETURN MANIFOLDS

Cut short nipple (2.25 inches/5.7 cm) and cement T-fittings together to form cooling water return manifolds. Install slip by thread reducing bushings into one end of the water return manifolds using PVC primer and cement. These reducing bushings will receive the threaded end of the compression fittings. For a unit with 5 cooling tubes you will need 4 cooling water return manifolds.

A few notes on using PVC cement: Wear gloves and work in a well-ventilated area. It is important to use PVC primer (purple color) before applying PVC cement (blue color). Keep in mind that once PVC cement is applied to the fitting it will dry up very quickly. Be prepared to apply cement and assemble fittings in less than 10 seconds per fitting. Once assembled, hold fittings together under compression for about 30 seconds.

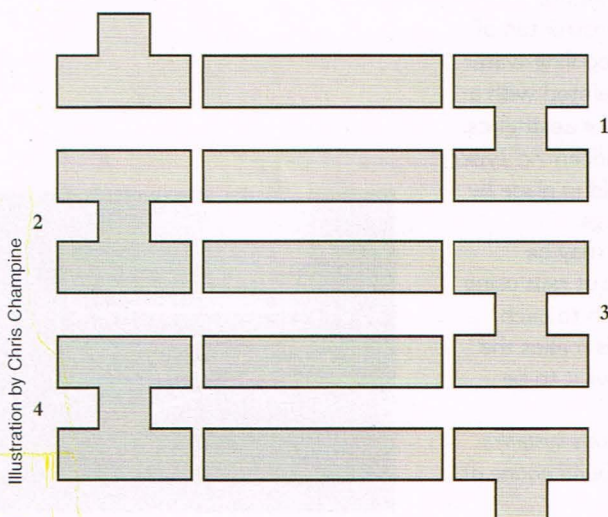


Illustration by Chris Champine

3. ASSEMBLE PVC OUTER SHELL

Using PVC cement, connect all cooling water PVC tubes to the four cooling water return manifolds to form the completed outer shell. Notice how the assembly ends with two simple T-fittings. These are the inlet and outlet for cooling water.

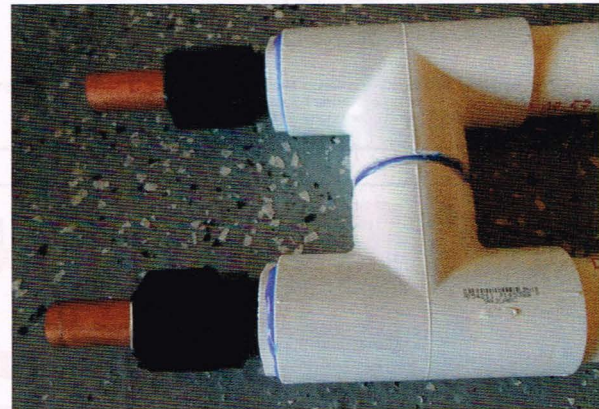
4. INSTALL COMPRESSION FITTINGS

Thread the compression fitting $\frac{3}{8}$ -inch NPT side into each end of the cooling water manifolds. All ends of the cooling water return manifolds will need one compression fitting to secure copper tubes. These plastic compression fittings are made of polypropylene rated to 212 °F (100 °C) and use an O-ring to make a seal between the copper and PVC tubes.



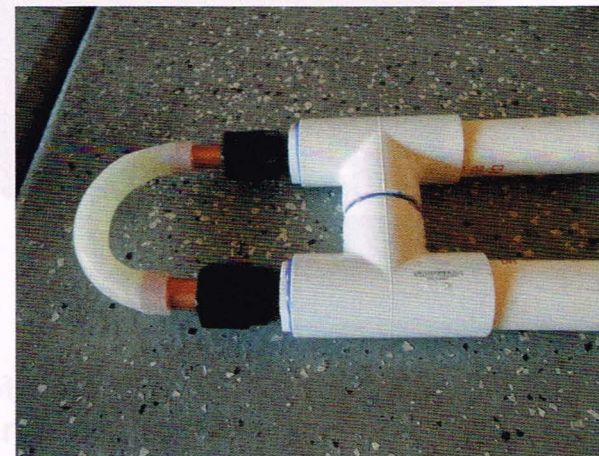
5. INSTALL COPPER TUBES

Slide copper tubes through compression fittings until they come out the other end. Make sure the length of the copper tube that extends out from the PVC assembly is even on both sides (this will allow you to install the wort return tubes in the next step). Using the crescent wrench, tighten compression nut of the compression fittings to secure copper tube. Repeat this step for all concentric tubes.

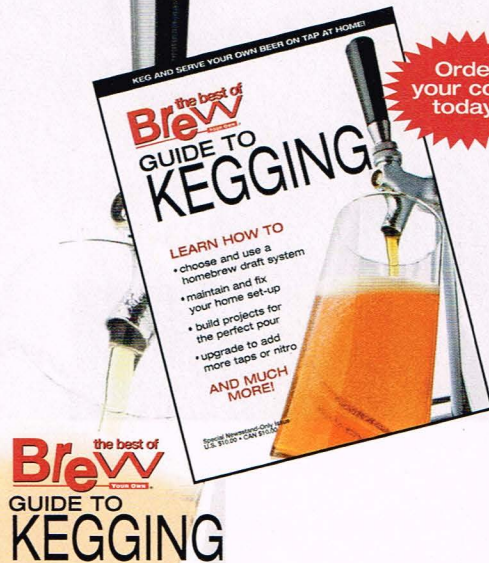


6. INSTALL RETURN TUBES

Cut the high-temperature food-grade silicone hose to 6 inches (15 cm) and slip onto copper concentric tubes. Use a $\frac{1}{2}$ -inch clamp to secure the silicone hose to the concentric tube. The pressure rating of high-temp silicone hose is 10 pounds per square inch (PSI) so it's important to have a free flow of wort out of the wort chiller. If you are using a pump to run the hot wort and need to regulate the flow-rate, place a throttling valve on the outlet of the pump before it gets to the heat exchanger. This will keep a low pressure in the heat exchanger. Use a hose with a higher-pressure rating if the wort needs to be pumped over a long distance and a high restriction is expected. To regulate the wort flow in gravity fed configurations, place a valve on the outlet of the boil kettle and feed wort to the chiller from the bottom to top in order to keep concentric tubes fully submersed in liquid and maximize heat transfer. (BYO)



Start Kegging
Today With This
Valuable Resource



Order
your copy
today!

**the best of
Brew**
YOUR OWN
GUIDE TO
KEGGING

For those just getting into kegging or those looking to upgrade their existing system, *Brew Your Own's* Guide to Kegging is the perfect resource to get you where you are going. Just \$10!

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

THE **Brew** / **Wine Maker** YOUR OWN BEGINNER'S guide!



two GREAT HOBBIES in one GREAT ISSUE!

With a range of content covering brewing beer with kits & extracts to all-grain **AND** making wine from kits, concentrates, juices and fresh grapes, the Beginner's Guide is the perfect reference for...

- Your friends just starting out in the hobby
- A brewer interested in making wine **OR** a winemaker interested in making beer
- Homebrew & winemaking starter kits*

At just \$8.00 (\$8.00 CAN) retail, you won't find a more valuable reference to get you started on the right foot in the great hobbies of brewing and winemaking!

Available at better homebrew and winemaking retailers
or order today by calling 802-362-3981
Online at www.winemakermagstore.com

* Attention homebrew & winemaking supply shop owners - call us today at 802-362-3981 to discuss volume discounts to resell the Beginner's Guide in your shop!

Brew THE HOW-TO HOMEBREW BEER MAGAZINE YOUR OWN 2.0

ANYTIME • ANYWHERE



Our new digital edition of *Brew Your Own* can be read on a computer, Apple devices like iPads and iPhones, Android tablets and phones, and more! Each digital edition contains all the great content of our print edition plus the ability to search terms, add bookmarks, link directly to web content and other unique digital features.

Choose from two digital subscription options:

Digital Only

8 digital issues for \$28
(All countries - same rate.)

Digital and Print

8 digital issues + 8 print issues for \$33
(U.S. rate only. Canada rate is \$38.
Other countries are \$50.)

For more information check out:
byo.com/digitaledition

for direct links to all of our advertisers' websites, go to www.byo.com/resources/readerservice

