Brew Your Own®

OCTOBER 2002, VOL.8, NO.6

THE HOW-TO HOMEBREW BEER MAGAZINE

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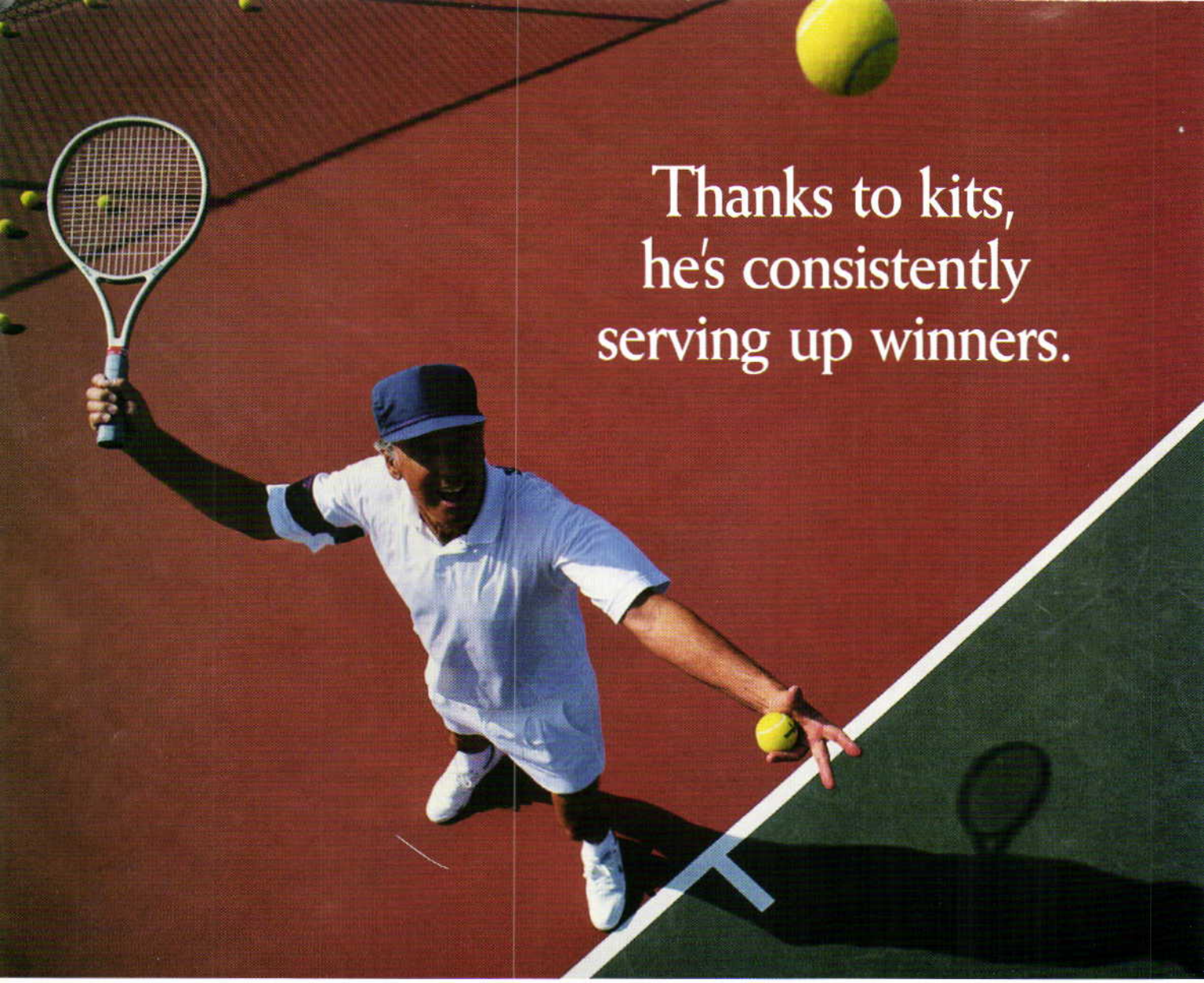

"It tasted just as good - if not better - than many a pint I've drunk in London pubs."

Richard Neill
'Weekend Telegraph' (April 99)

"I wouldn't have believed that a kit beer could be so good"

Roy Bailey - Beer Correspondent
CAMRA's 'What's Brewing' magazine (April 2000)

"It resulted in as good a home-made beer as I have ever tasted"

Maximum 5-point rating in kit review
'Bizarre' magazine (September 99)

This man is a dedicated brewer. But he also loves to play tennis.

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Since switching to kits our man's game has gone from strength to strength. With Premium Gold, he's still proudly brewing beers that taste easily as good as his full mash brews. But Premium Gold saves on time, cost, grief and inconsistent results.

If you've been a slave to full grain mashing, don't be! Serve up a winner every time with Premium Gold, from Muntons.

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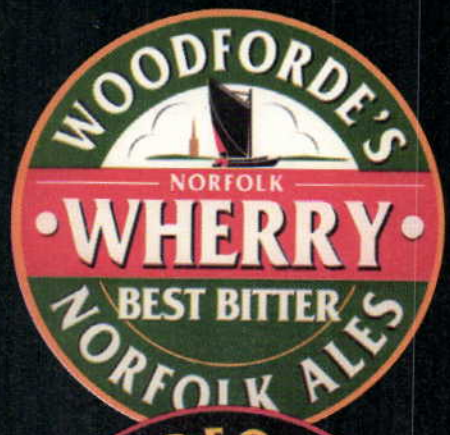

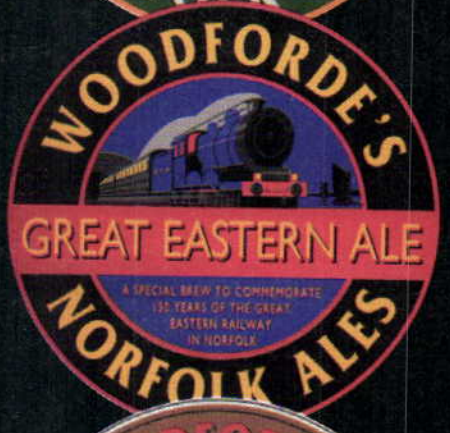

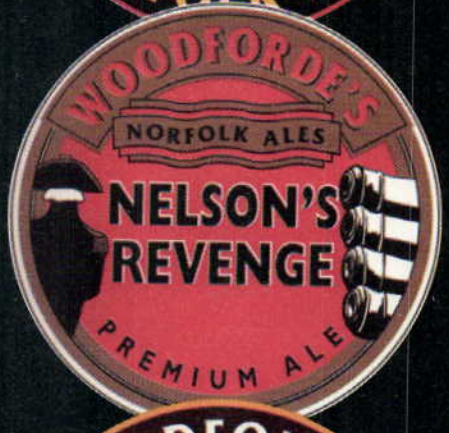

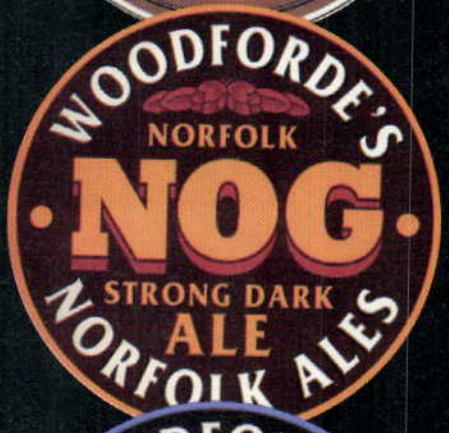

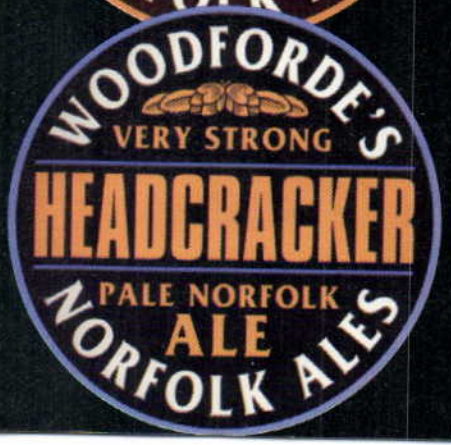

New!
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Carefully formulated by Woodfordes Brewery and Muntons, this range of beerkits brings you a taste which is so close to the original even expert brewers cannot tell them apart.

OCTOBER Volume 8 Number 6

Departments

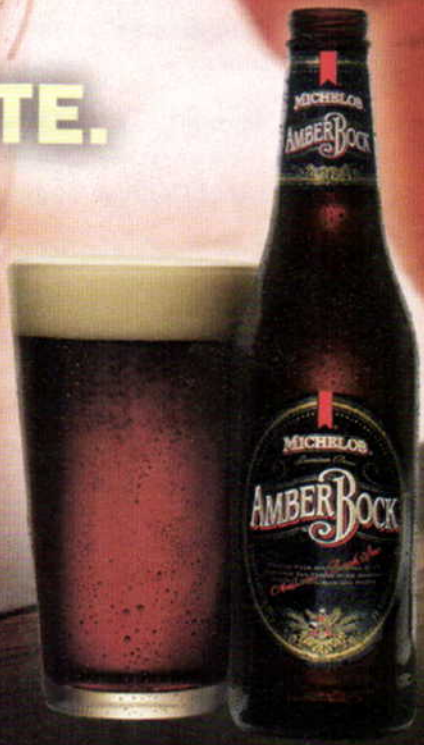
Features

Where to find it

COVER PHOTOGRAPHY: *Charles A. Parker*

RICH IN COLOR.

SMOOTH IN TASTE.



Introducing the specialty beer whose specialty is smoothness. Imported hops and two-row barley give AmberBock from Michelob a rich, full flavor that goes down easy. It's a premium beer that actually tastes as good as it looks.

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Special Subscription Offer
8 issues for $24.95

Web Site
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Brew Your Own (ISSN 1081-826X) is published monthly except February, April, June and August for $24.95 per year by Battenkill Communications, 5053 Main Street, Suite A, Manchester Center, VT 05255; tel: (802) 362-3981; fax: (802) 362-2377; e-mail: BYO@byo.com. Periodicals postage rate paid at Manchester Center, VT and additional mailing offices. Canada Post International Publications Mail Product Sales Agreement No. 1250469. Canadian Mail Distributor information: Express Messenger International, P.O. Box 25058, London BC, Ontario, Canada N6C6A8. POSTMASTER: Send address changes to *Brew Your Own*, P.O. Box 469121, Escondido, CA 92046-9121. Customer Service: For subscription orders call 1-800-900-7594. For subscription inquiries or address changes, write *Brew Your Own*, P.O. Box 469121, Escondido, CA 92046-9121. Tel: (800) 900-7594. Fax: (760) 738-4805. Foreign and Canadian orders must be payable in U.S. dollars plus postage. The subscription rate to Canada and Mexico is $30; for all other countries the subscription rate is $40.

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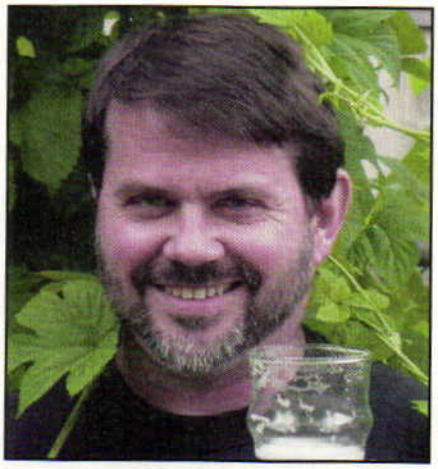
Volume 8, Number 6: October 2002

Steve Bader grew up in the "serious beer-drinking town" of New Leipzig, North Dakota. This rural, wheat-farming community stays true to its German heritage and even hosts its own version of Munich's Oktoberfest.

Steve began homebrewing in 1989 when he received Charlie Papazian's "The Complete Joy of Homebrewing" as a Christmas gift. He began teaching homebrew classes in 1990 and has taught several hundred sessions in the last 12 years. In 1992, Steve opened his own homebrew shop, Bader Beer and Wine, in the Portland suburb of Vancouver, Washington. He has a thick file of "cloned" beer recipes in his shop's files, and he adds to the stack each month when he writes the "Replicator" column for *BYO*.

On page 40 of this issue, Steve describes an innovative method of malt-extract homebrewing that has proven successful in his shop. His new method involves boiling the hops but not boiling the malt extract. This allows extract brewers to brew lighter-colored beers with more hop bitterness than standard techniques allow.

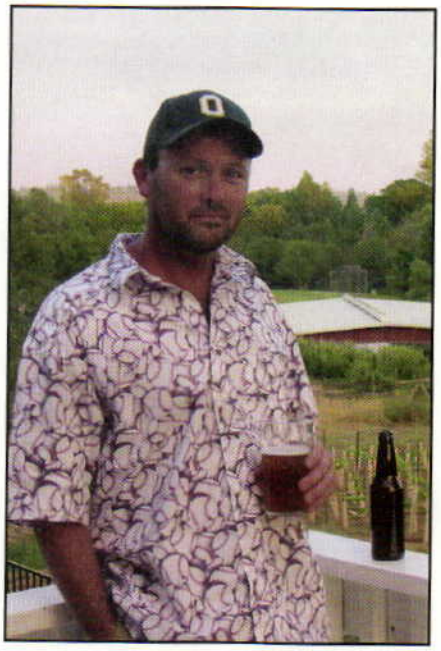


Mark Henry has been an avid homebrewer since 1985. In that time he has gone through the various homebrewing phases, from "novice without a clue," to "intermediate brewer without a clue about how to use hops in moderation," to expert all-grain guy. He then went full circle, trying to brew a quick batch of extract beer during the free moments of the weekend that wife Kimberly and their two girls would allow him.