1-2-1 Personal Gifts72 1-888-203-1045 www.121PersonalGifts.com orders@121PersonalGifts.com	Brewmasters Warehouse18 1-877-973-0072 www.brewmasterswarehouse.com info@brewmasterswarehouse.com	Mark's Keg Washer70 503-806-4115 www.kegwasher.com mark@kegwasher.com
50 Pound Sack67 www.50PoundSack.com	Briss Malt and Ingredients Co.49 & Recipe Cards 920-849-7711 www.brewingwithbriss.com info@briss.com	Midwest Supplies, LLCCover III 1-888-449-2739 www.midwestsupplies.com info@midwestsupplies.com
Adventures in Homebrewing73 313-277-2739 www.homebrewing.org	BSG HandCraft7 508-638-5154 www.bsgandcraft.com info@bsgandcraft.com	Monster Brewing Hardware LLC26 678-350-1731 www.monsterbrewinghardware.com francis@monsterbrewinghardware.com
American Brewers Guild Brewing School76 1-800-636-1331 www.abgbrew.com info@abgbrew.com	C&W Crate Company61 616-245-2728 www.cwcrate.com info@cwcrate.com	MoreBeer!16 1-800-600-0033 www.morebeer.com sales@morebeer.com
American Brewmaster32 www.americanbrewmaster.com	Dallas Home Brew a division of The Wine Maker's Toy Store70 1-866-417-1114 www.finevinewines.com geocorn@finevinewines.com	Muntions Malted Ingredients45 425-372-3082 www.muntions.com sales@muntions-inc.com
American Homebrewers Association34 www.HomebrewersAssociation.org	E.Z. Cap33 403-282-5972 www.ezcap.net ezcap@ezcap.net	My Own Labels52 www.myownlabels.com info@myownlabels.com
Annapolis Home Brew33 1-800-279-7556 www.annapolishhomebrew.com email@annapolishhomebrew.com	Electric Brewing Supply, LLC74 www.ebrewsupply.com sales@ebrewsupply.com	myLHBS (myLocal HomeBrew Shop)61 703-241-3874 www.mylhbs.com info@mylhbs.com
Asheville Brewers Supply85 828-285-0515 www.ashevillebrewers.com allpoints1@mindspring.com	FastRack69 1-800-549-5763 www.thefastrack.ca info@thefastrack.ca	NorCal Brewing Solutions59 530-243-BEER (2337) www.norcalbrewingsolutions.com sales@norcalbrewingsolutions.com
Austin Homebrew Supply69 1-800-890-BREW (2739) www.austinhhomebrew.com info@austinhhomebrew.com	Fermtech Ltd.32 519-570-2163 www.fermtech.ca derek@fermtech.ca	Northern Brewer, LLCCover II 1-800-681-2739 www.northernbrewer.com info@northernbrewer.com
Beer and Wine Hobby, Inc.35 1-800-523-5423 www.beer-wine.com shop@beer-wine.com	Five Star Chemicals & Supply Inc.60 1-800-782-7019 www.fivestarchemicals.com support@fivestarchemicals.com	Polar Ware Company53 1-800-319-9493 www.polarware.com
Beginner's Guide82 802-362-3981 www.brewyourownstore.com beginnersgd@byo.com	Fox Equipment Company85 816-421-3600 www.foxequipment.com kcsales@foxequipment.com	Quality Wine and Ale Supply52 574-295-9975 www.HomeBrewIt.com info@HomeBrewIt.com
Best of Brew Your Own95 25 Great Homebrew Projects95 250 Classic Clone Recipes95 Guide to Kegging82 802-362-3981 www.brewyourownstore.com	Grape and Granary78 1-800-695-9870 www.grapeandgranary.com info@grapeandgranary.com	Rebel Brewer22 615-859-2188 www.rebelbrewer.com info@rebelbrewer.com
A Better Brew Stand69 www.abetterbrewstand.com	GrogTag67 www.grogtag.com support@grogtag.com	RJS Craft Winemaking17 1-800-265-9463 www.rjscraftwinemaking.com
Better-Bottle® division of High-Q, Inc.23 1-800-435-4585 www.Better-Bottle.com sales@better-bottle.com	High Gravity59 918-461-2605 www.highgravitybrew.com store@highgravitybrew.com	Ruby Street Brewing, LLC77 970-673-RUBY (7829) www.rubystreetbrewing.com questions@rubystreetbrewing.com
The Beverage People, Inc.70 707-544-2520 or 1-800-544-1867 www.thebeveragepeople.com bevpeo@sonic.net	Home Brewery (MO)26 1-800-321-2739 (BREW) www.homebrewery.com brewery@homebrewery.com	Seven Bridges Co-op Organic Homebrewing Supplies78 1-800-768-4409 www.breworganic.com 7bridges@breworganic.com
BH Enterprises (Temperature Controls)73 1-800-973-9707 www.winestat.com info@winestat.com	Homebrew Heaven74 1-800-850-2739 or 425-355-8865 www.homebrewheaven.com info@homebrewheaven.com	South Hills Brewing Supply26 412-937-0773 (Greentree) 412-374-1240 (Monroeville) 412-366-0151 (North Hills) www.southhillsbrewing.com
Blichmann Engineering, LLC3 www.blichmannengineering.com john@blichmannengineering.com	Homebrewer's Answer Book67 802-362-3981 www.brewyourownstore.com	Speidel Tank - und Behälterbau GmbH72 www.speidels-braumeister.de
Brew Brothers Homebrew Products, LLC26 1-888-528-8443 www.brewbrothers.biz info@brewbrothers.biz	HomeBrewStuff.com34 1-888-584-8881 or 541-830-0100 www.HomeBrewStuff.com info@HomeBrewStuff.com	St. Louis Wine & Beermaking LLC76 636-230-8277 www.wineandbeermaking.com info@wineandbeermaking.com
Brew Your Own Back Issue Binders85 802-362-3981 www.brewyourownstore.com	Kegs.com Ltd. dba SABCO60 419-531-5347 www.brew-magic.com office@kegs.com	Tap Boards, Inc.77 512-394-7955 www.TapBoards.com contact@tapboards.com
Brew Your Own Back Issues24-25 802-362-3981 www.brewyourownstore.com backissues@byo.com	Keystone Homebrew Supply11 215-855-0100 www.keystonehomebrew.com info@keystonehomebrew.com	UC Davis Extension59 1-800-752-0881 www.extension.ucdavis.edu/brew extension@ucdavis.edu
Brew Your Own Digital Edition82 www.byo.com/digitaledition	Lallemand Inc.6 www.LallemandBrewing.com homebrewing@lallemand.com	The Vintage Shop18 604-590-1911 www.thevintageshop.ca info@thevintageshop.ca
Brew Your Own Merchandise85 1-877-809-1659 www.cafepress.com/brewyourown	Larry's Brewing Supply85 1-800-441-2739 www.larrysbrewsupply.com customerservice@larrysbrewsupply.com	White Labs Pure Yeast & Fermentation10 & Recipe Cards 1-888-5-YEAST-5 www.whitelabs.com info@whitelabs.com
Brewcraft USA21 503-281-3941 www.brewcraftusa.com info@brewcraftusa.com	LD Carlson Company57 1-800-321-0315 www.ldcarlson.com www.brewersbestkits.com ldcarlson@ldcarlson.com	William's Brewing44 & 60 1-800-759-6025 www.williamsbrewing.com service@williamsbrewing.com
Brewers Publications14 & 31 1-888-822-6273 www.BrewersPublications.com info@brewersassociation.org	LOGIC, Inc.70 608-658-2866 www.ecologiccleansers.com info@ecologiccleansers.com	Wyeast Laboratories, Inc. - 100% Pure Liquid CulturesCover IV 541-354-1335 www.wyeastlab.com customerservice@wyeastlab.com
The Brewing Network44 www.thebrewingnetwork.com	love2brew31 1-888-654-5511 www.love2brew.com	
BrewingHub.com69 424-241-2678 www.brewinghub.com info@brewinghub.com		

APPAREL

BEER GEEK TEES

Get 10% off with
Coupon: BYOMAG
Wholesale pricing for resellers.
BrewerShirts.com

BEERSHIRTZ - FREE SHIPPING!

www.beershirtz.com

BREW TEES APPAREL

Brewery and beer related apparel.
Retail & Wholesale.
www.BrewTees.com

GET YOUR BYO GEAR!

BYO logo shirts, sweats, hats
& lots more.
www.cafepress.com/brewyourown

BAR SUPPLIES

BEERS NOT BOMBS!

Bottle Openers made from
Disarmed Nuclear weapon
systems.
www.BeersNotBombs.com

CUSTOM BOTTLE CAPS

engraved glassware, tap handles &
more. Customize online today.
www.wildhopsprintshop.com

BREWING EQUIPMENT

#1 BREWING SYSTEM

All stainless steel,
American-made, TIG welded.
Visit us at synergybrew.com

ABETTERBREWSTAND.COM

presents single and two tier brew-
stands and complete brew systems
from 5 gallons to 1 barrel. Brew
kettles and accessories from Polar
Ware, Bayou Classic.

BARGAINFITTINGS.COM

High quality weldless, stainless
steel kits to convert your kegs,
kettles and coolers.

BEER WORT CHILLERS

Highly Efficient. Time & Water
Saving Garden Hose Connections.
Daily Shipping
www.dudadiesel.com
256-340-4866

BEVERAGE EQUIPMENT:

Over 4,500 items! Everything for beer,
wine & soda.
www.chicompany.net

BREWHEMOTH - SIZE MATTERS

22 gallon fermenter
and accessories.
www.brewhemoth.com

CHUGGER PUMPS -

Stainless Steel Brew Pumps
www.chuggerpumps.com
1-800-810-1053

ELECTRIC BREWING EQUIPMENT

Low prices, growing selection, DIY kits.
\$5 Shipping, Orders over \$49 ship free
www.ebrewsupply.com

KEGGLER BREWING

Corny Kegs, Tap Systems and Parts,
Refrigerator Conversion Kits, Kegglers
and Weldless Fittings.
www.KeggleBrewing.com

LIFE'S TOO SHORT

To Worry About Wort. Monitor
pitching & fermentation
temperature with a Fermometer™!
www.tkachenterprises.com

OneDerBrew™ LOW COST

pressurizable conical
fermenters starting at \$59.99
www.onederbrew.com
questtech2002@gmail.com

STOUT TANKS & KETTLES

Stainless conical fermenters,
mashtuns, & HLTs. 5-150 gallons.
conical-fermenter.com

TESCO PUMPS

March Homebrew Pumps
& Parts Since 1977.
www.tescopumps.com
Email: tescoincnc@aol.com
(704) 357-3400

www.UnitedBottles.com

Bottles, hops and more...

DRAFT & BOTTLING EQUIPMENT

www.TheBeerTapStore.com

Kegerator kits and more. Stocking
Perlick, Taprite, Bevflex tubing.
Custom quotes available.

USE COMMERCIAL KEGS

with your homebrew setup. Keg
coupler ball-lock adapters available.
www.thekeggingpart.com

GIFTS

YOU WANT THIS!

Beercandy! Chocolate-covered
Beercaramels, Beertaffy in IPA and
stout, Hopdrops.
www.Beercandy.com

HOPS

GROW HOP PLANTS

35 varieties shipped direct to you.
Better than rhizomes!
www.HighHops.net

NEED QUALITY HOPS?

Hops grow best in the Northwest
Female Hop Rhizomes, Potted Hops,
T-90 Pellets, Wet/Dry Cone Hops.
www.NorthwestHops.com
(503) 974-Hops (4677)

INGREDIENTS

www.UnitedBottles.com

great hops and more...

LABORATORY & TESTING SUPPLIES

BREWLAB™/plus TEST KIT,
for home brewers measures up to
6 water test factors.
www.lamotte.com/brewlab

SOFTWARE

iBrewMaster

The Premier Brewing Application.
Technology Never Tasted So Good!
www.ibrewmaster.com

TRAVEL

TRAVEL FOR BEER?

Beer-focused, small group tours for
discerning travelers.
Belgium, Germany, Ireland.
www.BeerTrips.com

WHOLESALE EQUIPMENT

BAYOU CLASSIC® BREW

Wholesale Equipment: Brew Kettles,
Cookers, Accessories.
www.thebayou.com
erin.busin@bi2.com

For details on
running a
classified email
dave@byo.com



GREAT gifts for you or your brewing buddies

Shirts, Sweats, Hats & Lots More!



Go to
www.cafepress.com/brewyourown
and order your Brew Gear today!

www.cafepress.com/brewyourown
SHOW THE WORLD YOU'RE A HOMEBREWER!

Homebrew Heat Pad

Constant temperature for fermenting
"Way better than heat belts"




FREE CATALOG
 Call (800) 821-2254
 or fax (800) 972-0282

WHOLESALE ONLY
FOXX
 EQUIPMENT COMPANY

Visit foxxequipment.com to find a Home Brew Shop near you!
 See our complete catalog online!

Just Brew It !!

Larry's

BREWING SUPPLY

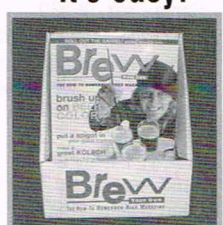


1-800-441-2739
www.larrysbrewsupply.com

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
- Free Online listing & Hotlink on byo.com!

To set up an account or find out more
 call Dave at (802) 362-3981 ext. 107

BYO BINDERS!



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

Only \$20 each (includes shipping)

Order Today at
brewyourownstore.com

Make your own beer!

Start with the best ingredients.
 Let us show you how!

Now on the Web!
www.ashevillebrewers.com

ASHEVILLE BREWERS
 SUPPLY

828-285-0515

ASHEVILLE, NORTH CAROLINA
 SINCE 1994 • SOUTH'S FINEST

ALABAMA

Werner's Trading Company

1115 Fourth St. SW
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
e-mail: winesmith@bellsouth.net
www.thewinesmith.biz
Serving Central Gulf Coast Homebrewers

ARIZONA

Brew Your Own Brew and Wine

525 East Baseline Rd., Ste 108
Gilbert 85233
(480) 497-0011
gilbertstore@brewyourownbrew.com
www.brewyourownbrew.com
Where the art of homebrewing starts.

Brew Your Own Brew and Wine

8230 E. Raintree Rd., #103
Scottsdale 85260
(480) 625-4200
www.brewyourownbrew.com
scottsdale@brewyourownbrew.com
Where the art of homebrewing starts.

Brew Your Own Brew and Wine

2564 N. Campbell Ave., Suite 106
Tucson 85719
(520) 322-5049 or
1-888-322-5049
info@brewyourownbrew.com
www.brewyourownbrew.com
Where the art of homebrewing starts.

Brewers Connection

1435 E. University Drive, #B103
Tempe 85821
(480) 449-3720
ami@brewersconnection.com
www.brewersconnection.com
Arizona's oldest homebrew store. Full service 7 days a week.

Brewers Connection

4500 E. Speedway Blvd. #38
Tucson 85711
(520) 881-0255
www.brewersconnection.com
Arizona's oldest homebrew store. Full service 7 days a week!

Mile Hi Brewing Supplies

125 N. Cortez St.
Prescott 86301
(928) 237-9029
www.milehibrewingsupplies.com
We have the best selection of beer, wine, spirits and cheese making equipment and supplies and an unmatched commitment to customer service!

Tap That Brewing Supplies

15223 N. 87th St., Ste. 115
Scottsdale 85260
(480) 991-9528
fax: (480) 275-3336
www.tapthatbrewingsupplies.com
kelly@tapthatbrewingsupplies.com
The North Scottsdale Home Brew Shop.

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
For all your beer & wine making needs.

CALIFORNIA

Addison Homebrew Provisions

1328 E. Orangethorpe Ave.
Fullerton 92831
(714) 752-8446
www.addisonhomebrew.com
Beer, Wine & Mead. Free brewing demos, club & message board.

Bear Valley Hydroponics & Homebrewing

17455 Bear Valley Rd.
Hesperia 92345
(760) 949-3400
fax: (760) 948-6725
info@bvhydro.com
Excellent customer service and selection whether you grow or brew your own or both. Open 7 days a week.

The Beverage People, Inc.

1845 Piner Road, Suite D
Santa Rosa
1-800-544-1867
www.thebeveragepeople.com
Fast Shipping, Great Service, Cheesemaking too!

Brew Ferment Distill

3216 Martin Luther King Jr. Blvd.
Sacramento 95817
(916) 476-5034
tim@brewfermentdistill.com
www.brewfermentdistill.com
"Promoting the Slow Drink Movement, One Bottle at a Time." Stop in for all your brewing needs.

Culver City Home Brewing Supply

4234 Sepulveda Blvd.
Culver City 90230
(310) 397-3453
www.brewsupply.com
Mon-Sat 11am-7pm, Sun Noon-4 Full supply of extracts, malts & hops. Personal service you can't get online.

Doc's Cellar

855 Capitolio Way, Ste. #2
San Luis Obispo
(805) 781-9974
www.docscellar.com

Eagle Rock Home Brewing Supply

4981 Eagle Rock Blvd.
Los Angeles 90041
www.brewsupply.com
Mon-Sat 11am-7pm, Sun Noon-4 Fully Supply of extracts, malts & hops. Personal service you can't get online.

Home Brew Shop

1570 Nord Ave.
Chico 95926
(530) 342-3768
email: homebrushop@yahoo.com
www.chicohomebrewshop.com
Years of experience, advice always free!

Hop Tech Home Brewing Supplies

6398 Dougherty Rd. Ste #7
Dublin 94568
1-800-DRY-HOPS
www.hoptech.com
Owned by people who are passionate about beer! With over 50 Hops, 60 Grains, White Labs, Wyeast & a large selection of dry yeast, online & in-house. We carry a large selection for beer & wine making.

MoreBeer! & MoreWine!

995 Detroit Ave., Unit G
Concord 94518
(925) 771-7107 fax: (925) 671-4978
concordshowroom@moreflavor.com
www.morebeer.com
Showrooms also in Los Altos and Riverside.

Murrieta Homebrew Emporium

38750 Sky Canyon Dr., Ste A
Murrieta 92563
(951) 600-0008
toll-free: 888-502-BEER
www.murrietahomebrew.com
Riverside County's Largest Full Serve Homebrew and Wine Making Supply Store! Taking orders online now! Free shipping on orders over \$100. Free demonstrations twice a month.

NorCal Brewing Solutions

1768 Churn Creek Rd.
Redding 96002
(530) 243-BEER (2337) or
(530) 221-WINE (9463)
www.norcalbrewingsolutions.com
Full line of beer, wine & distilling supplies, hardware and custom made equipment including the world famous "Jaybird" family of false bottoms.

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
Southern California's Oldest & Largest Homebrew Store! Large inventory of hard to find bottled & kegged beer.

Seven Bridges Co-op 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 90808
(562) 425-0588
www.steinfillers.com
brew@steinfillers.com
Your complete Homebrew Store, serving the community since 1994. Home of the Long Beach Homebrewers.

Valley Brewers

515 Fourth Place
Solvang 93463
(805) 691-9159
www.valleybrewers.com
Serving Santa Barbara County
with a full-service homebrew and
winemaking store.

COLORADO**Beer and Wine
at Home**

1325 W. 121st. Ave.
Westminster
(720) 872-9463
www.beerathome.com

Beer at Home

4393 South Broadway
Englewood
(303) 789-3676 or
1-800-789-3677
www.beerathome.com
Since 1994, Denver Area's
Oldest Homebrew Shop. Come
See Why.

The Brew Hut

15120 East Hampden Ave.
Aurora
(303) 680-8898
www.thebrewhut.com
Beer, Wine, Mead, Soda,
Cheese, Draft & CO₂ refills —
WE HAVE IT ALL!

**Hops & Berries
(S. Fort Collins)**

1833 E. Harmony Rd., Unit 16
Fort Collins 80528
(970) 493-2484
www.hopsandberries.com
Visit us in Old Town and our new
South Fort Collins location.
Everything you need to make your
own beer, wine, soda, cheese and
more at home!

**Hops & Berries
(Old Town)**

125 Remington St.
Fort Collins 80524
(970) 493-2484
www.hopsandberries.com
Visit us in Old Town and our new
South Fort Collins location.
Everything you need to make your
own beer, wine, soda, cheese and
more at home!

Juice of the Barley

2961 29th Street
Greeley 80634
(970) 515-6326
juiceofthebarley.net
juiceofthebarley.noco@gmail.com
We help create beer geeks!
Northern Colorado's newest
source for home brewing supplies,
parts and accessories.

Lil' Ole' Winemaker

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

**Wine or Wort Home
Brew Supply**

150 Cooley Mesa Rd.
(next to Costco)
Gypsum 81637
(970) 524-BEER (2337)
www.wineorwort.com
Beer and Wine making supplies
for the novice to the advanced
brewer. Your high country's only
home brew supply store.

CONNECTICUT**Beer & Wine Makers
Warehouse**

290 Murphy Road
Hartford 06114
(860) 247-BWMW (2969)
e-mail: info@bwmwct.com
www.bwmwct.com
Area's largest selection of beer &
winemaking supplies. Visit our
3000 sq ft facility with demo area,
grain crushing and free beer &
wine making classes with equip-
ment kits.

Brew & Wine Hobby

Now Full Service!
Area's widest selection of beer
making supplies, kits & equipment
12 Cedar Street
East Hartford 06108
(860) 528-0592 or
1-800-352-4238
www.brew-wine.com
Always fresh ingredients in stock!
We now have a Pick Your Own
grain room!

Maltose Express

246 Main St. (Route 25)
Monroe 06468
In CT.: (203) 452-7332
Out of State: 1-800-MALTOSE
info@maltoseexpress.net
www.maltoseexpress.net
Connecticut's largest homebrew &
winemaking supply store. Buy
supplies from the authors of
"CLONEBREWS 2nd edition" and
"BEER CAPTURED"! Top-quality
service since 1990.

**Rob's Home
Brew Supply**

1 New London Rd, Unit #9
Junction Rte 82 & 85
Salem 06420
(860) 859-3990
robshomebrew@sbcglobal.net
www.robshomebrew.com

Stomp N Crush

140 Killingworth Turnpike (Rt 81)
Clinton 06413
(860) 552-4634
www.stompcrush.com
email: info@stompcrush.com
Southern CT's only homebrew
supply store, carrying a full line
of Beer & Wine making supplies
and kits.

DELAWARE**How Do You Brew?**

Shoppes at Louviers
203 Louviers Drive
Newark 19711
(302) 738-7009 fax: (302) 738-5651
joe@howdoyoubrew.com
www.howdoyoubrew.com
Quality Supplies and Ingredients
for the Home Brewer including:
Beer, Wine, Mead, Soft Drink and
Kegging. One of the Mid-Atlantic's
largest and best-stocked Brew
Stores!

Xtreme Brewing

18501 Stamper Dr. (Rte 9)
Lewes 19958
(302) 684-8936
fax: (302) 934-1701
www.xtremebrewing.com
support@xtremebrewing.com
Ingredients for the extraordinary
beer you want to make plus all
the ordinary stuff you need.

Xtreme Brewing

24608 Wiley Branch Rd.
Millsboro 19966
(877) 556-9433
www.xtremebrewing.com
support@xtremebrewing.com
Ingredients for the extraordinary
beer you want to make plus all
the ordinary stuff you need.

FLORIDA**Beer and
Winemaker's Pantry**

9200 66th St. North
Pinellas Park 33782
(727) 546-9117
www.beerandwinemaking.com
Complete line of Wine & Beer
making supplies and ingredients.
Huge selection, Mail orders, Great
service. Since 1973.

Southern Homebrew

711 West Canal St.
New Smyrna Beach 32168
(386) 409-9100
info@SouthernHomebrew.com
www.SouthernHomebrew.com
Largest store in Florida! Complete
inventory of Brewer's Best, True
Brew, Coopers & Mountmellick.
Including a complete stock of
grain, etc and all beer & wine
making supplies & equipment all
at money Saving prices.

GEORGIA**Barley & Vine**

1445 Rock Quarry Rd., Ste #202
Stockbridge 30281
(770) 507-5998
Email: info@barleyNvine.com
www.BarleyNvine.com
Now selling Import/Craft Beers &
Growlers! Best stocked brew shop
in Metro Atlanta serving all your
fermentation and cheese making
needs. Friendly, knowledgeable
staff will help you with your first
batch or help you design your next
perfect brew. Check out our website
for our specialty clone kits, classes,
events and specials. Competitive
prices/Same Day shipping on most
orders. Located just 1/2 mile off I-
75, exit 224.