In 1992, he founded Evergreen Brewing Supply. During 1994, he and a group of customers started the Cascade Brewers Guild and held the first annual St. Patrick's Day Homebrew Competition in Seattle. In 1999, he sold Evergreen to concentrate on his responsibilities as the co-owner of Cascadia Importers, the North American importer for Coopers. He has written numerous articles for *BYO*.

Mark's most memorable experience with homebrewing was his very first. "I brewed my first batch of beer when I was living with a bunch of college buddies. I brewed on Saturday, bottled on Friday and went away for the weekend. Big mistake. When I got back my pals had drunk all the beer. Their response? Well, it didn't taste very good and it was flat — but they went ahead and drank it all anyway!"

In his continuing quest to brew any style of beer as quickly and easily as possible, Mark shares his insights on supplementing extract beers with a partial mash on page 35.



Anita Johnson lives in Indianapolis, Indiana with her husband Jim, two boys and a dog. Anita and Jim started brewing about 10 years ago when Anita's co-worker poured them a pint of homebrew from his kegerator. "We tasted the homebrew and exclaimed, 'Wow, you made this?'" Anita says. "We were hooked. Brewing became a passion for both of us."

Having passed through the high-alcohol, high-bitterness stage of brewing, her current quest is lower-alcohol beers with lots of flavor, such as Kölsch, Classic American Pilsners and pale ales. Anita brews both extract and all-grain recipes on a three-tiered converted keg system. Her basement laundry room was converted into the brewery, complete with a custom-made copper exhaust hood, bathroom and kegerator. Her favorite tools are a Jet Carboy washer hard-plumbed into her water line and her siphon starter.

On page 38, Anita shares her insights into brewing light-colored beers with malt extract. She developed the recipes at Great Fermentations, her homebrew shop. ■

RECIPE INDEX

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Mail

The Fining Print

On the "Mail" page of your September 2002 issue, Colin Kaminski says, " . . . cask-conditioned ales usually omit fining agents." In the United States, some of the so-called "cask-conditioned" ales are actually pre-carbonated (and often filtered) beers that are simply served with a beer engine or exposed to air during dispensing. These beers, which need no finings, are different than typical kegged beer but are not cask-conditioned in the traditional sense. British cask-conditioned ales almost always have some finings added — along with sugar, yeast and sometimes hops — before being sent to the pubs. Since cask-conditioned ale is a "living" beer, the finings are needed to clarify the beer at the pub.

Lynne O'Connor
Austin, Texas

There are traditional cask-conditioned ales and there are ales that just happen to be conditioned in bottles, kegs or casks. Colin was referring to the latter, a common packaging option among homebrewers. We should have drawn this distinction.

Clearing up a Filter Detail

In Colin Kaminski's article, "How Clear is Your Beer" *(July-August)*, you show a picture of an in-line filter connected to your CO_2 system. Is this just an "under the sink" water purification system that you would buy at WalMart or is it specifically designed for beer?

Phil Sande
via email

Kaminski replies: "The filter housing is the same as one you might see for filtering water. It is a standard 10" housing, which means it holds a 10" filter. The filters are spun polypropylene. They're often sold as 'sediment filters' and are graded by particle size. Note: When filtering beer, it is important to not use a charcoal water-filter element inside the housing."

120, 220 . . . Whatever it Takes

I have been building a RIMS system using the "Cordon Brew" system as described in the December 2001 issue. I need some information on powering the device. Are you using regular 120 household current? Did you have to run a separate circuit? I heard from someone that this system requires its own 220 or 240 circuit.

Matt Grubb
Owosso, Michigan

Author Thom Cannell responds: "The 'Cordon Brew' system is designed for British mash tuns, so it 'requires' 240. That said, I wired the inlet for 120V AC — standard house current. In future, I will run 240V to the system for better heat input. But for now, setting the dimmer switch midway seems to produce 153° F in short order."

Tastes Great, Less Flatulence

Didn't you publish an article recently, or maybe not so recently, about brewing a "lite" beer?

Doug Brown
Blaine, Washington

The March 2001 issue of BYO featured an article by Ashton Lewis called "Beano Brew." In it, he described how to make low-carbohydrate beers using the enzymes found in Beano tablets.

The Makings of Munich Malt

I wish to know if Munich malt is made with six-row barley.

Pedro Giménez
La Pampa, Argentina

Six-row barley is only grown in the United States, although maltsters elsewhere may import it. In American lagers, the high protein content of six-row malt is counterbalanced by low-protein adjuncts such as corn and rice.

Munich malt made in Europe is made from two-row barley. Munich malts and other special malts made in the U.S. are frequently made from six-row malt. Briess, a malting company from Wisconsin, actually labels their specialty malts that are made from two-row. This way, customers can make an informed decision about what type of malt they're buying. ■

homebrew club

The Members of Barleyment • Ottawa, Ontario

It all started with a message to a local homebrewing e-mail list: "Guys, anyone want to get together and brew some beer for a wedding?"

For several years, Ottawa homebrewer Alan McKay had maintained a small e-mail list to allow local homebrewers to keep in touch. It was never very active — a few messages a month, usually in the fall, when one brewer would make the trip to Montreal to buy bulk malt, and a few others would pitch in to buy a sack or two.

And then in the winter of 2002 something interesting happened. A few new brewers started joining the list. And then a few more. And then still more — and the messages started becoming more frequent as the list reached critical mass. The list allowed brewers from around the Ottawa metro region — including the suburbs of Almonte, Gatineau/Hull, Ashton and Merrickville — to share ideas, local sources for equipment and ingredients, and plan group purchases. And even a few "outlyers," brewers from Montreal, Winnipeg and Fredericton, joined up. Now more than a dozen posts a day flew across the e-mail list, and some days it had more content than the *Home Brew Digest*.

John Scime's request for help brewing beer for his friend's wedding turned into our first big event. Eleven local brewers showed up early Saturday morning in Alan's backyard and brewed 45 gallons of homebrew on three systems — the first all-grain experience for some brewers, and the first "club event" for us all. We named our local brew "Big StrangeBrew" after the event's sponsor (StrangeBrew recipe-formulation software, developed by Merrickville homebrewer Drew Avis). The event inspired at least three extract brewers to try their hand at all-grain brewing, which meant there was a need for new equipment...

Patrick Brochu impressed us all with his homemade digital temperature probe — a device that allows his PalmPilot to record the temperature readings of a mash. He soon impressed us even more with his counterflow chiller design, affectionately named the "ChillyWilly." This made for a perfect excuse for our second club event, a group chiller-building party that resulted in three more "Willies" for club members to take home.

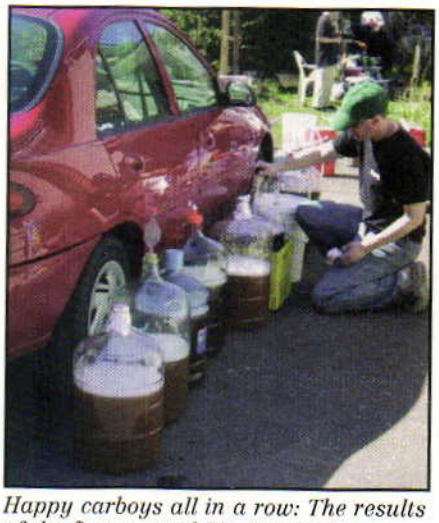
Soon after, John Scime hosted a "Big Strange Keg Conversion" work party, where several members converted stainless Sankey kegs for use as brewing vessels. All this new equipment means that there will be many systems up and running at our fall big brew — Big StrangeBrew II.

At one point we decided we needed a catchy name, as "Ottawa Brewers" was getting tedious, and didn't reflect the fact that at least half of the members were from outside Ottawa proper. A large number of possible names were debated on the list, and narrowed down to "Members of Barleyment (MOB)" and the "Hull/Ottawa Zymurgic Enterprises and Research Society" (HOZERS). After a close vote, Members of Barleyment won out. (Ottawa is also home to Canada's federal politicians, who named themselves the Members of Parliament in deference to our homebrew club).

While we're not a traditional club with monthly meetings, we have a format that seems to suit the geographically diverse nature of the club. Those working in Ottawa get together for an occasional lunch at some of the better pubs in the city, several newer members have paired up with experienced brewers to brew their first all-grain batches, and we all keep in touch on the email forum. Check out our Website at http://www.bodensatz.com/gallery/ottawa-brewers.

PHOTOS COURTESY OF THE MOB

MOBster Patrick Brochu helps build some Willies for his club compatriots.



Happy carboys all in a row: The results of the first annual Big StrangeBrew.

Brochu and Andrew Perron oversee the soldering during the Willy session.

homebrew profile

The Business of Homebrew • An interview with HWBTA president Roger Savoy

In this time of economic turmoil, how is the homebrew hobby holding up? For insight into the business side of homebrewing, we talked to Roger Savoy of Troy, New York. Savoy owns three homebrew supply shops and is the new president of the Home Wine and Beer Trade Association.

The Home Wine and Beer Trade Association, founded in 1976, is a nonprofit association of retailers and associates. The purpose is to promote, develop and grow homebrewing, winemaking and affiliated trades.

At its peak there were 1,000 stores offering homebrew products in the United States. Some of them were small part-time stores or offered brewing supplies as a sideline. Now there are closer to 700 stores. The number of homebrewers is more difficult to guess. There are no reliable statistics. Estimates range as high as 1 million.

The hobby has changed several times in the USA. Thirty years ago, before the legalization of homebrewing, wine was the primary focus. Brewing came into vogue in the early 1980s, growing relatively rapidly. Most brewers used all-grain methods, since really good extract products were not generally available. When good extract product became available the market grew again, peaking in the mid 1990s. There was a slump for several years. But the hobby seems to be rebounding.

One of the most significant trends is the rapid growth in winemaking. Winemaking kits now are extremely sophisticated, enabling anyone to make a superior product. This has fueled a rapid growth in winemaking kits, as well as traditional fresh-grape winemaking. Our business is half wine now, up from almost nothing 5 years ago.

Sales seem to be growing considerably this year. Wholesalers indicate that sales are up about 15% overall. Some stores I've talked with report growth of over 40%. The biggest trend seems to be towards premium winemaking kits and products.

Good homebrew stores know the importance of promoting the hobby. That starts with a clean store, convenient hours and a wide selection of products. A truly good store will also know how to promote the hobby through publicity and focused advertising. A good store should focus on the customer's needs.

The industry seems to be somewhat counter-cyclical: The industry actually improves during economic downturns. Also, we have seen more interest, I think, due to people looking to find something connected to their home and past, perhaps driven in part by the events of last September. But, from our experience, the main issue is simply getting the information about our industry to the public. While some stores were closing in late 1990s, my shop was growing 40% per year by aggressively bringing to the public the message that anyone can make great beer or wine at home.

One trend to watch is wine-on-premise shops, where much of the homemade wine in Canada is produced. A few have opened in the USA. Another interesting item is the Brew House beer. This is four gallons of no-boil concentrated wort. Add water and yeast and time. We've had good reports from customers.

homebrew calendar

October 14, November 23

24th Annual California State Homebrew Competition
San Francisco, California

A statewide competition hosted by the San Andreas Malts homebrew club. Entry deadline is October 14, judging at the Stern Grove Clubhouse on November 23. For information go to http://www.sanandreasmalts.org.

October 4, 17–19

19th Annual Dixie Cup
Houston, Texas

An annual competition hosted by the Foam Rangers. Entry deadline is October 4. This year's theme is "Night of the Living Fred" and the highlight is a beer tasting with Fred Eckhardt. The 2002 "special" competition category is Monster Mash; beers must be over SG 1.070 and contain Halloween candy. For more info: Kuyler Boyle by email at dixiecup@foamrangers.com or phone (713) 798-3918.

October 4, 26

Hoppy Halloween Challenge
Fargo, North Dakota

Hosted by the Prairie Homebrewing Companions. Deadline is October 4, Challenge is on the 26th. Contact: Karl Gunderson at (701) 282-4966 or go to the Web at www.linkup.net/~dtrautmann/phc.html.

The HWBTA benefits the average homebrewer by educating retailers. We stress that it's a new climate for the industry and that successful retail stores need to be more professional. Many customers may remember stores begun by a hobbyist, with variable hours and old product. Visit some of the more progressive stores now and you'll see them open seven days a week, with fresh product and a clean environment. For more information visit our Website at www.hwbta.org. ■

Wort Aeration

How to give your yeast some gas

by Thomas J. Miller

Oxygen is an enemy of beer. Let this gas find its way into your finished brew and — ack! — your entire award-winning batch can quickly go stale. However, there is a time when oxygen is a brewer's friend. Yeast cells need oxygen to make components of their cell membranes when they grow. So you need to aerate your wort after it is cooled but before fermentation. Here's how.

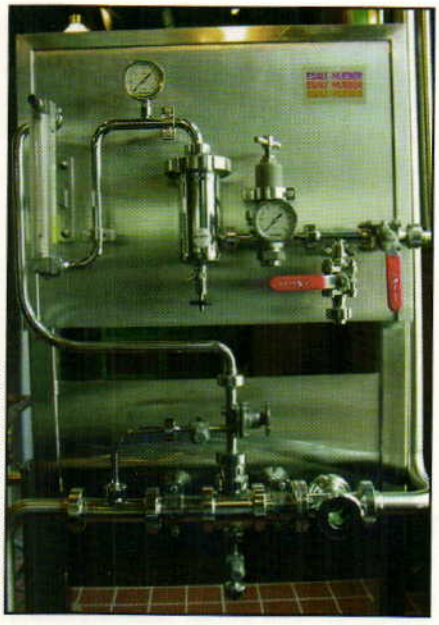


PHOTO COURTESY OF ASHTON LEWIS

Brewer: Ashton Lewis began homebrewing in high school and decided to pursue brewing as a career. He studied Food Science at Virginia Polytechnic Institute, completing his BS in Food Science in 1991. Later that year, Lewis moved to Davis, California to study beer in graduate school with Dr. Michael Lewis (no relation). While working on his MS in Brewing Science at UC Davis, Ashton completed the Master Brewer's Program and passed the prestigious, nine-hour Associate Membership Examination of the Institute of Brewing in London. Since completing his graduate work in 1994, he has been involved in many aspects of the craft-brewing industry. He was a brewing science instructor at UC Davis, was a partner in a brewing consulting firm and served as technical editor for an industry magazine. Today, he is Master Brewer of the Springfield Brewing Company in Springfield, Missouri. In his spare time, Ashton serves as technical editor for *BYO*. His Märzen won a silver medal at last year's GABF in Denver.

When I think of aeration, what comes to mind is that I'm setting the stage for a good fermentation. Basically, brewers manage three things in setting the stage for fermentation. First, they make the wort. Then they cool it to a certain temperature. And finally, they aerate.

What I rarely see mentioned is that brewers can manipulate the level of aeration in order to get different results in their beer. I worked with a brewery in Japan and one of their flagship beers was going to be a weizen. The brewers wanted to get a fruitier flavor in that beer, so less aeration was worked into the recipe. The fact is that limiting aeration produces more esters, so what you end up with is a fruitier beer. It's possible, then, to intentionally under-aerate if you want more ester characteristics in a particular beer. Conversely, it's also possible to reduce ester production through good aeration practices.

In high-gravity beers, the increased wort concentration decreases oxygen solubility. In something like a doppelbock, for instance, you really need to make the effort to get more oxygen into the wort to reduce esters.

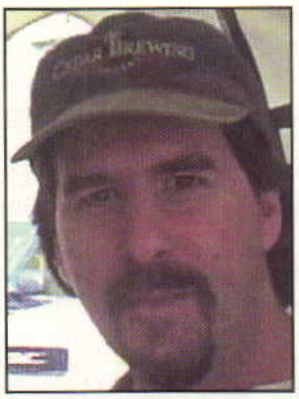
There's a good chance you'll have less oxygen in a homebrewed beer that's just "splashed" against the side of a fermenter, or maybe shaken up a bit, compared to aeration methods that actively inject air or oxygen into the wort stream. One option for homebrewers is the "Oxynater." This is an oxygenating system that consists of a small tank of pure oxygen and a hose equipped with a stainless-steel aeration stone. The hose and stone are inserted into your chilled wort and then the oxygen valve on the tank is opened. The oxygen percolates through the device, saturating the wort. Homebrewers might also opt for a system that uses an aquarium pump connected to an aeration stone.

Ideal oxygen levels are between eight to ten parts per million (ppm). However, when you use pure oxygen you can get oxygen levels exceeding 20 ppm. This means that you can overdo it if you don't have the tools to measure oxygen flow and oxygen content. Since most homebrewers lack these instruments, I recommend taking good notes when using pure oxygen and determining by trial and error what works well.

Just as too little oxygen can be bad, too much oxygen can also have a negative impact on the beer — especially if you also pitch too much yeast. What could happen, essentially, is you'll end up with beer that has very little character. There are flavors produced when yeast is growing, but if you start with a large quantity of yeast and excessive oxygen, the yeast will not need to struggle and multiply to ferment out the sugars in the wort. In this case, they will not impart important flavors and aroma to the beer.

Homebrewers can't overdo it, however, when they use air. This is because the oxygen saturation in wort is only about eight parts per million when air (as opposed to oxygen) is used for aeration. At full speed with an aquarium pump, you can add air for ten minutes. Next time, maybe run it for 15–20 minutes as an empirical test. If you find no change in fermentation rate or changes in taste, then you know ten minutes is probably enough time to saturate the wort with oxygen.

At Springfield Brewing Company, we use an in-line device for wort aeration called the "Turbo Air" *(see photo)*. This unit uses dry, compressed air that is filtered through a sterile filter. When this thing is in use it has this really cool humming sound, and the wort resembles milk as it passes through a sight glass at the far end of the unit.



Brewer: Mike Snyder started homebrewing in 1991 after taking a two-night course on homebrewing at Kirkwood Community College in Cedar Rapids, Iowa. He started an online mail-order homebrew shop in 1992, one of only four on the Internet at the time. Snyder was the president of the Cedar Rapids Association of Zymurgy and Yeastology (CRAZY) homebrew club for two years. In 1996, he applied at Cedar Brewing Company and he has been their brewmaster ever since.

The only time you want to introduce oxygen into beer is when you pitch the yeast. The yeast needs plenty of oxygen to make it multiply and ferment quickly. Without aeration, the lag time — the time from pitching to the start of fermentation — will be extended and the risk of bad bacteria taking over the fermentation will be much higher.

When I was a homebrewer, I used a 7.5-gallon plastic bucket as my fermenter. As soon as I pitched the yeast in the bucket, I whipped up the wort with a sanitized stainless-steel whisk. The whipping causes oxygen in the surrounding air to be introduced into the wort. It is very important to make sure the whisk is clean and sanitized. I continued whipping until the froth was up to the top of the bucket, then pitched the yeast and put the lid and airlock on. Many homebrewers think it's enough just to splash the beer into the bucket. In most cases, this is true. You'll still get fermentation, but probably with a longer lag time. So the more oxygen you introduce during pitching, the better.

At Cedar Brewing, I inject medical-grade oxygen directly into the wort as it is transferred from the brew kettle to the fermenter. This is after it is chilled through the heat exchanger. This is accomplished through a small sintered stainless stone, which is inside a sight glass. Since we are a small brewpub, I do not have the equipment to determine the exact concentration of oxygen (in ppm) that is injected. I simply go by the pressure on the gauge and time.

My advice to homebrewers on achieving "good" aeration levels is this: anything is better than nothing. If you have a carboy and can't whip up the chilled wort, make sure you splash the wort aggressively as it goes into the carboy. Or shake it all up once you are done transferring to the carboy. Do your best to introduce as much oxygen as possible into your wort. In this case, it's your friend.

Brewer: Will Gilson has been the head brewer at Moat Mountain Smokehouse and Brewing Company in North Conway, New Hampshire since 1999. He was an avid homebrewer in the 1980s before taking a brewing position at Salt Lake Brewing Company/Squatter's Pub in Salt Lake City, Utah from 1993–1994. He worked as an assistant brewer at Snake River Brewing Company in Jackson Hole, Wyoming from 1995–1998. Gilson also did coursework at Weihenstephan, the world-famous Bavarian brewing school, from 1998-1999.

Oxygen is a necessary element for yeast to metabolize. The brewer's goal is to get the yeast to take over the wort in the fermenter as quickly as possible. With so many nutrients in the wort, that really isn't hard to do. You just need to give them their basic element — oxygen — so they can perform their job.

One way to limit lag time is to make a yeast starter and pitch it when the starter is at a full kraeusen. To make a yeast starter, boil one cup of dry malt extract and chill it to pitching temperature, keeping it sterile. Pitch your yeast into the starter. Once it's obviously fermenting strongly, you can pitch that into your five-gallon batch.

Without good aeration, however, your yeast still might have a hard time taking off. There are two things to consider about aeration. First, it's important for the aeration to be on the "cold side." In other words, you want to aerate once the wort has cooled to fermentation temperature.

My aeration set-up consists of a basic fish-tank pump, connected to a length of sterile hose, which goes into a sterile filter. Another length of sterile hose comes out the other end, with a carbonating stone attached on the end. This might be a plastic stone from a fish shop, but these tend to have big holes so the oxygen that comes out of it doesn't go into solution so well. A ceramic stone with smaller holes usually works better. You might also want a weight to hold the stone beneath the surface of the wort.

Sanitize the hoses, put the end of the hose in the chilled wort, turn on the pump and let it go for 10–15 minutes. You should get an inch or two of foam on top of the wort.

Low-tech aeration can be nothing more than swirling the wort with a spoon or pouring the wort back and forth from bucket to bucket. Remember that homebrewing is as complicated as you make it. It's up to you to decide where you want to pay special attention to detail. ■

Fruity Haze

Aluminum kettles and all about attenuation

Pectin Haze is in my Mind

Strawberries are in season and I'm about to make my first fruit ale. I'm a devoted extract brewer, but the addition of fruit is new to me. Scanning the Internet, I've found a few recipes that look good, so I'm going to formulate a recipe based on what I've read. However, I'm a little confused as to the purpose of pectic enzyme. How much do I use? I understand it comes as a powder as well as a liquid. Do I add it to the primary or secondary fermenter? Also, how is the yeast going to react to the sugars in the berries? A friend told me to run a blow-off tube because there will be so much action in the primary fermenter that my 6.5-gallon fermenter will overflow. My next venture will be with blueberries — we have a pub in Bar Harbor that makes a wicked blueberry ale. Will I need pectic enzyme with blueberries as well?

Kevin Buck
Lyman, Maine

This question reminds me of one of the goofiest names I ever gave a batch of beer — Strawberry Fields For Alever. It was a wheat beer with strawberries added after primary fermentation was complete, and it had an interesting pink, cloudy appearance with a nice, fruity nose. I like adding fruit to beer after primary fermentation because of the good retention of fresh fruit aromas and colors. If fruit is added to the primary, special care must be used to prevent potential carboy bombs. The fermentation lock can get plugged and pressure can build up inside the fermenter. The safest method is to ferment the beer in a plastic bucket with a large lid and an airlock. A blow-off tube on a carboy can also be used, but it too can clog and this can be dangerous.

The last two issues of *BYO* — the July-August 2002 issue and the September 2002 issue — contained a two-part article on fruit beers. Check these out for information on formulating and brewing fruit beers. I will tackle the question regarding pectin here.

Pectin is a type of carbohydrate found in fruits that act as a structural member of the fruit, kind of like beta glucan in cereal grains. In cooking, pectin is useful for its ability to form a gel when heated in a sugar solution with a low pH. This is why jams and jellies are thick and stay on your toast or bagel instead of running off. Although all fruits contain some pectin, many do not contain enough for making jams and jellies and many fruit spreads use pectin from other sources than the fruit being used. Certain varieties of apples, such as Granny Smith, are well-known for their especially high pectin contents.

When it comes to brewing and winemaking, pectin levels are usually kept low for two main reasons. The first is the haze pectin can cause; pectin hazes are due to the very large size of the pectin molecule and the tendency for the molecule to form gels. This is analogous to starch hazes. This is a cosmetic issue that some of us don't worry too much about, depending on the beer style being made. My strawberry wheat beer was cloudy, but wheat beers are typically cloudy and the cloud looked cool in that beer. Cloudiness, these days, is in fashion and some of those wimpy malternatives, like Smirnoff Ice and Mike's Hard Lemonade, actually include ingredients to make them permanently cloudy. A friend of mine was in a brewery that was making — I dare not use the term "brewing" — some of these things and he saw a big container of something called "cloud." This was the special ingredient to make it look interesting. When you make a fruit beer at home, you can omit the "cloud."

The other thing about pectin is that filtration becomes very, very difficult. The reason for this is again the large size of the molecule and its gelling properties. I make a hard cider every year. A couple of years ago I set up the filter, sent the cider to it as I had done in the past and wham! — the flow immediately slowed to a stop in a matter of seconds. When the filter was broken down, there was a distinctive orange film on the filter. Although the film was thin, it was so tight that cider simply could not pass through it.

The solution to this problem was to buy a liquid pectinase that I then added to the cider. Pectinase enzymes reduce the size of the pectin molecule and also prevent the fragments from gelling. About a week later, filtration was a breeze. What I should have done was to perform an easy test for pectin before filtration. To check for the presence of pectin, simply add one part of the wort, beer or wine to one part 70% alcohol. Ethanol and iso-propanol both work. I use iso-propanol (rubbing alcohol) because it's cheap. This test will cause pectin to gel. When this occurs, the sample becomes cloudy and the pectin begins to precipitate and will eventually settle on the bottom of the sample glass.

Although this method is not quantitative, you can get a feel for the pectin

concentration. If the haze is detectable, but very slight, you may decide not to worry. If the sample looks like orange juice after adding the alcohol, you probably will choose to deal with the pectin. Fortunately, it's simple to address this problem. The easiest thing to do is to add some pectinase to the fruit mush before adding the fruit to your beer. You can use dry or liquid pectinase — follow the recommendations with the enzyme regarding usage rate. The other approach to take, especially if you don't like adding stuff unnecessarily to your beer, is to do a test after fermentation is complete and the fruit has been added. If the sample indicates a pectin problem, then add your enzyme at this stage.