Beer & Wine Craft

220 Sandy Springs Circle, #109
Sandy Springs 30328
(404) 252-5606
beerandwinecraft@gmail.com
www.beerandwinecraft.com

**Brew Depot - Home of
Beer Necessities**

10595 Old Alabama Rd. Connector
Alpharetta 30022
(770) 645-1777
fax: (678) 585-0837
877-450-BEER (Toll Free)
e-mail: beerne@aol.com
www.BeerNecessities.com
Georgia's Largest Brewing Supply
Store. Providing supplies for all
of your Beer & Wine needs.
Complete line of draft dispensing
equipment, CO₂ and hard to find
keg parts. Award winning Brewer
on staff with Beginning and
Advanced Brew Classes available.
Call or email to enroll.
www.Brew-Depot.com

**Brewmasters
Warehouse**

2145 Roswell Rd., Suite 320
Marietta 30062
(877) 973-0072
fax: (800) 854-1958
info@brewmasterswarehouse.com
www.brewmasterswarehouse.com
Low Prices & Flat Rate Shipping!

**Buford Beer and
Wine Supplies**

14 West Main St.
Buford 30518
(770) 831-1195
www.bufordbeerandwinesupplies.com
info@bufordbeerandwinesupplies.com
We carry a comprehensive line of
beer and wine making supplies. If
we don't have it we will be happy
to make special orders. We keep
over 25 specialty grains on hand.

Just Brew It!

1924 Hwy 85
Jonesboro 30238
1-888-719-4645
www.aardvarkbrewing.com
Atlanta's favorite homebrew shop since 1993. Great prices with the most complete line of ingredients and kegging supplies in the region. Just 8 miles south of the perimeter on Georgia hwy 85,

Wine Workshop and Brew Center

627-F East College Ave.
Decatur 30030
(404) 228-5211
info@wineworkshop.net
wineworkshop.net
"Have Fun! Be Proud!™"
We are committed to ensuring your satisfaction with quality ingredients, equipment and excellent customer service.

HAWAII

HomeBrew in Paradise

2646-B Kilihau St.
Honolulu 96819
(808) 834-BREW
mike@homebrewinparadise.com
www.homebrewinparadise.com
The Best Homebrew Supply Store in Hawaii

IDAHO

HomeBrewStuff.com

9165 W. Chinden Blvd., Ste 103
Garden City 83714
(208) 375-2559
www.homebrewstuff.com
"All the Stuff to Brew, For Less!"
Visit us on the web or at our large Retail Store! Now offering a selection of over 600 craft beers.

ILLINOIS

Bev Art Brewer & Winemaker Supply

10033 S. Western Ave.
Chicago
(773) 233-7579
email: bevart@bevart.com
www.BevArt.com
Mead supplies, grains, liquid yeast and beer making classes on premise.

Brew & Grow (Bolingbrook)

181 W. Crossroads Pkwy., Ste A
Bolingbrook 60440
(630) 771-1410
www.brewandgrow.com
Your complete one stop shop for all your brewing and winemaking needs.

Brew & Grow (Chicago)

3625 N. Kedzie Ave.
Chicago 60618
(773) 463-7430
www.brewandgrow.com
Your complete one stop shop for all your brewing and winemaking needs.

Brew & Grow (Chicago West Loop)

19 S. Morgan St.
Chicago 60607
(312) 243-0005
www.brewandgrow.com
Your complete one stop shop for all your brewing and winemaking needs.

Brew & Grow (Crystal Lake)

176 W. Terra Cotta Ave., Ste. A
Crystal Lake 60014
(815) 301-4950
www.brewandgrow.com
Your complete one stop shop for all your brewing and winemaking needs.

Brew & Grow (Rockford)

3224 S. Alpine Rd.
Rockford 61109
(815) 874-5700
www.brewandgrow.com
Your complete one stop shop for all your brewing and winemaking needs.

Brew & Grow (Roselle)

359 W. Irving Park Rd.
Roselle 60172
(630) 894-4885
www.brewandgrow.com
Your complete one stop shop for all your brewing and winemaking needs.

Chicagoland Winemakers Inc.

689 West North Ave.
Elmhurst 60126
Phone: 1-800-226-BREW
info@chicagolandwinemakers.com
www.chicagolandwinemakers.com
Full line of beer & wine making supplies.

Home Brew Shop LTD

225 West Main Street
St. Charles 60174
(630) 377-1338
www.homebrewshopltd.com
Complete line of beer, wine & mead making supplies, varietal honey. Draft equipment specialists encompassing all kegging needs, line cleaning service, system installation. Classes offered in-store.

Perfect Brewing Supply

619 E. Park Ave.
Libertyville 60048 (847) 816-7055
info@perfectbrewingsupply.com
www.perfectbrewingsupply.com
Providing equipment and ingredients for all of your homebrewing needs, a full line of draft beer equipment and expert staff to answer your questions.

Somethings Brewn'

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

INDIANA

The Brewer's Art Supply

1425 N. Wells Street
Fort Wayne 46808
(260) 426-7399
brewersartsupply@gmail.com
www.brewingart.com
facebook: BrewersArtSupply
Your Complete STOP Homebrew Shop! Beer • Wine • Cider • Mead • Soda Pop.

Butler Winery Inc.

1022 N. College Ave.
Bloomington 47404
(812) 339-7233
e-mail: intown@butlerwinery.com
Southern Indiana's largest selection of homebrewing and wine-making supplies. Excellent customer service. Open daily or if you prefer, shop online at: butlerwinery.com

Great Fermentations of Indiana

5127 E. 65th St.
Indianapolis 46220
(317) 257-WINE (9463)
Toll-Free 1-888-463-2739
www.greatfermentations.com
Extensive lines of yeast, hops, grain and draft supplies.

Quality Wine and Ale Supply

Store: 108 S. Elkhart Ave.
Mail: 530 E. Lexington Ave. #115
Elkhart 46516
Phone (574) 295-9975
E-mail: info@homebrewit.com
Online: www.homebrewit.com
Quality wine & beer making supplies for home brewers and vintners. Secure online ordering. Fast shipping. Expert advice. Fully stocked retail store.

Superior Ag Co-op

5015 N. St. Joseph Ave.
Evansville 47720
1-800-398-9214 or (812) 423-6481
superioragevv@gmail.com
Beer & Wine. Brew supplier for Southern Indiana.

IOWA

Beer Crazy

3908 N.W. Urbandale Dr./100 St.
Des Moines 50322
(515) 331-0587
www.beercrazy.com
We carry specialty beer, and a full-line of beer & winemaking supplies!

Bluff Street Brew Haus

372 Bluff Street
Dubuque
(563) 582-5420
jerry@bluffbrewhaus.com
www.bluffbrewhaus.com
Complete line of wine & beer making supplies.

Deb's Brewtopia

106 Cedar Street NW
Elkader 52043
Toll Free: (855) 210-3737
debsbrewtopia@alpinecom.net
www.debsbrewtopia.com
Visit the store for a great selection of brewing and wine making supplies

Kitchen Wines & Brew Shop

1804 Waterloo Rd.
Cedar Falls 50613
(319) 266-6173
info@kitchenwines.com
kitchenwines.com
Specializing in home brewing and wine making supplies and equipment.

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.

2061 E. Santa Fe
Olathe
(913) 768-1090 or
Toll Free: 1-866-BYO-BREW
Secure online ordering: www.homebrewproshoppe.com

KENTUCKY

My Old Kentucky Homebrew

361 Baxter Ave.
Louisville 40204
(502) 589-3434
www.myoldkentuckyhomebrew.com
Beer & Wine supplies done right. Stop by and see for yourself.

Winemakers & Beermakers Supply

9475 Westport Rd.
Louisville 40241
(502) 425-1692
www.winebeersupply.com
Complete Beermaking & Winemaking Supplies. Premium Malt from Briess & Muntons. Superior Grade of Wine Juices. Family Owned Store Since 1972.

LOUISIANA

Brewstock

3800 Dryades St.
New Orleans 70115
(504) 208-2788
www.brewstock.com
e-mail: aaron@brewstock.com
The Largest Selection of Homebrewing Supplies in Louisiana!

MARYLAND

Annapolis Home Brew

836 Ritchie Hwy., Suite 19
Severna Park 21146
(800) 279-7556
www.annapolishomebrew.com
Friendly and informative personal service; Online ordering.

Cheers!

1324 South Salisbury Blvd.
Salisbury 21801
(410) 742-8199 fax: (410) 860-4771
cheersby.wordpress.com
We sell Beer, Wine, Cigars and Supplies for the Home Brewer and Home Vintner!

The Flying Barrel

1781 North Market St.
Frederick
(301) 663-4491 fax: (301) 663-6195
www.flyingbarrel.com
Maryland's 1st Brew-On-Premise; winemaking and homebrewing supplies!

Maryland Homebrew

6770 Oak Hall Lane, #108
Columbia 21045
1-888-BREWNOW
www.mdhb.com
6,750 square feet of all your beer, wine & cheesemaking needs. We ship everywhere!

MASSACHUSETTS

Beer and Wine Hobby, Inc.

155 New Boston St., Unit T
Woburn 01801
1-800-523-5423
e-mail: bwinfo@beer-wine.com
Web site: www.beer-wine.com
Brew on YOUR Premise™
One stop shopping for the most discriminating beginner & advanced beer & wine crafter.

Modern Homebrew Emporium

2304 Massachusetts Ave.
Cambridge 02140
(617) 498-0400
fax: (617) 498-0444
www.beerbrew.com
email: mhe@beerbrew.com
The freshest supplies and equipment to make beer, wine, cheese and tea, as well as bottles, honey, herbs and spices, books, labels, kegging equipment and much more. Open 7 days a week. Since 1991.

NFG Homebrew Supplies

72 Summer St.
Leominster
(978) 840-1955
Toll Free: 1-866-559-1955
www.nfghomebrew.com
nfgbrew@aol.com
New England's Biggest Little Homebrew Store!!! With our personalized service, we offer a wide variety of the finest ingredients for beer and wine making at GREAT PRICES!! Since 1995.

South Shore Homebrew Emporium

58 Randolph Street
South Weymouth
1-800-462-7397
www.beerbrew.com
email: sshe@beerbrew.com
The largest homebrew store in New England has 7,000 square feet of space devoted to the freshest supplies and equipment to make beer, wine, cheese, and tea, as well as bottles, honey, herbs and spices, books, labels, kegging equipment and much more. Open 7 days a week.

West Boylston Homebrew Emporium

Causeway Mall, Rt. 12
West Boylston
(508) 835-3374
www.beerbrew.com
email: wbhe@beerbrew.com
The freshest supplies and equipment to make beer, wine, cheese and tea, as well as bottles, honey, herbs and spices, books, labels, kegging equipment and much more. Open 7 days a week. Since 1999.

The Witches Brew, Inc.

12 Maple Ave.
Foxborough 02035
(508) 543-0433
steve@thewitchesbrew.com
www.thewitchesbrew.com
You've Got the Notion, We've Got the Potion

MICHIGAN

Adventures in Homebrewing

6071 Jackson Rd.
Ann Arbor 48103
(313) 277-BREW (2739)
Michigan's Largest Supplier of Brewing Equipment & Ingredients
Visit us at: www.homebrewing.org

Adventures in Homebrewing

23869 Van Born Rd.
Taylor 48180
(313) 277-BREW (2739)
Full Line of Kegging Supplies!
Visit us at www.homebrewing.org

Bad Teacher Brewing Supply

"Those who can, BREW"
1331 S. Airport Rd.
Traverse City 49686
(231) 632-BREW (2739)
www.badteacherbrewing.com
Providing beer and wine making equipment and ingredients to beginners and experts alike by offering free classes, information and quality products.