As I stated earlier, all fruits contain some pectin. According to my handy-dandy book entitled "Preserving" (1981, Time-Life Books), tart apples, citrus fruits, cranberries, currants, gooseberries and sour plums all have "high" pectin levels. Interestingly, all of these fruits also rank high in natural acid levels and these fruits make great jams and jellies without requiring an exogenous (outside) source of pectin. Strawberries, peaches, pear, pineapple, apricots and rhubarb all have a low pectin content. Cherries, blueberries, blackberries and raspberries all have a medium level of pectin. I think I see a pattern here — it seems like brewers typically make fruit beers with fruits that have a low-to-medium pectin level. Makes sense to me!

Wanted: a New Kettle

My current stainless-steel brew pot is only five gallons and has developed a crack in the rim. I need to replace it with something larger that will not break my bank account and send my wife into a frenzy. I know that stainless is highly recommended for use as a brew kettle and I understand why, but are there any cheaper alternatives? I have read articles, including one by you, that say that using aluminum can be OK. Is this true? Also, what about the ceramic canning kettles that are readily available?

Phil Williams
Lock Haven, PA

A pot really only needs to satisfy a few simple requirements to become a qualified brew pot. For starters, it ought not to leak — a leaky kettle is a problem. A good candidate for the job should also be large enough to hold a whole batch of wort. In your case, that means 5.5 to 6 gallons of wort before boiling, plus about 20 percent extra space to prevent boilovers. Using this formula, you need about a seven-gallon kettle. If you can, it is much better to boil the whole volume of wort instead of doing a concentrated wort boil. A concentrated boil affects hop utilization, aroma changes to wort during boiling and color development much differently than doing a full wort-volume boil. The kettle should also be constructed from a material

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that can adequately conduct heat from the heat source to the wort. This is one property of stainless steel that is less than stellar. The final qualifier for the kettle is that it should not harm the wort by leaching compounds into it.

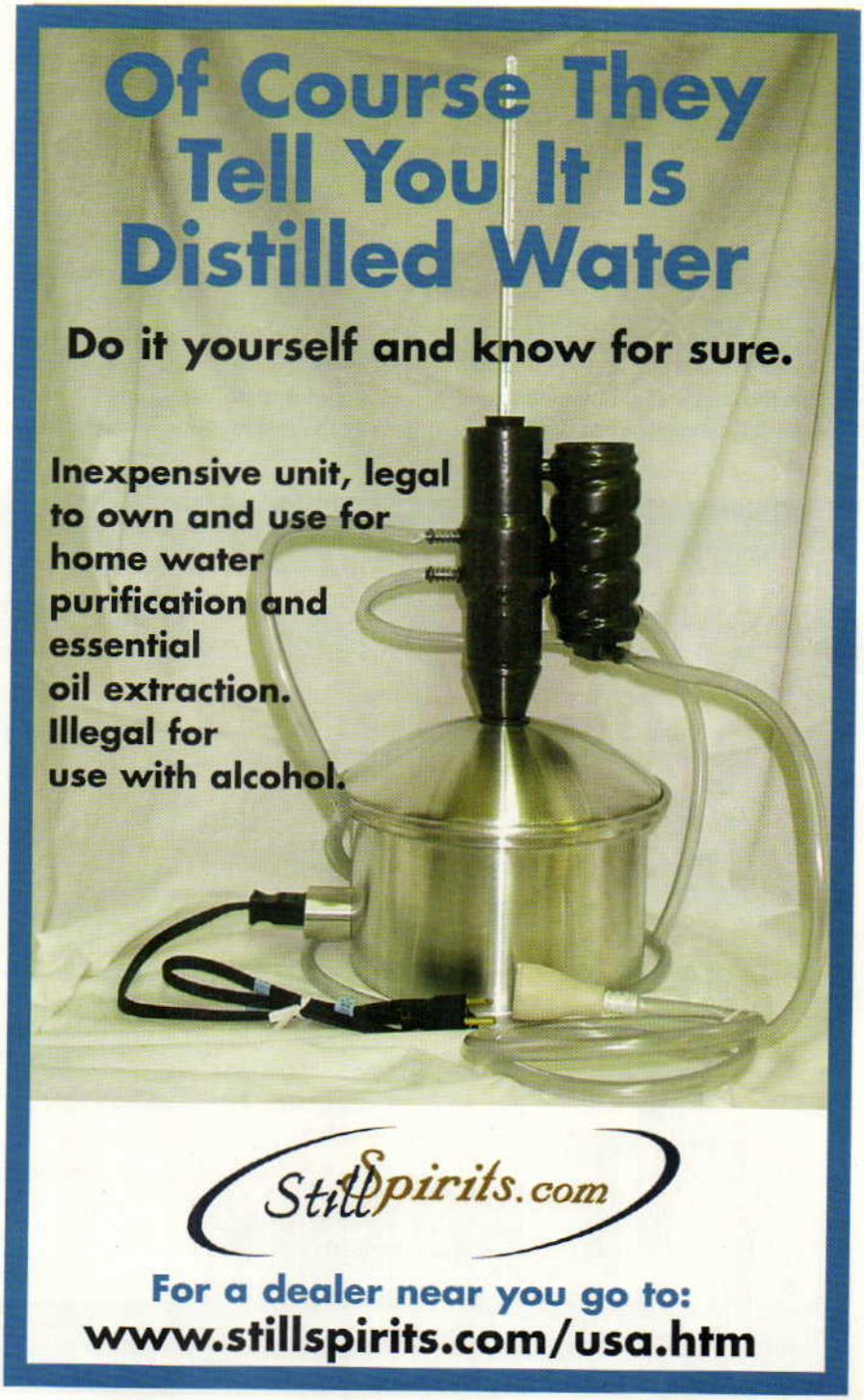
Stainless steel is certainly the most common material for kettle construction nowadays. Stainless steel is inert, is easily formed and welded and can be heated either by direct flame or with the use of steam jackets and coils. Steam is used by commercial brewers because it does not result in scorching. Unfortunately, stainless steel kettles are pretty spendy. A seven-gallon stainless steel pot can easily cost more than $150.

Ceramic canning vessels, also known as crab or lobster pots, certainly meet the basic requirements for a kettle. Canning vessels are usually made of tin with a thin enamel coating. These vessels are inert, have a high heat conductivity and they are less expensive than stainless pots. One drawback to ceramic pots is that you cannot weld a valve to them because the ceramic coating chips off. In addition, if they get chipped or cracked, the metal under the ceramic is not inert. If you are careful with how you handle these pots and don't mind not having an outlet valve, then this is one viable option. A minor drawback is that the handles of canning pots are not very strong and you should not attempt to lift a pot full of near-boiling wort. This is dangerous regardless of the handles and really ought to be avoided.

Aluminum pots are readily available in all sorts of sizes, are really inexpensive and have a terrific thermal conductivity. An outlet valve can be welded to an aluminum pot, but you will probably have a difficult time finding anyone who can weld a stainless steel ferrule to an aluminum pot because aluminum welding is a fairly specialized technique. The other issue with aluminum is that it is not inert. The main problem with this feature, especially in commercial applications, is that aluminum is readily dissolved by sodium hydroxide (commonly known as caustic) and caustic-based cleaners are the workhorse cleaners of the food and beverage industries. Any cleaner containing sodium hydroxide will have it on the label because sodium hydroxide is pretty nasty. Draino and Easy-Off both contain sodium hydroxide. The best advice is to read the label.

Aluminum has also been associated with Alzheimer's disease and some have suggested that there may be some cause-and-effect relationship with the two, but I haven't seen or read anything very convincing on that idea. Keep in mind that aluminum is a very commonly used metal for making all sorts of cooking utensils. If you don't need an outlet valve and don't use caustics, an aluminum kettle is fine.

The granddaddies of all kettles are ones made from copper. These dudes look great, have the highest thermal conductivity of all metals and are traditional. However, copper is expensive,



difficult to weld (soldering is typically used on copper and this is easy) and is not inert. Copper not commonly used anymore for making big pots. I hope you didn't have your heart set on copper! Those are some ideas on kettles.

One option many homebrewers take is to convert an old beer keg into a kettle. These make good kettles, but I feel obligated to remind everyone that stainless-steel beer kegs are the property of breweries. The paltry $10 deposit is only a small fraction of the true cost of a beer keg. If you use a keg for a kettle, make sure you buy the keg from its true owner and help prevent keg float shrinkage! (Breweries refer to kegs out of the brewery as a "keg float." Shrinkage refers to theft. What I'm trying to politely say is, give breweries a break and don't steal kegs!)

Attenuation Deficit Disorder

I would appreciate if you could explain the meaning of attenuation and the way to calculate it as well as its relation to alcohol content. I have been brewing for several years and so far I do not understand these issues.

Jorge Blasig
Montevideo, Uruguay

Attenuation expresses the reduction in wort concentration during the course of fermentation and is typically reported as a percentage. In other words, it tells a brewer how much the specific gravity will drop during fermentation.

There are actually two measures of attenuation used by brewers. The most common is apparent attenuation and is properly called "apparent degree of fermentation," or ADF for short. The apparent degree of fermentation is equal to the original wort density (in degrees Plato) less the apparent final density divided by the original wort density. A hydrometer is used to measure wort density (gravity) for both the original and final measurements. This is easy to understand if we turn it into an equation: ADF = (OG-FG)/OG. For example, a beer with a wort density of 12° P and a final gravity of 3° P has an ADF of 0.75 or 75 percent.

So why do brewers care about ADF? For starters, ADF is related to a beer's body and mouthfeel. Very dry beers (which exhibit a high ADF) tend to be lighter in body than beers that have a lower ADF. Mash temperature profile, the grains used in mashing and yeast strain all have an effect on ADF. For example, a long mash incorporating various rests will produce a more fermentable wort than a short, high-temperature mash. Similarly, a wort produced exclusively from malt will be more fermentable than a wort made using specialty grains, because specialty grains contain a higher percentage of unfermentable sugars. Given a constant wort, different yeast strains may have varying fermentation characteristics and most yeast suppliers use ADF as one of the parameters used to describe their yeast strains.

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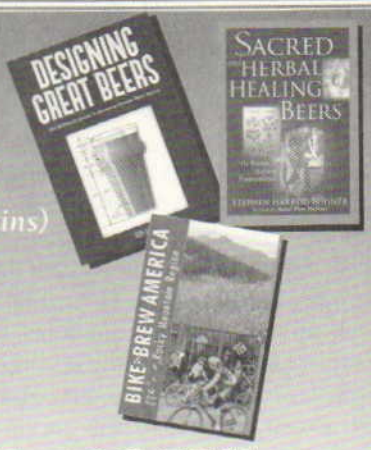

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If your goal is to produce a dry beer, like Asahi "Super Dry" from Japan, you want to focus on those variables that tend to increase ADF. I would choose a long mash profile using temperature rests from 140–160° F. I would use few, if any, special malts and probably would try to find a high-amylose rice variety. Amylose is a type of starch resulting in a high percentage of fermentable sugars in mashing. Finally, I would select a "highly attenuative" yeast strain.

This strategy obviously would fail if the goal were to produce a big, chewy Scottish ale with a luscious complement of unfermentable sugars. These types of beers typically use a high, single-temperature mash, contain a substantial dose of special malts and use yeast known for low attenuation.

In a nutshell, that's ADF. You may be wondering why it carries the moniker "apparent." Hydrometers work as measuring devices by taking advantage of the linear correlation between buoyancy and liquid density. As liquid density increases, so does the buoyancy of floating objects and that physical property can be used to calibrate the scale of a hydrometer. For example, two liquid samples are prepared in a liter volumetric flask. The first one-liter sample contains 25 grams of sugar and water. The second one-liter sample contains 25 grams of sugar, a glug of vodka and water. Sample one is measured using a hydrometer at 20° C and the hydrometer reads 1.010. This corresponds to a dissolved solids content of approximately 2.5° Plato. Since this measurement is made using a hydrometer, I am going to refer to this reading as apparent extract. Using this terminology, the solution has an apparent extract of 2.5° Plato. The second sample reads 1.007 with the hydrometer; this corresponds to an apparent extract of approximately 1.75° Plato. Both samples contain the same concentration of dissolved solids, but the alcohol in sample two decreases the liquid density and the buoyancy of the hydrometer.

The term "apparent extract" implies that there must also be an actual extract. There is, and it's called real extract. Real extract is determined by removing the alcohol from a sample of beer or wine by distillation, adjusting the sample volume back to the pre-distillation volume with water and then measuring the density of the sample. Real extract is useful because it indicates how much of the wort extract was fermented by the yeast during fermentation. This number is directly related to alcohol content and is a better indicator of body than ADF. When the degree of fermentation or real attenuation is calculated using real extract, the term "Real Degree of Fermentation" or RDF is used. Very few homebrewers or small-scale commercial brewers have the tools required to determine real extract. Instead, they rely on apparent extract and ADF for routine monitoring of their brews.

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Alcohol content is another factor most brewers want to know about their beer. The alcohol content of beer can be estimated using the wort original gravity and its apparent extract. It is important to recognize that the alcohol content of beer can only be known for certain by measuring alcohol directly, usually by distillation, because calculations relating alcohol content to original gravity and apparent extract make many assumptions about the fate of carbohydrates during fermentation.

In simplistic terms, one molecule of glucose is converted to two molecules each of carbon dioxide and ethanol during fermentation. By weight, fermentation yields 0.5111 grams of ethanol for every gram of glucose fermented. In reality, there is more going on during fermentation. Yeast cells are increasing in number and a whole host of metabolic intermediates are being spun off from fermentation and follow different biochemical pathways, many of which result in the formation of flavor active compounds. What this means in practical terms is that there is less than 0.5111 grams of ethanol being produced per gram of glucose. Based on empirical data, brewers know that about 45 percent of the fermented extract (real, not apparent) is converted to ethanol.