Bell's General Store

355 E. Kalamazoo Ave.
Kalamazoo 49007
(269) 382-5712
www.bellsbeer.com
Visit us next door to Bell's Eccentric Café or online at www.bellsbeer.com

Brew Gadgets

Store: 328 S. Lincoln Ave.
Mail: PO Box 125
Lakeview 48850
Online: www.BrewGadgets.com
E-mail: edw@BrewGadgets.com
Call us toll free @ (866) 591-8247
Quality beer and wine making supplies. Secure online ordering and retail store. Great! Prices and personalized service.

Brewers Edge Homebrew Supply, LLC

650 Riley Street, Suite E
Holland 49424
(616) 399-0017
www.brewersedgehomebrew.com
email: brewersedge@gmail.com
Your Local Homebrewing & Winemaking Supply Shop...get the Edge!

Brewingworld

5919 Chicago Rd.
Warren 48092
(586) 264-2351
Microbrewery, Homebrewing & Winemaking Supplies
www.brewingworld.com
www.kbrewery.com

Cap 'n' Cork Homebrew Supplies

16776 - 21 Mile Road
Macomb Twp.
(586) 286-5202
fax: (586) 286-5133
info@capncorkhomebrew.com
www.capncorkhomebrew.com
Wyeast, White Labs, Hops & Bulk Grains!

Capital City Homebrew Supply

1824 E. Michigan Ave.
Lansing 48912
(517) 374-1070
www.capitalcityhomebrewsupply.com
info@capitalcityhomebrewsupply.com
A full service brewshop in the heart of Lansing. Let our 30 years of combined experience help you find the products and answers you need.

Eastern Shores Brewing Supplies

510 Pine Street
Port Huron 48060
(810) 985-3757
www.easternshoresbrewing.com
Your home-brew connection. Large selection of grains, hops, yeast and brewing and kegging equipment.

Mainstreet Brew Shoppe

307 Grand River Ave.
Howell 48843
(517) 376-6978
mainstreetbrewshoppe.com
Full service beer and wine making supply store in downtown Howell.

The Red Salamander

902 E. Saginaw Hwy.
Grand Ledge 48837
(517) 627-2012
www.theredsalamander.com
Check us out on Facebook!

Siciliano's Market

2840 Lake Michigan Dr. N.W.
Grand Rapids 49504
(616) 453-9674
fax: (616) 453-9687
e-mail: sici@sbcglobal.net
www.sicilianosmkt.com
The largest selection of beer and wine making supplies in west Michigan. Now selling beer & wine making supplies online.

MINNESOTA

Midwest Supplies, LLC

5825 Excelsior Blvd.
Minneapolis 55416
1-888-449-2739
www.MidwestSupplies.com
The Ultimate Resource for Homebrewing & Winemaking

Still-H₂O, Inc.

1266 West Frontage Road
Valley Ridge Mall
Stillwater 55082
(651) 351-2822
www.still-h2o.com
Our grains, hops and yeast are on a mission to make your beer better! Wine and soda making ingredients and supplies available too. Locally owned/Family operated.

MISSISSIPPI

Brew Ha Ha Homebrew Supply
4800 I-55 North Suite 17A
Jackson 39206
(601) 362-0201
mac@brewhahasupply.com
Brewhahasupply.com
Mississippi's 1st Homebrew Store entirely dedicated to homebrewing, winemaking and cheesemaking, located in LeFleur's Gallery Shopping Center.

MISSOURI

Bocomo Bay
1122 Wilkes Blvd.
Columbia 65201
(573) 443-0873
email: bocomobay@gmail.com
www.bocomobay.com
Your friendly local home brew shop located in the heart of College Town U.S.A. offering a full line of beer and wine making supplies.

Brewer's True Value Hardware
915 Jungermann Rd.
St. Peters 63376
(636) 477-7799
www3.truevalue.com/brewerstrue-value/
Supplies for the home brewer and home winemaker have landed at Brewer's True Value. Stop in or call today.

The Home Brewery
1967 W. Boat St. (P.O. Box 730)
Ozark 65721
1-800-321-BREW (2739)
brewery@homebrewery.com
www.homebrewery.com
Over 29 years of great products and great customer service. One Stop Shopping for all your Beer, Wine, Soda and Cheese Making Supplies.

St Louis Wine & Beermaking LLC
231 Lamp & Lantern Village
St. Louis 63017
(636) 230-8277
www.wineandbeermaking.com
Making the Buzz in St. Louis

NEBRASKA

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

Kirk's Do-It-Yourself Brew
1150 Cornhusker Hwy.
Lincoln 68521
(402) 476-7414 fax: (402) 476-9242
www.kirksbrew.com
e-mail: kirk@kirksbrew.com
Serving Beer and Winemakers since 1993!

NEVADA

U Bottle It
2230 West Horizon Ridge Pkwy., Suite 150
Henderson 89052
(702) 565-5040
info@ubottleit.com
www.ubottleit.com
Come on in and see Southern Nevada's largest homebrew store with a wide selection of beer & wine supplies. Like us on Facebook!
www.facebook.com/ubottleit

NEW HAMPSHIRE

A&G Homebrew Supply
165 High St.
Portsmouth 03801
(603) 767-8235
www.aghomebrewsupply.com
gretchen@aghomebrewsupply.com
Conveniently located in downtown Portsmouth. Affiliated nano-brewery/tasting room in same building. Great prices, expert advice, friendly service, classes. Free parking. Shop our online store.

Fermentation Station
72 Main St.
Meredith 03253
(603) 279-4028
badabingnh@yahoo.com
www.2ferment.net
The Lake Region's Largest Homebrew Supply Shop!

The HomeBrew Barn
861 Lafayette Rd. #6A
Hampton Beach 03842
(603) 601-2548
www.thehomebrewbarn.com
Home Brewing Made Simple... With all the equipment, supplies and most importantly the knowledge to make it happen. Classes available, visit our website for a schedule.

Kettle to Keg
123 Main Street
Pembroke 03275
(603) 485-2054
www.kettletokeg.com
NH's largest selection of homebrewing, winemaking, spirit and soda ingredients, supplies & equipment. Located conveniently between Concord and Manchester.

Smoke N Barley
485 Laconia Rd.
Tilton 03276
(603) 524-5004
fax: (603) 524-2854
SmokeNBarley.com
smokenbarley@metrocast.net
Receive 10% off your brewing supplies purchase with the purchase of Brew Your Own Magazine.

Yeastern Homebrew Supply
455 Central Ave.
Dover 03820
(603) 343-2956
www.yeasternhomebrewsupply.com
info@yeasternhomebrewsupply.com
Southeastern NH's source for all your homebrewing needs.

NEW JERSEY

The Brewer's Apprentice
856 Route 33
Freehold 07728
(732) 863-9411
www.brewapp.com
Online Homebrew Shopping.

Cask & Kettle Homebrew
904-B Main St.
Boonton 07005
(973) 917-4340
www.ckhomebrew.com
email: info@ckhomebrew.com
New Jersey's #1 place for the homebrew hobbyist. Brew at home, or Brew on premise

Corrado's Wine & Beer Making Center
600 Getty Ave.
Clifton 07011
(973) 340-0848
www.corradosmarket.com

love2brew
1583 Livingston Ave. Ste. #2
North Brunswick 08902
(888) 654-5511
www.love2brew.com
New Jersey's largest Homebrew Shop serving the nation. Free shipping on orders over \$75. Huge free knowledge base with new content posted daily. 2000+ Products that ship next day!

Tap It Homebrew Supply Shop

129 Philadelphia Ave.
Egg Harbor 08215
(609) 593-3697
www.tapithomebrew.com
contact@tapithomebrew.com
From beginners to experienced all-grain brewers, Southeastern NJ's only homebrew, wine & soda making supply shop!

NEW MEXICO

The Grain Hopper
4116 Jackie Rd., Suite 104
Rio Rancho 87124
www.thegrainhopper.com
Great service, excellent selection, fast shipping!

Southwest Grape & Grain
2801 Eubank NE, Suite N
Albuquerque 87112
(505) 332-BREW (2739)
www.southwestgrapeandgrain.com
For all your homebrew needs. Open 7 Days a Week.

Victor's Grape Arbor
2436 San Mateo Pl. N.E.
Albuquerque 87110
(505) 883-0000
fax: (505) 881-4230
www.victorsgrapearbor.com
email: victors@nmia.com
Serving your brewing needs since 1974. Call for a Free Catalog!

NEW YORK

American Homesteader
6167 State Hwy 12
Norwich 13815
(607) 334-9941
americanhomesteader@frontier.com
www.AmericanHomesteader.net
Very large line of beer and wine making supplies. We stock some of the more unusual supplies and equipment as well. We take phone mail orders. Please visit our online store. Hours are 10-6 Mon-Sat.

Brooklyn Homebrew
163 8th St.
Brooklyn 11215
(718) 369-0776
info@brooklyn-homebrew.com
www.BrooklynHomebrew.com
Stop buying dusty old ingredients! Our products are fresh! We carry a large selection of hops, malts, extract, yeast, spices & much more!

Brooklyn Kitchen
100 Frost St.
Brooklyn 11211
(718) 389-2982
homebrew@thebrooklynkitchen.com
www.thebrooklynkitchen.com
Stay thirsty bitches!

Doc's Homebrew Supplies

451 Court Street
Binghamton 13904
(607) 722-2476
www.docsbrew.com
Full-service beer & wine making shop serving NY's Southern Tier & PA's Northern Tier since 1991. Extensive line of kits, extracts, grains, supplies and equipment.

Homebrew Emporium

470 N. Greenbush Rd.
Rensselaer 12144
(800) 462-7397
www.beerbrew.com
email: heny@beerbrew.com
The largest homebrew store in NY has the freshest supplies and equipment to make beer, wine, cheese and tea, as well as bottles, honey, herbs and spices, books, labels, kegging equipment and much more. Open 7 days a week. Since 1988.

Homebrews and Handgrenades

2378 Grand Ave.
Baldwin 11510
(516) 223-9300
email: pete@brewgrenades.com
website: brewgrenades.com
Make the best beer you'll ever drink!

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

Pantano's Wine Grapes & Homebrew

249 Rte 32 South
New Paltz 12561
(845) 255-5201
(845) 706-5152 (cell)
www.pantanosbeerwine.com
pantanowineandbeer@yahoo.com
Find Us On Facebook.
Carrying a full line of homebrewing equipment & ingredients for all your brewing needs and Distilling Yeast. Here to serve Hudson Valley's homebrewers.

Party Creations

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

Saratoga Zymurgist

112 Excelsior Ave.
Saratoga Springs 12866
(518) 580-9785
email: oosb@verizon.net
www.SaratogaZ.com
Now serving Adirondack Park, lower Vermont and Saratoga Springs area with supplies for beer and wine making. "Home to all your fermentation needs"

NORTH CAROLINA

Alternative Beverage

1500 River Dr., Ste. 104
Belmont 28012
Advice Line: (704) 825-8400
Order Line: 1-800-365-2739
www.ebrew.com
37 years serving all home brewers' & winemakers' needs! Come visit for a real Homebrew Super Store experience!