One commonly cited equation used to calculate alcohol concentration by weight using apparent extract and original extract is the following:

Alcohol by weight = (OE - AE) X [0.39661 + (0.0017091 X OE) + (0.000010788 X OE^2)]

(OE = original extract in degrees Plato and AE = final extract in degrees Plato)

For example, a beer has an OE of 12° Plato and an AE of 3° Plato. Alcohol by weight is equal to (12-3) X [(0.397)+ (0.00171 X 12) + (0.0000108 X 12^2)] or 3.77 percent. This can be converted to 4.77 percent alcohol by volume by dividing 3.77 percent by 0.79.

The multiplier in this equation is called Balling's factor and relates a wide range of empirical data to estimating alcohol content based on apparent extract. I hope I have helped resolve your question. ■

Do you have a question for Mister Wizard? Write to him c/o Brew Your Own, 5053 Main Street, Suite A, Manchester Center, VT 05255 or send your e-mail to wiz@byo.com. If you submit your question by e-mail, please include your full name and hometown. In every issue, the Wizard will select a few questions for publication. Unfortunately, he can't respond to questions personally. Sorry!

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Beers Cloned

Hennepin and Eastside Dark Lager

by Steve Bader

Dear Replicator,

I am fairly new to the homebrewing scene. What really got me excited about homebrewing was my desire to create a clone of my all-time favorite beer, Hennepin Ale from Brewery Ommegang out of Cooperstown, New York. Hennepin is a Saison-style farmhouse Belgian ale with a spicy character that is truly magnificent, at least to me. I am hoping you can help guide me in my quest.

Douglas Stetson
Lowell, Ohio

What a unique beer! I can understand why you love it. In 1997, Don Feinberg and Wendy Littlefield opened Brewery Ommegang with the assistance of the makers of Duvel and Scaldis. It's an authentic Belgian brewery in upstate New York.

I spoke with Randy Thiel, head brewer at Ommegang, about this beer. Randy is a fan of *Brew Your Own* magazine and was happy to give us help in replicating this beer.

Randy told me that, as a farmhouse beer, Hennepin is made in an artistic style, rather than an industrial style. This means they concentrate more on making an interesting beer to drink than on making a style that is commercially acceptable. The Saison style is typically a fruity, hoppy, moderately-strong and refreshing ale. Hennepin is a complex beer with an initial malt sweetness followed by a dry finish. The color is light and the beer has excellent foam retention. A secret blend of spices helps to give it a unique flavor. Randy did admit to using ginger root in this beer, since that is a pronounced flavor when Hennepin is young. The ginger flavor, however, fades as it ages. To round out the spice blend, I have suggested that homebrewers use some orange peel.

Hennepin is a beer with a high original gravity and a low ending gravity — with a resulting 8% alcohol! Ommegang achieves this by using approximately 20% cane sugar in this beer, but they suggest that homebrewers try using Belgian candi sugar. For yeast, Randy suggested that you use a Belgian strain with a high attenuation and a mild ester and phenolic flavor.

For more information about Brewery Ommegang, visit their Website at http://www.belgianexperts.com/Ommegang/ or call (800) 656-1212.

Brewery Ommegang Hennepin

(5 gallons, extract only)

OG = 1.070 FG = 1.008 IBUs = 24 ABV = 8.0%

Ingredients

6.6 lbs. Muntons light malt extract syrup
0.5 lbs. Muntons light malt extract powder
2 lbs. light candi sugar
6.5 AAU Styrian Golding hops (bittering hop) (1.25 oz. of 5.25% alpha acid)
1.75 AAU Saaz hops (bittering hop) (0.5 oz. of 3.5% alpha acid)
1 tsp. Irish moss
1 oz. dried ginger root
1 oz. bitter orange peel
White Labs WLP550 (Belgian Ale) or Wyeast 1214 (Belgian Abbey) yeast
0.75 cups corn sugar (for priming)

Step by step

Heat three gallons of water to boiling. Remove from heat and stir in the malt syrup, powder and candi sugar. Resume heating and bring the wort to a boil. Add Styrian Golding (bittering) hops, Irish moss and boil for 60 minutes. Add the ginger root and bitter orange peel for the last 15 minutes of the boil. Add 0.5 ounce of Saaz (aroma) hops for the last two minutes of the boil.

When done boiling, strain out hops, add wort to two gallons of cool water in a sanitary fermenter, and top off with cool water to 5.5 gallons. Cool the wort to 80° F, aerate the beer and pitch your yeast. Allow the beer to cool over the next few hours to 68–70° F, and ferment for 10–14 days. Bottle your beer, age for two to three weeks and enjoy!

All-grain option:

Replace the light syrup and powder with seven pounds Belgian Pilsner malt and two pounds Belgian pale malt. Brewery Ommegang uses a multiple-step mash starting at 122° F and ending at 152° F. Decrease the amount of Styrian boiling hops to one ounce.

Dear Replicator,

Being from the Brewtown metropolitan area (Milwaukee, Wisconsin) — where the beer is certainly much better than the baseball — I enjoy favorites from one of the local breweries, Lakefront Brewery. I especially enjoy Lakefront's Eastside Dark. Although their Website offers some information concerning this brew, I need a bit more help in developing a clone. Would you please help? I even asked Lakefront for their blessing.

Jerry Marowsky
Milwaukee, WI

Eastside Dark and baseball? Sounds like a great combination to me. It would certainly make watching the Brewers more enjoyable!

I talked to Russ Klisch, brewer and one of the founders of Lakefront Brewery, and asked him to reveal the secrets of this wonderful beer. Russ said most Americans think that dark beer is bitter, thick, high in alcohol and generally hard to drink. Lakefront's intentions with this beer are to make a dark beer that breaks this stereotype and is pleasant to drink.

Eastside Dark is a beer with a rich, malty body and balanced flavors. It is based on the German schwarzbier style. While it is a dark beer, Lakefront uses conservative amounts of the more harshly-flavored grains like roasted barley. Instead, it relies on chocolate malt, which is a mellower-flavored dark malted barley, for most of its color and dark beer flavors.

Lakefront uses Mt. Hood hops exclusively in this beer. There are three additions; and here again, the intention is not to overpower the malt flavor, but to be in balance with the malt. Smooth, but with a small bite at the end — kind of like a good curveball.

Lakeside uses White Labs WLP830 German Lager for this beer and ferments at 50° F for two weeks, then lagers the beer at 36° F for two more weeks before serving. This yeast also lends to the smooth flavors of this beer.

For more information on the Lakefront Brewery, visit their Website at http://www.Lakefront-Brewery.com or call them at (414) 372-8800.

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Lakefront Brewery Eastside Dark

(5 gallons, extract with grains)

OG = 1.060 FG = 1.016 IBUs = 20 ABV = 5.8%

Ingredients

6.6 lbs. Briess light malt extract syrup
1 lb. Briess light dry malt extract
10 oz. Briess Munich malt
4 oz. Briess chocolate malt
2 oz. Briess roasted barley
5.125 AAU Mt. Hood hops (bittering hop) (1.25 oz. of 4.1% alpha acid)
2.05 AAU Mt. Hood hops (flavor hop) (0.50 oz. of 4.1% alpha acid)
1.0 AAU Mt. Hood hops (aroma hop) (0.25 oz. of 4.1% alpha acid)
1 tsp Irish moss
White Labs WLP830 (German Lager) or Wyeast 2206 (Bavarian Lager) yeast
0.75 cups corn sugar (for priming)

Step by step

Steep crushed malts in three gallons of water at 150° F for 30 minutes. Remove grains from wort, add malt syrup and powder and bring to a boil. Add 1.25 oz. Mt. Hood (bittering) hops, Irish moss and boil for 60 minutes. Add 0.5 oz. Mt. Hood (flavor hops) for last 15 minutes of the boil. Add 0.25 oz. of Mt. Hood (aroma) hops for the last two minutes of the boil. When done boiling, strain out hops, add wort to two gallons cool water in a sanitary fermenter, and top off with cool water to 5.5 gallons. Cool the wort to 70° F, aerate the beer and pitch your yeast. Leave the beer at 65–70° F degrees until fermentation begins, and then drop the temperature to 50° F and ferment for 14 days. When fermentation is complete, cool the beer to 36° F and lager for two weeks. Bottle your beer, let it carbonate at 50° F or higher for two to three weeks and swing . . . or swig!

All grain option:

Replace the light syrup and powder with 10.5 lbs. two-row pale malt. Mash the pale malt and specialty grains at 155° F for 60 minutes.

Collect enough wort to boil for 75 minutes and have a 5.5-gallon yield. Lower the amount of the Mt. Hood boiling hops to one ounce. ■

Brown Ale

The British beer that changed American history

by Horst D. Dornbusch

BROWN ALE by the numbers

OG	1.040–1.048 (10–12° P)
FG	1.008–1.012 (2-3° P)
SRM	18-22
IBU	25-35
ABV	4.1–4.8%

Here is a legitimate question. If I brewed a beer with top-fermenting yeast and made sure that it was brown, would the beer be a brown ale? As any savvy homebrewer knows, the answer is "not necessarily." I could just as well have made a Belgian trappist ale, a dunkelweizen, an alt or even a biére de garde. These are all ales and they are all brown. So when does an ale that is brown become a brown ale?

The First Brown Ales

Brown ale, like most of the world's ales, is British in origin. We don't really know when the British started brewing, but they were definitely making ales when Julius Caesar's legions invaded the British Isles in 54 B.C. But until about five centuries ago, all the ales the British made differed from modern beers in one key respect — they were all brewed without hops. Although there is evidence that wild hops had reached Britain at least 5,000 years ago, they weren't used in brewing until much later.

Dutch-speaking farmers from Flanders (in present-day Belgium) were probably the first to introduce British brewers to hops. In the early 1400s, these Flemish immigrants crossed the Channel and settled in Kent, where they cultivated hops as they had done back home. Today, Kent is still the home of what is perhaps the most famous of English ale hops, East Kent Goldings. Evidence suggests that hops became a common beer ingredient on the Continent by the late Middle Ages, and that Britain was among the last of the major brewing centers to adopt it.

In those days, the "brownness" of British brown ales was a direct result of unpredictable malting techniques. Based on what we know about the malting practices at the time, which involved kilning the grist over open coal or wood fires, virtually all brewing grains were somewhat dark, smoky and roasted. Pale malt was simply not available then. The color of beer made from such medieval malt would invariably have been some shade of brown.

Once hops were introduced into this beer toward the end of the Middle Ages, the brew that emerged was the original brown ale, the foundation style for all other British ales. The lower-gravity browns eventually evolved into mild ales; the darker browns, into stouts; blends of stouts and browns, into porters; and the paler, hoppier browns, into IPAs, bitters and pale ales. Today, the typical brown ale is dark amber, with a slight copper hue or ruby tinge.

Brown Ale Versus Beer

In Britain, the introduction of hops was apparently not without controversy. As we know from a manuscript written in 1440, the new (hopped) ale became known as "beer" to distinguish it from the traditional unhopped ales. In fact, while hops were being legislated into beer on the European continent, it seems that, at least initially, hops were being legislated out of beer in Britain. In the 1530s, King Henry VIII forbade the use of hops outright at his court. He considered hops an aphrodisiac that would drive the populace to sinful behavior. This from a ruler who managed to go through countless mistresses, not to speak of six wives — two of whom lost their heads in the Tower!

Traditional British Brown Ale

(5 gallons, all-grain)
OG = 1.044 FG = 1.010
SRM = 20-22 IBU = 30

Ingredients

5.0 lbs. pale ale two-row (3–4° L)
1.0 lb. crystal (40° L)
1.0 lb. Weyermann rauchmalz (smoked malt, 2–3.5° L)
2.0 lbs. Munich malt (10° L)
0.5 oz. black patent malt
6.75 AAU East Kent Goldings hops (bittering) (1.35 oz. of 5% alpha acid)
0.5 oz. East Kent Goldings or Fuggles hops (flavor)
Wyeast 1318 (London Ale III) or White Labs WLP002 (English Ale) yeast
0.75–1 cup DME or corn sugar

Modern British Brown Ale

(5 gallons, all-grain)
OG = 1.044 FG = 1.010
SRM = 20 IBU = 30

Ingredients

5.0 lbs. pale ale two-row (3–4° L)
1.5 lb. crystal (40° L)
2.5 lbs. Munich malt (10° L)
6.75 AAU East Kent Goldings hops (bittering) (1.35 oz. of 5% alpha acid)
0.5 oz. East Kent Goldings or Fuggles hops (flavor)
Wyeast 1028 (London Ale) or White Labs WLP005 (British Ale) yeast
0.75–1 cup DME or corn sugar

Step by Step

The process for making a brown ale, as for making most British ales, is really very simple. All-grainers use a single-infusion mash. For a drier beer, keep the rest temperature at about 152° F, which favors beta saccharifica-

tion and thus produces plenty of simple, fermentable sugars. For a more balanced finish, keep the temperature at about 156° F, which favors alpha saccharification and thus produces plenty of complex unfermentable sugars. The rest and the sparge should take about one hour each. During the sparge, let the grain-bed temperature rise to about 168–170° F, but not above. Discontinue the sparge if the gravity of the run-off drops below 1.012. This avoids leaching too many acrid tannins into the kettle. If need be, water down your wort a bit instead.