American Brewmaster

3021-5 Stony Brook Dr.
Raleigh 27604
(919) 850-0095
www.americanbrewmaster.com
abrew@americanbrewmaster.com
Expert staff & friendly service. Your hub for homebrewing since 1983.

Asheville Brewers Supply

712-B Merrimon Ave
Asheville 28804
(828) 285-0515
www.ashevillebrewers.com
The South's Finest Since 1994!

Atlantic Brew Supply

3709 Neil St.
Raleigh 27607 (919) 400-9087
orders@atlanticbrewsupply.com
www.atlanticbrewsupply.com
All you need to make quality craft beer on a budget.

Beer & Wine Hobbies, Int'l

4450 South Blvd.
Charlotte 28209
Advice Line: (704) 825-8400
Order Line: 1-800-365-2739
www.ebrew.com
Large inventory, homebrewed beer making systems, quality equipment, fresh ingredients, expert advice, fast service and all at reasonable prices.

Beer & Wine Hobbies, Int'l

168-S Norman Station Blvd.
Mooresville 28117
Voice Line: (704) 527-2337
Fax Line: (704) 522-6427
www.ebrew.com
Large inventory, over 150 recipe packages, home brewing and wine making systems, quality equipment, fresh ingredients, expert advice, and reasonable prices.

The Fermentation Station

216 Henderson Dr.
Jacksonville 28540
(910) 455-7309
www.Fermentation-Station.com
Serving Home brewers and wine-makers from Wilmington to Morehead City since 1995. Expert advice, courteous service, great supplies and equipment at reasonable prices.

OHIO

The Brew Mentor

7295 Mentor Ave. Points East Plaza
Mentor 44060
440-951-BEER (2739)
www.thebrewmentor.com
Northeast Ohio's largest homebrew and wine making retail and online store. We offer expert advice, service, education and a complete line of high quality products.

The Grape and Granary

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

The Hops Shack

1687 Marion Rd.
Bucyrus 44820
(419) 617-7770
www.hopsshack.com
Your One-Stop Hops Shop!

Label Peelers Beer & Wine Making Supplies

137 East Ave., Suite 34
Tallmadge 44278
Toll Free: (877) 752-9997
(330) 677-1687 fax: (330) 678-6400
info@labelpeelers.com
www.labelpeelers.com
Specializing in winemaking / homebrew supplies & equipment. Free monthly classes.

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. Tasting Room now Open!

Miami Valley BrewTensils

2617 South Smithville Rd.
Dayton 45420
(937) 252-4724
www.brewtensils.com
email: darren@schwartzbeer.com
Next door to Belmont Party Supply. Redesigned online store @ www.brewtensils.com. All your beer, wine & cheese supplies.

Paradise Brewing Supplies

7766 Beechmont Ave.
Cincinnati
(513) 232-7271
www.paradisebrewingsupplies.com
The Brew Dogz Are Waiting to See You!

Shrivers Pharmacy

406 Brighton Blvd.
Zanesville 43701
1-800-845-0560 fax: (740) 452-1874
shriversbeerwinesupplies@yahoo.com
www.shriversbeerwinesupply.com
Large selection of beer & winemaking supplies.

Titgemeier's Inc.

701 Western Ave.
Toledo 43609
(419) 243-3731
fax: (419) 243-2097
e-mail: titgemeiers@hotmail.com
www.titgemeiers.com
An empty fermenter is a lost opportunity - Order Today!

Unicorn Wine Guild, LLC

1816 Washington Blvd.
Belpre 45714
(740) 423-1300
unicornwineguild@sbcglobal.net
www.unicornwineguild.com
Beer and Wine Making Supplies, Classes.

OKLAHOMA

The Brew Shop

3624 N. Pennsylvania Ave.
Oklahoma City 73112
(405) 528-5193
brewshop@juno.com
www.thebrewshopokc.com
Oklahoma City's premier supplier of home brewing and wine making supplies. Serving homebrewers for over 17 years! We ship nationwide.

High Gravity

7142 S. Memorial Drive
Tulsa 74133
(918) 461-2605
store@highgravitybrew.com
www.highgravitybrew.com
Turn it up to Eleven! Save money. Brew electric.

Learn to Brew, LLC

2307 South Interstate
35 Frontage Rd.
Moore 73160
(405) 793-BEER (2337)
info@learntobrew.com
www.learntobrew.com
Learn To Brew is run by a professionally trained brewer and offers a complete line of beer, wine, and draft dispense products and equipment and also offers beer and wine classes for all levels.

OREGON

Brew Brothers Homebrew Products, LLC
2020 NW Alolek Dr., Ste 107
Hillsboro (Aloha area) 97124
Toll-free: (888) 528-8443
info@brewbrothers.biz
www.brewbrothers.biz
*Pay less, brew more!
Huge selection of grain, anywhere. "Come join the family!!!"*

F.H. Steinbart Co.
234 SE 12th Ave
Portland 97214
(503) 232-8793
fax: (503) 238-1649
e-mail: info@fhsteinbart.com
www.fhsteinbart.com
Brewing and Wine making supplies since 1918!

Falling Sky Brewshop (formerly Valley Vintner & Brewer)
30 East 13th Ave.
Eugene 97401
(541) 484-3322
www.brewabeer.com
email: ordering@brewabeer.com
Oregon's premier, full-service homebrew shop, featuring unmatched selection of whole hops and organically grown ingredients.

Grains Beans & Things
820 Crater Lake Ave., Suite 113
Medford 97504
(541) 499-6777
www.grains-n-beans.com
email: sales@grains-n-beans.com
Largest homebrew and winemaking supplier in Southern Oregon. We feature Wine, Beer, Mead, Soda and Cheese making supplies and equipment. Home coffee roasting supplies and green coffee beans from around the world. Best of all - Great Customer Service!

Homebrew Exchange
6550 N. Interstate
Portland 97217
(503) 286-0343
info@homebrewexchange.net
www.homebrewexchange.net
New warehouse location, same great customer service. Check out our large selection of homebrew and DIY supplies.

The Hoppy Brewer
328 North Main
Gresham 97030
(503) 328-8474
thehoppybrewer@gmail.com
OregonsHoppyPlace.com
Homebrewing Supplies, Draft Equipment, Bottle Shop, Tap Room & Nanobrewery.

Let's Brew
8235 SE Stark St.
Portland 97216
(503) 256-0205 fax: (503) 256-0218
email: kim@letsbrew.net
www.letsbrew.net
Since 1996. Beer-Wine-Kegging supplies-Cheese kits. Brew on Premise - 5 & 12 gallon batches. Free beer samples that were brewed here!

Mainbrew
23596 NW Clara Lane
Hillsboro 97124
(503) 648-4254
www.mainbrew.com
Since 1991 providing excellent customer service and serving only top quality ingredients.

The Thyme Garden Herb Company
20546 Alsea Highway
Alsea 97324
1-800-487-8670
Visit us at: www.thymegarden.com
Email: herbs@thymegarden.com
Growing organic hop rhizomes and rooted cuttings for 24 years. Over 20 varieties of hop rhizomes, extra large and rooted rhizomes. Wholesale by phone only. Also dried cones and pellets.

PENNSYLVANIA

A&M Wine Supplies
415 S. Main Street
Washington 15301
(724) 222-WINE
email: amwinesupply@gmail.com
www.amwinesupplies.com
Located in downtown Washington, we have the equipment, ingredients, grains, extracts, kits, kegging systems and more to make beer. We also stock winemaking supplies. Make it. Drink it. Share it.

Beer Solutions
507 Blackman St.
Wilkes-Barre 18702
(570) 825-5509
email: sacz@ptd.net
www.beersolutionsinc.com
Complete line of supplies. We specialize in kegging equipment with kegs, parts & we fill CO₂ & Nitrogen tanks. 3 Blocks from Rt. I-81.

Country Wines
3333 Babcock Blvd., Suite 2
Pittsburgh 15237
(412) 366-0151 or
Orders toll free (866) 880-7404
www.countrywines.com
Manufacturer of Super Ferment® complete yeast nutrient/energizer, Yeast Bank®, and the Country Wines Acid test kit. Wholesale inquiries invited. Visit us or order online.

Homebrew4Less.com
890 Lincoln Way West (RT 30)
Chambersburg 17202
(717) 504-8534
www.Homebrew4Less.com
Full line of homebrew and wine supplies and equipment.

Keystone Homebrew Supply
126 E. 3rd St.
Bethlehem 18015
(610) 997-0911
infobeth@keystonehomebrew.com
www.keystonehomebrew.com
New location with expanded product selection & services for your beer & wine making needs.

Keystone Homebrew Supply
435 Doylestown Rd. (Rte. 202)
Montgomeryville 18936
(215) 855-0100
sales@keystonehomebrew.com
Where Homebrewing Dreams Come True
www.KeystoneHomebrew.com

Lancaster Homebrew
1944 Lincoln Highway E
Lancaster 17602
(717) 517-8785
www.lancasterhomebrew.com
info@lancasterhomebrew.com
Your source for all your beer brewing and wine making needs!

Porter House Brew Shop, LLC
1284 Perry Highway
Portersville 16051
(just north of Pittsburgh)
(724) 368-9771
www.porterhousebrewshop.com
Offering home-town customer service and quality products at a fair price. Large selection of home brewing, winemaking and kegging supplies. Now offering Winexpert Kits!

Ruffled Wine & Brewing Supplies
616 Allegheny River Blvd.
Oakmont 15139
(412) 828-7412
www.ruffledhomebrewing.com
Carrying a full line of quality kits, grains, hops, yeast & equipment. Also serving all your winemaking needs. Stop by or check us out online. Gift Cards Available!

Scotzin Brothers
65 N. Fifth St.
Lemoyne 17043
(717) 737-0483 or
1-800-791-1464
www.scotzinbros.com
Open 7 days! M-F 10am-6pm, Sat 10am-5pm, Sun Noon-5pm. Central PA's Largest IN-STORE Inventory!

Simply Homebrew
2 Honey Hole Rd.
(Corner of Rt 309 & Honey Hole Rd)
Drums 18222
(570) 788-2311
www.simplyhomebrew.com
email: simplyhomebrew@aol.com
Home Beer & Wine Making Supplies and Much More. Plus a complete line of kegging supplies & we fill CO₂. Come make your own Beer or Wine in our store!

South Hills Brewing - Greentree
2212 Noblestown Rd.
Pittsburgh 15205
(412) 937-0773
www.southhillsbrewing.com
Specialty grains available by the ounce on our new website. 3,000 square foot showroom with expanded line of beer equipment.

South Hills Brewing - Monroeville
2526 Moss Side Blvd.
Monroeville 15146
(412) 374-1240
www.southhillsbrewing.com
Located within minutes of Interstate 376, Rt 22, and the Pennsylvania Turnpike to serve our customers east of Pittsburgh. Visit us or order online.

Weak Knee Home Brew Supply
North End Shopping Center,
1300 N. Charlotte St.
Pottstown 19464
(610) 327-1450 fax: (610) 327-1451
www.weakkneehomebrew.com
BEER and WINE making supplies, varieties of HONEY; GRAPES & JUICES in season; KEGGERS, equipment & service; monthly classes and our unique TASTING BAR.

Wet Your Whistle
Corner of 12th & Walnut Sts.
1136 Federal Street
Lebanon 17042
(717) 274-2424
www.wetyourwhistle.net
cheryl@wetyourwhistle.net
*Find us on Facebook/Twitter
Providing excellent service seven days a week! Carrying a full line of beer and wine making ingredients and equipment.*

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! Call for directions, please don't follow your GPS or online directions.

**Wine Barley & Hops
Homebrew Supply**
248 Bustleton Pike
Feasterville 19053
(215) 322-4780
info@winebarleyandhops.com
www.winebarleyandhops.com
*Your source for premium beer &
wine making supplies, plus
knowledgeable advice.*

RHODE ISLAND

**Blackstone Valley
Brewing Supplies**
407 Park Ave.
Woonsocket
(401) 765-3830
www.blackstonevalleybrewing.com
*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
*Providing unmatched Value,
Service & Quality to you for over
45 years!*

Keg Cowboy
108 E. Main St.
Lexington 29072
(281) 772-2070
www.kegcowboy.com
*Covering all your draft and keg-
ging needs and wants. We also
now carry homebrew supplies,
CO₂ gas and organic ingredients.
Visit our website or stop by our
showroom in Lexington.*

SOUTH DAKOTA

**GoodSpirits Fine
Wine & Liquor**
3300 S. Minnesota Ave.
Sioux Falls 57105
(605) 339-1500
www.gsfcw.com
*Largest selection in South Dakota
for the home brewer and wine-
maker. We are located in the
Taylor's Pantry Building on the
corner of 41st & Minnesota Ave.*

TENNESSEE

**All Seasons Gardening
& Brewing Supply**
924 8th Ave. South
Nashville 37203
1-800-790-2188
fax: (615) 214-5468
local: (615) 214-5465
www.allseasonsnashville.com
*Visit Our Store or Shop Online.
Nashville's Largest Homebrew
Supplier!*

TEXAS

**Austin Homebrew
Supply**
9129 Metric Blvd.
Austin 78758
1-800-890-BREW or (512) 300-BREW
www.austinhomewbrew.com
Huge online catalog!

**Black Hawk
Brewing Supply**
582 E. Central Texas Expressway
Harker Heights 76548
(254) 393-0491
www.blackhawkbrewing.com
blackhawkbrewing@hotmail.com
*Your homebrewing headquarters
in the Ft. Hood area. Supplies to
make beer, wine, cheese, cider &
mead. Also great gifts & T-shirts.
Find us on Facebook!*

**Dallas Home Brew a
division of The Wine
Maker's Toy Store**
1500 North Interstate 35E, Ste 116
Carrollton 75006
(866) 417-1114
www.finevinewines.com
*Dallas' largest home brew supply
store.*

**DeFalco's Home Wine
and Beer Supplies**
9223 Stella Link
Houston 77025
(713) 668-9440 fax: (713) 668-8856
www.defalcos.com
Check us out on-line!

Home Brew Party
15150 Nacogdoches Rd., Ste 130
San Antonio 78247
(210) 650-9070
info@homebrewparty.com
www.homebrewparty.com
*Beer and wine making classes
and supplies.*

Home Brew Party
8407 Bandera Rd., Ste 103
San Antonio 78250
(210) 520-2282
info@homebrewparty.com
www.homebrewparty.com
*Beer, wine and cheese making
supplies.*

**Homebrew
Headquarters**
300 N. Coit Rd., Suite 134
Richardson 75080
(972) 234-4411 or 1-800-966-4144
www.homebrewhq.com
*Proudly serving the Dallas area
for 30+ years!*

Pappy's HomeBrew
3334 Old Goliad Rd.
Victoria 77905
(361) 576-1077
www.PappysHomebrew.com
Register for Monthly Drawing.

**Stubby's Texas
Brewing Inc.**
5200 Airport Freeway, Ste. B
Haltom City 76117
(682) 647-1267
www.texasbrewinginc.com
info@texasbrewinginc.com
*Your local home brew store with
on-line store prices.*

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"™

Salt City Brew Supply
750 E. Fort Union Blvd.
Midvale 84047
(801) 849-0955
www.saltcitybrewsupply.com
*Salt Lake valley's newest Home
Brew Supply Store that feels like
it has been around for genera-
tions.*

VERMONT

Brewfest Beverage Co.
199 Main St.
Ludlow 05149
(802) 228-4261
www.brewfestbeverage.com
*Supplying equipment & ingredi-
ents for all your homebrewing
needs. Largest selection of craft
beer in the area. Growlers poured
daily! "We're hoppy to serve
you!"*

South Royalton Market
222 Chelsea St.
South Royalton 05068
(802) 763-2400
www.soromarket.com
*Serving all levels of brewers from
beginner to expert. Best selection
of ingredients, equipment and
advice in the Upper Valley, and
home of The Guru!*

VIRGINIA

**Blue Ridge
Hydroponics & Home
Brewing Co.**
5327 D Williamson Rd.
Roanoke 24012
(540) 265-2483
www.blueridgehydroponics.com
*Hours: Mon-Sat 11am - 6pm and
Sunday 10am - 2pm.*

HomeBrewUSA
96 West Mercury Blvd.
Hampton 23669
(757) 788-8001
www.homebrewusa.com
*Largest Selection of Beer & Wine
Making Supplies & Equipment in
Southeastern Virginia!*

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

Jay's Brewing Supplies
9790 Center St.
Manassas 20110
(703) 543-2663
www.jaysbrewing.com
email: info@jaysbrewing.com
*No matter if you're a novice or
advanced brewer, we have what
you need. Setting the standard
for brewing supplies & ingredi-
ents at competitive prices.*

**myLHBS (myLocal
HomeBrew Shop)**
6201 Leesburg Pike #3
Falls Church
(703) 241-3874
www.myLHBS.com
*All the basics plus unique and
hard-to-find Belgian and other
specialty ingredients.*

Original Gravity
6920 Lakeside Ave. Suite D
Richmond 23228
(804) 264-4808
www.oggravity.com
*Supplying bottles and corks to
malted grains and hops for the
brewing process, we work hard to
bring you quality supplies so you
can make a quality product.*

**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!*

**Wine and Cake
Hobbies, Inc.**
6527 Tidewater Drive
Norfolk 23509
(757) 857-0245
fax: (757) 857-4743
mail@wineandcake.com
www.wineandcake.com
*Hampton Road's original wine &
beer making supplier since 1973.
Extensive selection of Kegging &
all-grain equipment. We carry
over 85 varieties of grains and 50
styles of hops.*

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
www.thebeeressentials.com
Mail order and secure on-line ordering available. Complete line of brewing and kegging supplies.

The Cellar Homebrew

Make your own beer & wine
14320 Greenwood Ave. N.
Seattle 98133
1-800-342-1871
FAST Reliable Service, 40 Years! Secure ordering online www.cellar-homebrew.com

Homebrew Heaven

9121 Evergreen Way
Everett 98204
1-800-850-BREW (2739)
fax: (425) 290-8336
info@homebrewheaven.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

8530 122nd Ave. NE, B-2
Kirkland 98033
(425) 803-3996
info@mountainhomebrew.com
www.mountainhomebrew.com
The Northwest's premier home brewing & winemaking store!

Northwest Brewers Supply

940 Spruce St.
Burlington 98233
(800) 460-7095
www.nwbrewers.com
All Your Brewing Needs Since 1987

Sound Homebrew Supply

6505 5th Place S.
Seattle 98108
(855) 407-4156
info@soundhomebrew.com
soundhomebrew.com
Knowledgeable Staff. Great Selection.

WISCONSIN

Brew & Grow (Madison)

1525 Williamson St.
Madison 53703
(608) 226-8910
www.brewandgrow.com
Your complete one stop shop for all your brewing and winemaking needs.

Brew & Grow (Waukesha)

2246 Bluemound Rd.
Waukesha 53186
(262) 717-0666
www.brewandgrow.com
Your complete one stop shop for all your brewing and winemaking needs.

Farmhouse Brewing Supply

3000 Milton Ave.
Janesville 53545
(608) 305-HOPS
farmhousebrewingsupply@gmail.com
Farmhousebrewingsupply.com
Conveniently located minutes off of I-90 and offering Southern Wisconsin's largest selection of hops.

Homebrew Market

1326 North Meade St.
Appleton 54911
1-800-261-BEER
www.homebrewmarket.com
Beer, wine, soda and cheese making retail supply store. Unlike online stores, questions answered in person by knowledgeable staff.

House of Homebrew

410 Dousman St.
Green Bay 54303
(920) 435-1007
staff@houseofhomebrew.com
www.houseofhomebrew.com
Beer, Wine, Cider, Mead, Soda, Coffee, Tea, Cheese Making.

Point Brew Supply & O'so Brewing Co.

3038 Village Park Dr.
I-39/Exit 153
Plover 54467
(715) 342-9535
marc@pointbrewsupply.com
www.pointbrewsupply.com
www.osobrewing.com
"The Feel Good Store with a team of Professional Brewers on Staff"

The Purple Foot

3167 South 92nd St.
Milwaukee 53227
(414) 327-2130 fax: (414) 327-6682
wineandbeer@purplefootusa.com
www.purplefootusa.com
Top quality wine and beer supply - Call for a FREE catalog!

RiteBrew.com

1700 Lamers Dr.
Little Chute 54140
(920) 687-2533
fax: (920) 788-2096
email: sales@ritebrew.com
RiteBrew.com
Quality Homebrewing Supplies at Wholesale Prices!

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
wineandhop@gmail.com
Madison's locally-owned homebrewing and winemaking headquarters. Offering fresh ingredients, quality supplies, and expert advice for over 40 years.

WYOMING

Big Horn Basin Brew Supply

728 Big Horn Ave.
Worland 82401
(307) 347-BREW (2739)
www.facebook.com/brewsupply
BREW WHAT YOU DRINK!

Doctor Fermento's Beer & Wine Supplies

122 East Midwest Ave.
Casper 82601
(307) 472-0481
Find Us on Facebook!
doctorfermento@gmail.com
A full service shop which sells ingredients, supplies, and books for everyone from the beginning home beermaker, winemaker, and cheesemaker to the expert.

AUSTRALIA

QUEENSLAND

National Home Brew

Shop 2, "The Precinct"
92 Beach Rd.
PIALBA 4655
(07) 4128 2033
www.nationalhomebrew.com.au
Re-designed website coming soon! With over 1,200 items to choose from and growing rapidly, we are Australia's must see retail store for all your homebrewing needs and wants!

VICTORIA

Grain and Grape Pty LTD.

5/280 Whitehall St.
Yarraville 3013
(03) 9687 0061
www.grainandgrape.com.au
Equipment, ingredients and advice for the beginner & expert. Full mail order service.