Boil brown ales for about one hour and a half. Add the bittering hops about 10-15 minutes into the boil and the flavor hops about 20-30 minutes before the end of the boil. Add cold water, if needed, until the wort reaches the target gravity of OG 1.044. Then cool the wort to the proper fermentation temperature of around 68-70° F. Rack after about a week, or when the interval between bubbles in your airlock is about one minute. Rack again two weeks later. Depending on the level of carbonation you desire, prime the finished brew with one-half to one cup of priming agent (DME or corn sugar). The brown ale should be ready after about one week of conditioning.

Traditional British Brown Ale

(5 gallons, partial-mash)
OG = 1.044 FG = 1.010
SRM = 20 IBU = 30

Ingredients

3.3 lbs. (1.5-kg can) plain pale malt extract (such as Edme, Coopers, John Bull or Muntons)
1.0 lb. crystal malt (60° L)
1.0 lb. Weyermann rauchmalz (smoked malt, 2-3.5° L)
2.0 lbs. Munich malt (10° L)
1 oz. black patent malt
6.75 AAU East Kent Goldings hops (bittering)
(1.35 oz. of 5% alpha acid)
0.5 oz. East Kent Goldings or Fuggles hops (flavor)
Wyeast 1318 (London Ale III) or White Labs WLP002 (English Ale) yeast
0.75–1 cup DME or corn sugar

Modern British Brown Ale

(5 gallons, partial-mash)
OG = 1.044 FG = 1.010
SRM = 20 IBU = 30

Ingredients

3.3 lbs. (1.5-kg can) plain pale malt extract (such as Edme, Coopers, John Bull or Muntons)
2.0 lbs. crystal malt (40° L)
2.0 lbs. Munich malt (10° L)
6.75 AAU East Kent Goldings hops (bittering)
(1.35 oz. of 5% alpha acid)
0.5 oz. East Kent Goldings or Fuggles (flavor)
Wyeast 1028 (London Ale) or White Labs WLP005 (British Ale) yeast
0.75–1 cup DME or corn sugar

Step by Step

Mill the Munich malt separately from the other specialty malts. Because the amount of specialty malts is fairly large, use two muslin bags, one for the Munich and the other for the darker malts, to get all the flavor out of the grains.

Steep both grain bags together in about three gallons of water for at least half an hour until the temperature reaches 170-190° F. Rinse the bags in cold water and discard. Bring the brewing liquor to a boil, turn off the heat, and add the extract. Stir gently until all the extract is evenly distributed. Fill the kettle with additional water, but leave enough headspace to prevent a boilover. Bring wort back to a boil.

From this point forward, follow the all-grain instructions for hopping, gravity-correcting, cooling, fermenting and conditioning your brown ale.

Traditional British Brown Ale

(5 gallons, extract only)
OG = 1.044 FG = 1.010
SRM = 20.5 IBU = 30

Ingredients

2.1 lbs. plain amber malt extract (such as Coopers, John Bull or Muntons)
1.2 lbs. plain dark malt extract (such as Coopers, John Bull or Muntons)
6.75 AAU East Kent Goldings hops (bittering)
(1.35 oz. of 5% alpha acid)
0.5 oz. East Kent Goldings or Fuggles (flavor)
Wyeast 1318 (London Ale III) or White Labs WLP002 (English Ale) yeast
0.75–1 cup DME or corn sugar

Modern British Brown Ale

(5 gallons, extract only)
OG = 1.044 FG = 1.010
SRM = 19.5 IBU = 30

Ingredients

2.3 lbs. plain amber malt extract (such as Coopers, John Bull or Muntons)
1 lb. plain dark malt extract (such as Coopers, John Bull or Muntons)
6.75 AAU East Kent Goldings hops (bittering)
(1.35 oz. of 5% alpha acid)
0.5 oz. East Kent Goldings or Fuggles hops (flavor)
Wyeast 1028 (London Ale) or White Labs WLP005 (British Ale) yeast
0.75–1 cup DME or corn sugar

Step by Step

Bring three gallons of brewing water to a boil. Turn off the heat and add your two malts in the required proportions. Stir to distribute the extracts evenly in the kettle. Bring the mixture back to a boil and add the bittering hops. Continue to boil for about one hour. Add flavor hops and boil for another 20 minutes. Top the kettle off with enough cold water to reach the target gravity of OG 1.044. Cool the wort to 68-70° F.

From this point forward, follow the all-grain instructions for fermentation and conditioning.

Brown Ale and American History

Brown ale may have also played an inadvertent role in shaping the destiny of the United States. The Mayflower carried the Pilgrims from Plymouth, England in 1620, to start a colony in Virginia. In addition, the Mayflower also carried casks of ale for the Pilgrims to drink. Assuming that the beer aboard the Mayflower was brewed by the standard methods of the time, more likely than not it was a brown ale. A shortage of that very ale forced the Pilgrims to land in Massachusetts instead of Virginia. As one of the Pilgrims, George Morton, explained in his Mourt's Relation, first published in London in 1622, "So in the morning . . . we came to this resolution: to go presently ashore [on Cape Cod] . . . our victuals being much spent, especially our beer. . . "

Just think about it: Without the need to conserve the remaining brown ale, American history might have taken a completely different course! Certainly, the Thanksgiving holiday would not have come to be.

Brown Ale: Ingredients

The traditional brown ale in the recipe section is a freestyle attempt at imitating a medieval brown ale as it might have been served to British pub patrons long ago. To make this brew with modern grains, I would use British pale ale malt as a foundation. Add a substantial amount of crystal malt (40-80° L) for "nuttyness," a bit of black (patent) malt for depth of color, some smoked malt for "dirtyness," and a nice dose of Munich malt (10-20° L) for body and mouthfeel.

The modern recipe takes its orientation from current mass-market versions of brown ale, or "nut brown" as it is also called. Perhaps the best-known modern brand is Newcastle Brown Ale from Newcastle-Upon-Tyne in the north of England. With an alcohol by volume (ABV) of slightly more than five percent, it ranks among the stronger versions on the brown ale spectrum. Like all brown ales, though, Newcastle has a dominant nutty-malty note. It is medium-bodied and full-flavored, with a slight residual sweetness and some underlying bitterness in the finish. For partial-mash browns, simply replace the pale grain with plain pale malt extract. As always in a British-style beer, a British-style extract works best. Plain pale malt extracts from Edme, Coopers, John Bull or Muntons are all acceptable choices.

For extract-only batches, I would mix portions of plain amber and plain dark malt extracts. By themselves, amber extracts usually make a beer of around 15 SRM in color, while dark extracts make a beer of around 30 SRM in color. Considering that the average brown ale has a color rating of about 20 SRM, mixing the two extracts yields an optimum result. As a rough rule, brown ales become lighter in color the further north you travel in England. They became darker the further south you travel. So you can play

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with regional variations of this beer by altering the amber-to-dark ratio of the two extracts in either direction. All-grain and partial-mash brewers can do the same by varying the Lovibond ratings of the black, crystal and Munich malts as well as the relative quantities of these grains.

Considering that British brewers have often used sugars as adjuncts, you could try a five-gallon batch of all-grain, partial mash, or all-extract brown ale with the addition of about half a pound of molasses or brown sugar for a rougher flavor and a bit more alcohol. When making a stronger, more "modern" Newcastle-type brown ale, consider adding corn sugar instead of the molasses or brown sugar to raise the alcohol level. Add these sugar adjuncts to the kettle at shutdown because they just need to be dissolved and sterilized. For a winter-warmer brown ale, consider the unconventional trick of adding a 750 mL bottle of very dark rum to the brew at priming time and let the beer condition for about three weeks. After all, rum is made from sugar cane. The result is a brown ale with a rich depth of flavor and a nice afterglow on your palate. (If you added 750 mL of 80-proof rum to 5 gallons of water, the alcohol percentage would be 1.6 percent.)

As a standard hop regimen for brown ales, I personally would always use East Kent Goldings for bittering and flavor. However, you can also use Fuggles or even one of the German noble hops, such as Northern Brewer, Perle or Spalt. For a more North American flavor, use Galena or Chinook for bittering and Willamette for flavor. For a Northwestern flavor, you can always use Cascades.

For yeast, I would choose Wyeast 1028 London or White Labs WLP005 British for a drier finish, as you might find in a Newcastle Brown Ale. If you favor a slightly sweeter finish, as would be more typical of a southern English brown ale, try Wyeast 1318 London III or White Labs WLP002 English. ■

Horst Dornbusch is the author of "Prost! The Story of German Beers" (1997, Brewers Publications).

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All BREWFERM beerkits are made to deliver superb Belgian-style beers without a hassle. If you want to personalise the beers even more, here are a few tips and tricks:

- Replace the sugar to be added (partially) with Belgian candy sugar.
- Want more hop aroma? Add a handful of aroma hops in your fermenting bin and leave them while fermenting.
- If the alcohol content is too strong to your taste, diminish the quantity of sugar added.
- Hooked on Wyeast liquid yeasts? Here are a few suggestions:
  - Wheat Beer: use 3944 Belgian White
  - Kriek and Framboise: use 3278 Belgian Lambic blend
  - Diabolo: use 1388 Belgian Strong Ale
  - Grand Cru: use 3522 Belgian Ardennes
  - Old Flemish Brown: use 1762 Belgian Abbey II
  - Abbey Beer: use 3787 Belgian Trappist
  - Gold: use 1338 European Ale or 2042 Danish Lager

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RECIPE

Northern German Wheat
(Coopers Wheat Beer II)
OG = 1.036 FG = 1.012
IBUs = 17 ABV = 2.7%

1. Mix 0.5 lbs. corn sugar and 1.5 lbs. wheat or pale dry malt extract in at least 2 liters of water. 2. Heat to 160 to 180° F (48 to 58° C). Hold for 15 minutes. 3. Remove from heat and mix in one can **Coopers Brewmaster Series Wheat Beer Kit**. 4. Cool wort in pot to room temperature. Transfer into fermenter. Aerate well, then top up to five gallons if necessary. 5. Pitch one package **Coopers Wheat Beer Yeast** when temp is less than 80° F. 6. Ferment at 68 to 74° F.

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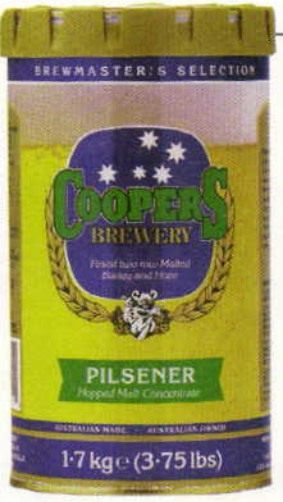

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RECIPE

Put the cans from the beer kit into hot water to soften the contents. Boil about 7 US pints of water, sterilize your fermenter and stirrer and add the boiling water and can contents. Stir well, then add cold water up to the 6 US gallons mark. Now add the yeast supplied. Leave to ferment, then bottle and finally drink — sounds too easy, doesn't it?

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DOCKLANDS PORTER
IMPERIAL STOUT
INDIA PALE ALE

CONNOISSEURS RANGE
EXPORT STOUT
NUT BROWN ALE
BOCK
TRADITIONAL BITTER
YORKSHIRE BITTER
IPA BITTER
CONTINENTAL LAGER
PILSNER
EXPORT PILSNER
WHEAT BEER

PREMIUM RANGE
BITTER
IRISH STYLE STOUT
SCOTTISH HEAVY ALE
PILSNER
AMERICAN STYLE LIGHT
BARLEY WINE
CANADIAN BEER
MIDLAND MILD
OLD ALE
LAGER

"I wouldn't have believed that a kit beer could be so good"

Roy Bailey - Beer Correspondent CAMRA's 'What's Brewing' Magazine (April 2000)

In Roy Bailey's local Good Beer Guide Pub, the customers' reaction was *"uniformly complimentary"* and *"most of them thought it was a full-mash ale"*

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BBC Radio 4 food & drink programme (July 2000)

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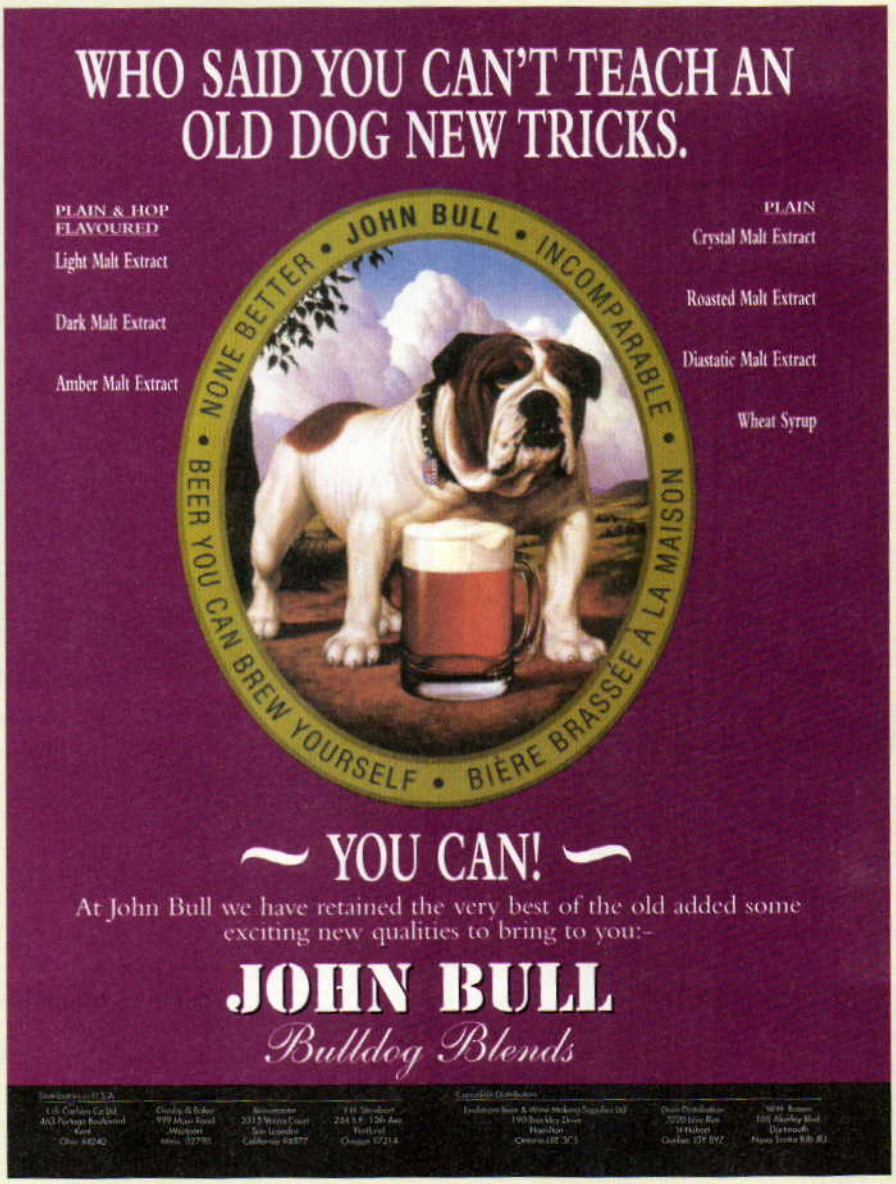