W. AUSTRALIA

Brewmart Brewing Supplies

21 John Street
Bayswater 6053
618 9370 2484
fax: 618 9370 3101
email: info@brewmart.com.au
www.brewmart.com.au
Wholesale and Retail distributors for Barrels and Kegs, Better Bottle, Bintani, BrewCellar, Coopers, Edwards Essences, Fermtech, Krome Dispense, Pure Distilling, Samuel Willards, The Beverage Food Company.

CANADA

ALBERTA

The Vineyard Fermentation Centre

6025 Centre Street South
Calgary T2H 0C2
(403) 258-1580
www.TheVineYard.ca
*Authorized Blichmann Dealer
Authorized Winexpert Dealer
Alberta's one stop equipment and brewing ingredients store.*

BRITISH COLUMBIA

Bosagrape Winery & Beer Supplies

6908 Palm Ave.
Burnaby V5E 4E5
(604) 473-9463
www.bosagrape.com
Not only for wineries! Best selection of Beer & Wine Making Ingredients, Supplies & Equipment.

Hop Dawgs Homebrewing Supplies

Vernon
(250) 275-4911
www.hopdawgs.ca
Fast mail order service for, Brewing Equipment, Kegging Equipment, Malts, Hops, Yeasts.

ONTARIO

Beer Grains Supply Co.

8 Frontenac Crescent
Deep River K0J 1P0
(888) 675-6407
www.beergrains.com
info@beergrains.com
We connect Canadian home brewers with fresh brewing ingredients and home brewing supplies. Count on us to support you and your passion for brewing.

The Brewmonger

383 Merritt St.
St. Catharines L2P 1P7
(289) 362-0330
www.thebrewmonger.ca
Niagara's beer brewing specialists. Grains, hops, yeast, starter kits and equipment.

Canadian Homebrew Supplies

10 Wilkinson Rd., Unit 1
Brampton L6T 5B1
(905) 450-0191
chs-store@bellnet.ca
www.homebrewsupplies.ca
Drink a Beer, Waste an Hour.
Brew a Beer, Waste a Lifetime!
For all your homebrew supply needs and wants.

Clear Valley Hops

Nottawa
Canada's largest hops plantation at the base of the Blue Mountains. 18 varieties vacuum sealed and nitrogen flushed. Available online. www.clearvalleyhops.com

CHINA

My Homebrew Store, Shanghai

4028 Long Dong Ave., #145
Pudong 201201
+86-158-2111-3870
mike@myhomebrewstore.cn
Everything for Beer and Wine.
The most complete line of ingredients and equipment in China.
Email for catalogue via return email.

GERMANY

Hopfen und mehr

Rudenweiler 16
Tett nang 88069
(+49) 7543 500051
fax: (+49) 7543 500052
info@hopfen-und-mehr.de
www.hopfen-und-mehr.de
Everything for home and hobby brewers. Great selection, fast shipping.
Alles für Haus-und Hobbybrauer.
Grosse Auswahl, schneller Versand.

NEW ZEALAND

BrewShop

www.brewshop.co.nz
sales@brewshop.co.nz
(07) 929 4547
Online homebrew beer supplies

NORWAY

Bryggeland AS

Gjerdumsgata 20
Lillestrøm
Tel: (+47) 63 80 38 00
www.Bryggeland.no
Alt man trenger for å lage øl.
"Fra råvare til nytelse"
Butikker i Oslo, Drammen og Lillestrøm.

Petit Agentur AS

7977 Hoylandet
Phone: (0047) 7432-1400
Web: petit-agentur.no
Mail: post@petit-agentur.no
Home made beer made fun!
Your best source for everything you need to brew your own Beer.

SWEDEN

Humlegårdens Ekolager AB

Fabriksvägen 5 B
SE-18632 Vallentuna
(+46) 8 514 501 20
fax: (+46) 8 514 501 21
Email: info@humle.se
Website: shop.humle.se
50+ book titles, 50+ malt types, 60+ hop varieties, 100+ yeast strains. Fast order handling and shipping to 25 countries in Europe.

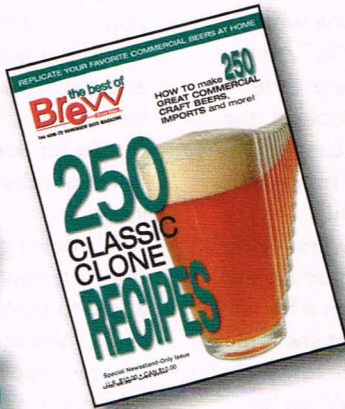


250 CLONE RECIPES IN ONE GREAT SPECIAL ISSUE!

FEATURES
132 pages of
recipes & know-how
to brew 250 commercial
craft and import beers

the best of
Brew
THE HOW-TO HOMEBREW BEER MAGAZINE

250
CLASSIC
CLONE
RECIPES



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

- Intro on how to clone brew commercial beers
- 250 recipes provided for all-grain and extract brewers - includes 150 recipes from the now out-of-print "150 Classic Clone Recipes" plus 100 more clone recipes!
- Cross indexed so you can easily find your favorite recipes by brewery or style

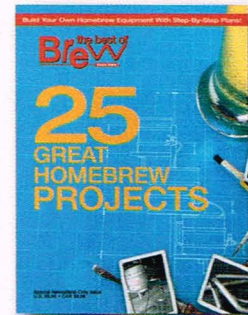
At just \$10.00 (\$10.00 CAN) retail, you won't find a more valuable recipe collection to brew beers like the pros make!

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 250 Classic Clone Recipes issue in your shop

25 GREAT HOMEBREW PROJECTS

in one great special issue!
25 project plans included



ORDER
YOURS
TODAY!

The Ultimate Do-It-Yourself guide for homebrewers!
Includes the best projects stories to run in BYO magazine over the past 16 years! All projects include a parts & tools list as well as detailed instructions on the build and pictures to help guide you through the project. All this for just \$9.99 retail!

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

* Attention homebrew supply shop owners — call us today at 802-362-3981 to discuss volume discounts to resell the BYO 25 Great Homebrew Projects issue in your shop



last call
by Betsy Parks

Top Honors

Meet the 2013 Homebrewer of the Year

“I don’t think about brewing being a female, and I never think about it in terms of race. I’m just a homebrewer — I’m just a home cook.”



Photo Courtesy of Annie Johnson

The 2013 Homebrewer of the Year is unique in a lot of ways. For starters, Sacramento, California’s Annie Johnson is the first woman to win the American Homebrewing Association’s coveted award since 1983. She’s also African American — the first to ever win in the history of the competition. And she won with a light American lager. That’s right — the same beer style that, as a beer magazine editor, I hear reviled by beer snobs day in and day out. Are you listening IPA?

But of course it’s not just the style of beer that makes AHA judges stand up and take notice — it’s how well the beer is made. And Annie delivered the goods, winning in the light lager category and earning more points than any of the other winning beers in the other 25 categories to make Best of Show — which is the criteria for winning Homebrewer of the Year.

Annie started homebrewing around 1999 because she always loved beer. She was born in Germany and was fascinated by her mother’s collection of German beer steins as a girl.

“My mom was the one who encouraged me to go for it,” Annie said about learning to brew. After becoming interested in cooking, she developed an interest in beer and wine, which is when her mom said, “You can make your own!”

Like many homebrewers, Annie’s first batch came from a beer kit she received as a present from a friend. It wasn’t long after that that she and her friend would get together to watch football and brew beer. When her friend moved to Delaware, that was almost the end of the line — but about a month later all of the homebrewing equipment that had moved to Delaware showed up on Annie’s doorstep . . . along with a case of Dogfish Head beer.

In 2001 she entered her first homebrew competition in the

California State Fair and won first place for an American amber.

“That was when I got to the point where not only was I making good beer, but I got that competition bug,” she said. Along with entering competitions, she also became a Beer Judge Certification Program judge, which further broadened her palate for different beer styles. She brews what she likes, mostly lagers, Belgian styles and porters, based on the season.

“I love Belgian beers. I took two years of my homebrewing and just devoted it to Belgian beers,” she said. “I did all the reading and went through the different styles — took my time. It was fun — there was so much to do.”

Her advice for brewing award-winning beer is simple: read up on the style, follow recipe directions, and wait until the end of the brew day to have a homebrew.

“I never drink when I homebrew,” she said. “You’re more apt to make a mistake. You don’t pay attention. Sometimes you’re having a good time drinking a beer and then you’re too tired to cool down your carboy. Or you don’t take a reading. Little things like that. I wait until I pitch the yeast and start cleaning up before I have a beer. It is so much more satisfying.”

As for her big win being inspirational to other brewers, Annie takes it in stride.

“I didn’t go into it to be an inspiration, but now that I won I have been asked to speak to lots of homebrew clubs,” she said. “I’m finding out that it is inspirational to many other female brewers. I don’t think about brewing being a female, and I never think about it in terms of race. I’m just a homebrewer — I’m just a home cook.”

To brew Annie’s winning American light lager (a recipe she made based on a *Brew Your Own* recipe of the same name), visit <http://byo.com/story2850> 

MIDWEST SUPPLIES

HOME BREWING & WINEMAKING

MICRO BRU

HOME BREW KIT

SMALL SCALE
BREWING AT
ITS FINEST!



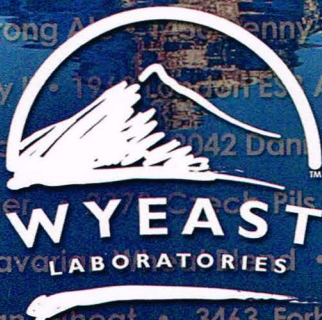
MidwestSupplies.com

888.449.BREW (2739)

Wyeast Culture Collection

Pure Liquid Yeast

1007 German Ale • 1010 American Wheat • 1028 London Ale • 1056 American Ale® • 1084 Irish Ale • 1098 British Ale • 1099 Whitbread Ale • 1187 Ringwood Ale • 1214 Belgian Abbey • 1272 American Ale II • 1275 Thames Valley Ale • 1343 London Ale III • 1332 Northwest Ale • 1335 British Ale II • 1388 Belgian Strong Ale • 1469 West Yorkshire Ale • 1728 Scottish Ale • 1762 Belgian Abbey • 1942 Danish Lager • 2000 Budvar Lager • 2001 Urquell Lager • 2007 Pilsen Lager • 2035 American Lager • 2042 Danish Lager • 2112 California Lager • 2124 Bohemian Lager • 2206 Bavarian Lager • 2308 Munich Lager • 2565 Kolsch • 2633 Oktoberfest Lager Blend • 3056 Bavarian Lager • 3068 Weihestephan Weizen • 3278 Belgian Lambic Blend • 3333 German Wheat • 3463 Forbidden Fruit • 3522 Belgian Ardennes • 3638 Bavarian Wheat • 3711 French Saison • 3724 Belgian Saison • 3763 Roeselare Ale Blend • 3787 Trappist High Gravity • 3942 Belgian Wheat • 3944 Belgian Witbier • 5112 Brettanomyces bruxellensis • 5335 Lactobacillus • 5526 Brettanomyces lambicus • 5733 Pediococcus



Private Collection

Available July through September 2013

1026-PC British Cask • 3725-PC Bier de Garde • 3822-PC Belgian Dark Ale

www.wyeastlab.com

© 2013 Wyeast Laboratories Inc.