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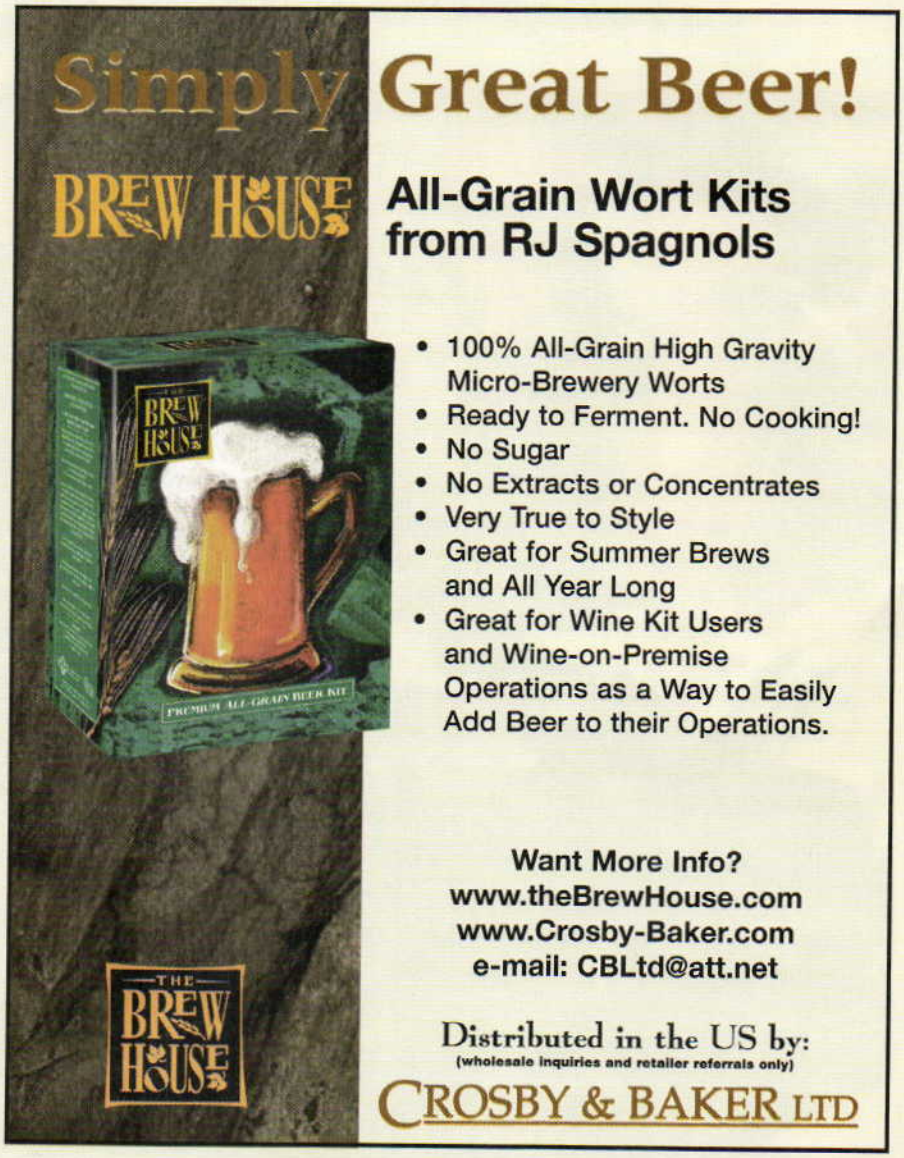

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beer on a PLATE

FROM GERMAN WHEAT BEER POTATO SALAD TO STEAK MARINATED IN SCOTCH ALE, BEER LENDS FLAVOR AND COMPLEXITY TO A LIP-SMACKING ARRAY OF DISHES.

PHOTO BY IAN MACKENZIE

Now you can drink your homebrew and eat it, too! As any gourmand worth his salt knows, beer marries with food as well as wine does — and sometimes beer works even better. The bite of hops, the sweetness of malt and the bready tang of yeast add rich flavors and complexity to a variety of dishes.

Beer can be the superstar in traditional "beer cuisine" like Flemish beef stew (*carbonnade la flamande*) and beer-battered onion rings. It also can be a key component in dressings for salads, marinades for meats, delicate broths for seafood and much more.

Beer as an ingredient is not a new food fad. People have been cooking with beer since the Middle Ages, when it was a staple of their diet. The citizens of the Middle Ages cooked with beer because it was available; we carry on the tradition because of the remarkable flavors beer imparts to dishes.

When used as a marinade, beer will tenderize meat. Soaking fish in beer will remove any fishy character and lend a delicate balance. A reduction of beer makes an excellent glaze, a dark color and sweet caramel coating. Homebrew, which is alive with yeast and carbonation, acts as a leavening agent; it makes breads moist and makes batter coatings, as well as pancakes, light and buoyant.

Pairing beer and cheese is a perfect marriage of flavors. The classic Welsh rarebit is simply cheese thinned with beer, and it also can be used as the liquid in fondue.

So whether you use beer to steam your hotdogs, or want to venture into the flavorful world of beer cuisine by incorporating it into your recipes and trying new ones, here are a few rules to follow. These will ensure your culinary success.

Cooking with Beer: The Basic Rules and Regs

1. Never use beer that you would not drink. If the beer is not palatable, it will not add to the dish. Use your best homebrew; you won't regret it.

2. Beer should add nuances and depth to a dish, but not dominate it.

3. Cooking and simmering concentrates flavors. Do not use an IPA or Imperial Stout in a stew that you would simmer for three hours. The bitterness will be overwhelming and ruin the stew. If you want to use a bitter, hoppy beer in a slow-cooked meal, stir in a small amount during the last five minutes of cooking.

4. This is the most important rule. It applies not only to cooking with beer, but also to pairing beer with foods. Always remember the three C's: Cut, Contrast and Complement. The following are examples of the three Cs:

Cut the heat and spice of a fiery jerk chicken by marinating it in IPA. Serve a soothing light lager with the chicken to contrast the heat of the chicken.

Contrast the assertive flavors of smoked German sausages or Polish kielbasa by making a gravy with a malty Oktoberfest. Complement the smoke in the meats with a classic German rauchbier.

Complement the tender, delicate flavor of squid in beer-batter fried calamari by using a light, dainty German wheat beer in the batter. The beer to drink with this meal is a hoppy American IPA. The bitter hops will cut the oil you used to fry the squid. Bitterness cuts through fat.

Our Beer Menu: A Flavorful Homebrew Feast

This menu is easy and elegant at the same time. It's a perfect menu for guests. Just add some warm, crusty beer bread with individual dishes of extra-virgin olive oil that have been warmed with a clove of garlic, a sprig of rosemary and hot pepper flakes.

Serve a simple salad of baby greens with a raspberry ale or gueuze vinaigrette. We always finish our meal with a strong Belgian ale. We find that the Belgian ales, maybe because of the spices in the beer and the spicy properties of the yeast, make an excellent digestif. Enjoy!

Lager and Lime Shrimp Appetizer

Yield: 4 as an appetizer

This festive appetizer is adapted from my brother's recipe. Michael and his wife Sharon live in New Mexico and slightly different versions of this dish are served all over the Southwest. It is traditional to serve saltine crackers with this, but freshly made tortilla chips are a delicious accompaniment. Be sure to present the shrimp in an icy margarita glass. You can drink the same lager that is used in the recipe, but we prefer a Vienna lager.

Ingredients

1 16-oz. bottle of light lager (Kölsch, Czech Pils or helles), reserving two tablespoons
1 pound large shrimp (21–24 per pound)
1 large ripe tomato (approximately 8 oz.), seeded and roughly chopped
1/2 cup tomato juice
2 tablespoons reserved beer
1 tablespoon tequila
4 tablespoons fresh lime juice
1 large clove of garlic, minced
1 to 2 teaspoons of Tabasco sauce
Sea salt and freshly ground pepper (to taste)
1/2 teaspoon cumin
1 medium Haas avocado, cut in cubes
1/2 medium sweet red pepper (chopped)
5 tablespoons diced Vidalia or sweet onion
1/2 cup diced celery
4 tablespoons chopped fresh cilantro
1 medium or large minced fresh jalapeno (depending on heat level)
4 slices of lime for garnish
4 sprigs of fresh cilantro for garnish
Saltine crackers or freshly-made tortilla chips

Method

Devein the shrimp, leaving the shell intact. In a saucepan, cover the shrimp with the beer. Slowly bring to a boil and simmer one to two minutes. The shrimp should turn pink. Cool the shrimp in the liquid. Drain, peel the shrimp and cut into three pieces. Chill.

BY TESS AND MARK SZAMATULSKI

Classic Beer Styles Matched to Dishes

The following is a list of classic beer styles and a sample entrée you can cook with each beer. These examples will help you understand what kind of beer works well with various dishes.

American light lager:
Barbecued Texas beef brisket
American dark lager:
Basted Smithfield ham with onion chutney and sweet-hot mustard
European pale lager:
Manila clams steamed in lager and fresh herbs.
Light ale:
Chili con queso with homemade fresh tortilla chips.
Bitter or English pale ale:
Dungeness crab chowder.
Scottish ale:
Salmon braised in Scottish ale, fresh dill and cream.
American pale ale:
Rosemary basted smoked chicken with garlic broccoli rabe.
American amber ale:
Habanero- and garlic-rubbed roasted chicken wings.
California common:
Marinated grilled pork tenderloins with spicy orange-beer vinaigrette.
India pale ale:
Steamed crawfish linguine smothered in fire sauce.
Kölsch:
Grilled sea scallops over kölsch risotto.
Altbier:
French onion soup with garlic toast and melted Gruyere cheese.
English brown ale:
Sauteed softshell crabs in brown ale sauce.
American brown ale:
Double-cut pork chops with an onion and potato gratin.
Old ale:
Glazed rack of lamb with a rosemary old ale sauce.
Wee heavy:
Toffee pudding.
English barleywine:
Fig tarts with walnuts.
American barleywine:
Andouille-stuffed chicken breast with barleywine mushroom sauce.

In a food processor or blender add the tomato, tomato juice, reserved beer, tequila, lime juice, garlic, Tabasco, salt, pepper and cumin. Blend until it is smooth.

Combine the shrimp, avocado, red pepper, onion, celery, cilantro and jalapeno. Chill for one hour.

Serve in a margarita glass with the lime and cilantro garnish and crackers or chips on the side.

Warm German Potato Salad With Beer Dressing

This warm potato salad is full of robust flavors that will stand up and accompany the steak perfectly. Not a run-of-the-mill mayo-laden salad, this German alternative has deep flavor and a bit of a bite. If you're just having this as a snack, pour yourself a tall glass of German weissbier to complement the salad.

Ingredients

5 Yukon Gold potatoes (approximately 2 to 2-1/4 pounds)
5 slices thick-cut bacon, cut into 1-inch strips (approx. 1 pound)
1/4 cup chopped white onion
Sea salt and freshly ground pepper
1/2 cup German wheat beer
1/3 cup cider vinegar, divided in half
1 tablespoon brown sugar
1 tablespoon German whole-grain mustard
1 tablespoon chopped dill pickle
3/4 cup chopped celery
1/4 cup chopped green onions (green part only)
1/8 cup chopped flat-leaf parsley (for garnish)
Hungarian sweet paprika for garnish
2 hard boiled eggs, sliced (optional)

Method

In a large saucepan, boil potatoes with enough salted water to cover by one inch and simmer until just tender. Peel and slice when they are cool enough to handle. While potatoes are cooking, in a medium skillet cook the bacon until crispy. Drain the bacon on paper towels.

Drain potatoes and slice. Combine with the bacon. Cover and keep warm.

Pour all but two tablespoons of bacon fat from the skillet. Sauté the white onion in the bacon fat until tender (not brown) with salt and pepper. Add the beer, half of the vinegar, sugar, mustard and dill pickle and simmer two to three minutes. Add the sautéed onion mixture to the potato-bacon mixture. Add the remaining vinegar, dill, celery, green onions and salt and pepper to taste. Toss gently, garnish with parsley, paprika and optional hard-boiled eggs. Serve immediately.

Porterhouse Steaks

(Marinated in Scotch Ale and Smothered with Beer-Carmelized Onions and Scotch Gravy)

Yield: 4 generous servings

Cooking the perfect steak is an art form. It takes knowledge, a great cut of meat, a hot grill and a sublime marinade. Smother the steak with onions that have been caramelized in Scotch ale. This is steak with an attitude, so make sure you have enough Scotch ale for the cook! If you find that Scotch ale is too heavy for your guests, a Scottish 80-shilling ale will also be nice. Any leftover steak can be sliced thin and served on a Caesar salad the next day.

Ingredients

4 porterhouse steaks (1-1/2 inches thick)
2 tablespoons of unsalted butter
Generous grindings of sea salt and black pepper

Marinade

16 ounces Scotch ale
1/2 tablespoon freshly ground black pepper
2 tablespoons soy sauce
3 cloves of garlic minced
4 green onions, sliced
1 tablespoon brown sugar

Caramelized onions:

3 large Vidalia or sweet onions, sliced
6 tablespoons unsalted butter
Sea salt and freshly ground black pepper (to taste)
4 ounces Scotch ale

Gravy:

4 ounces sliced portobello mushrooms, gills removed

2 tablespoons unsalted butter
3 tablespoons Scotch ale
3 tablespoons Scotch whiskey
10 ounces heavy cream
1 tablespoon soy sauce
1/2 teaspoon Hungarian sweet paprika
Sea salt and freshly ground black pepper to taste
Chopped parsley for garnish

Method

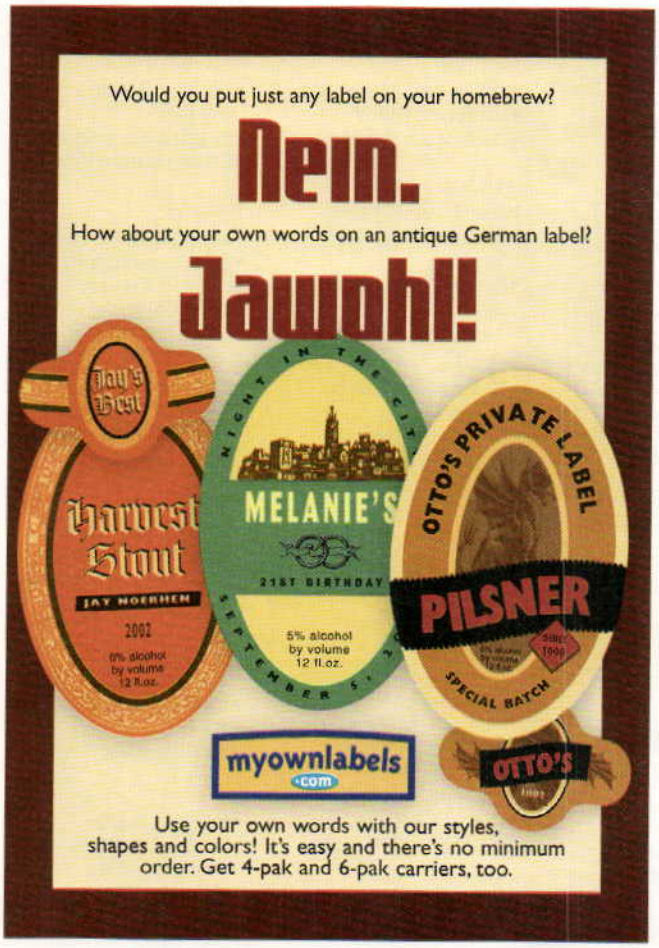
Whisk the marinade ingredients together. Put the steaks in Ziploc bags and divide the marinade evenly between the bags. Marinate in the refrigerator for 8–12 hours. Remove the steaks from the marinade and let them come to room temperature. To prevent curling, slit the fat at two-inch intervals. The grill should be clean and well oiled. If using a charcoal grill the coals should be white-hot. Pre-heat a gas grill for 10 minutes before grilling the steaks. Cook to desired doneness, either rare at 130° F (5 minutes for the first side, six minutes for the second side) or medium-rare at 145° F (7 minutes for the first side, eight minutes for the second). To sear the steaks, leave the lid off for the first two minutes of cooking on each side. If anyone wants this steak well-done, serve them a hamburger. Use tongs, not a fork, to handle the steak. Turn only once. When the steak is done, take it off the grill and put 1/2 tablespoon of butter on each and sprinkle with sea salt. Cover with foil and let rest five minutes. Serve with the onions and gravy.

To caramelize the onions: Melt the butter in a cast-iron pan. Add the onion with salt and pepper. Over medium heat, brown the onion, stirring occasionally. When the onions begin to brown, add the Scotch ale one ounce at a time. Let the beer evaporate before adding the next ounce. After all of the Scotch ale has been added, the onions should be deep brown and nicely caramelized. Adjust for salt and pepper. Keep the onions warm while you make the gravy in the same pan. Do not wash the pan after removing the onions.

To make the gravy: In the cast-iron pan used to caramelize the onions, sauté the mushrooms in the butter until all of their liquid has evaporated. Add the Scotch whiskey and carefully ignite to burn off the alcohol. Then add Scotch ale and stir to reduce by half. Add the rest of the ingredients except the parsley garnish and simmer until the gravy has reduced and thickened.

To assemble: Put the steak in a warmed plate, spoon gravy on and around it. Top with the onions and sprinkle the chopped parsley over all. ■

Tess and Mark Szamatulski own Connecticut's largest homebrew store, Maltose Express in Monroe. They are also the authors of "Clonebrews" (Storey Communications, 1998) and "Beer Captured" (Maltose Press, 2001). They are currently working on a book about cooking with beer and a third beer-recipe book



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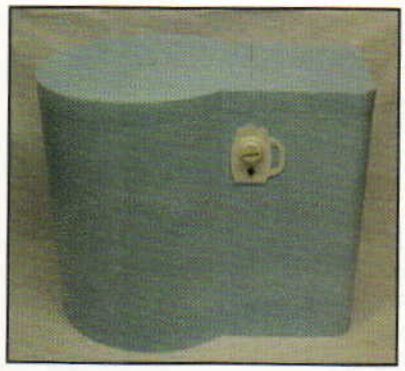

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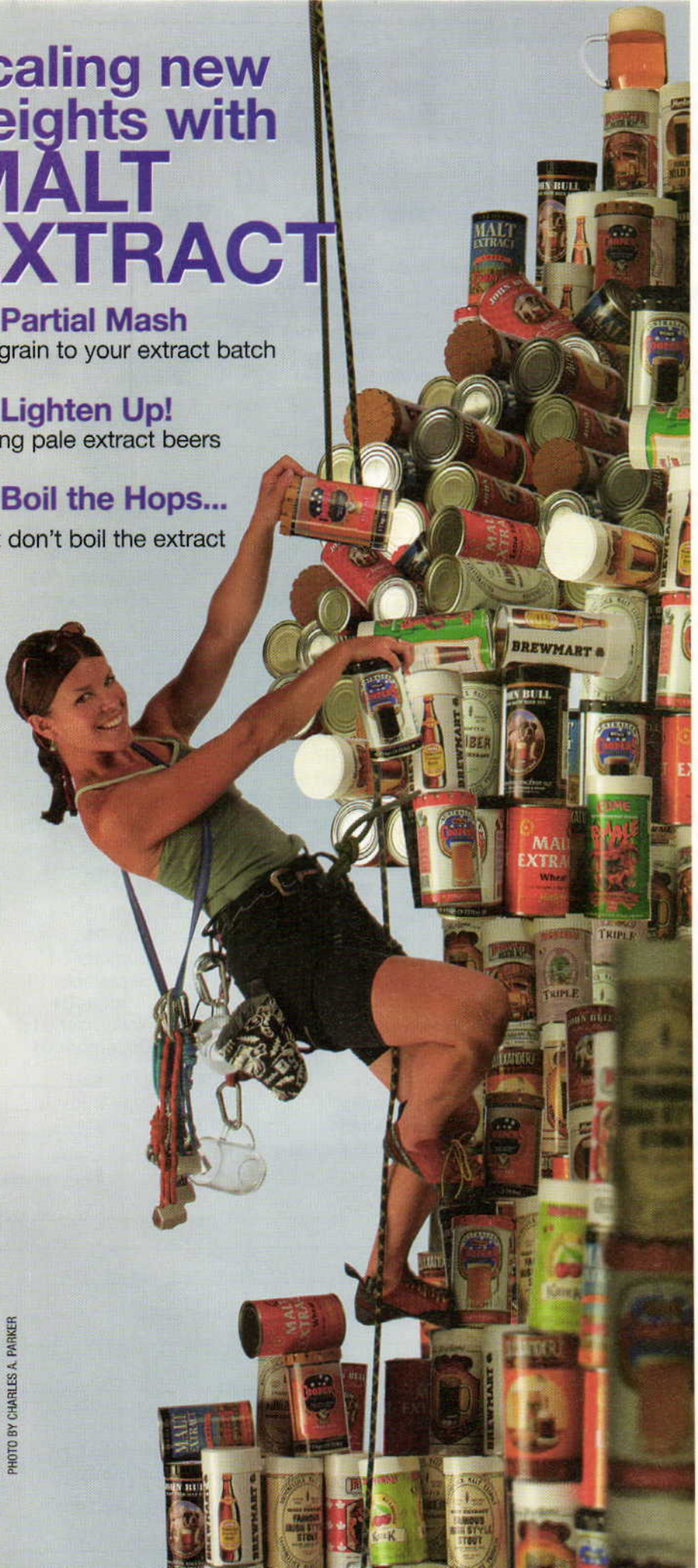


PHOTO BY CHARLES A. PARKER

partial MASH

Add some grain to your extract batch

by Mark Henry

Hello. My name is Mark Henry, and I love malt extract. It's easy to use, produces consistent results and requires minimal prep time. The only thing I believe you can't do with malt extracts is imitate the beer styles that come from well-used Munich malt, such as German bocks or Oktoberfests, or duplicate the wonderful flavors that can be achieved with some of the more esoteric Belgian malts in abbey beers. These various malts simply must be mashed to achieve their full effect. However, you don't need to switch to all-grain brewing to use these malts easily . . . at least you don't need to if you are using them in conjunction with malt extracts!

So, let's say you want to work with the Belgian aromatic malt that you tasted in the shop, but don't want your brewing process to become too complicated. The answer is partial or "mini" mashing. As the name implies, with partial mashing you are relying upon grains to supply a small percentage of your wort, with the balance coming from the use of malt extracts. This allows you to be somewhat easygoing with your mashing procedure.

The key to easy "mini-mashing" is to relax and remember that all you need to do is ballpark everything. Because malt extracts will always give us a pre-determined amount of fermentables and a pre-determined base flavor profile simply by opening the can, we are working around the edges of the beer's profile when we work with grains. And those edges don't have to be exact to make or break our beer. As long as we keep the various parameters within the ballpark, our beers will come out just fine. One caveat: just as

the idea of "ballparking it" implies, you cannot go into this expecting to nail a specific color or gravity.

I mentioned Munich malt and aromatic malt. What are some of the other malts that really should be mashed? Why can't they simply be steeped, like so many recipes call for? (While both mashing and steeping involve soaking grain in hot water, mashing has very specific time and temperature requirements for converting starch to sugar.)

When barley is malted, chemical reactions occur that make it possible for the brewer to turn starch into sugar during the mashing process. Base malts have undergone this process, and now only need the knowledgeable brewer to turn the starch into sugar. These base malts are known by a variety of different names, with the most widely-used base malts being Pilsner, lager, pale ale, pale, Munich, Vienna, mild, aromatic, wheat and rye malt. Because these malts still have significant amounts of starch, their use without mashing may impart some flavor characteristics, but not the full range possible. And you will most certainly invite a haze in your beer from the dissolved, unconverted starches.

The other class of malts is commonly referred to as specialty malts. These have had further processing at the malting facility and most of the starches have already been converted to sugar. To make use of specialty malts — such as crystal, chocolate, black and biscuit malts — one need only steep them in water to leach out the sugars and flavor profiles.

Most malt extracts are produced, depending upon their purpose, using different amounts of Pilsner, pale, crystal, wheat, chocolate and black malts. While this may cover most beer styles well, what about bocks? Or rye beers? Other styles that are difficult to reproduce using only malt extracts are Oktoberfest, Märzen and Belgian abbey beers. One of the more inventive uses of Munich malt is in really high IBU American-style IPA's. A group of intrepid homebrewers out of the Pacific Northwest discovered in the late 80s that generous amounts of Munich malt allowed IPA's to get really, really bitter, while still retaining some malt balance. So let's make a really hoppy IPA. We'll "just keep it in the ballpark" by using malt extract and a simple "mini-mash."

Instant Karma IPA

6.6 lbs. Coopers light malt syrup
1 lb. Coopers light dry malt extract
2 lbs. Dingeman's Munich malt
0.5 lb. Dingeman's aromatic malt
3 oz. Columbus hops
2 oz. Cascade hops
White Labs WLP001 (California Ale) or Wyeast 1056 (American Ale) yeast

Using fresh malts is key with any type of brewing! If Columbus hops are not available, use Centennial.

The Tools:

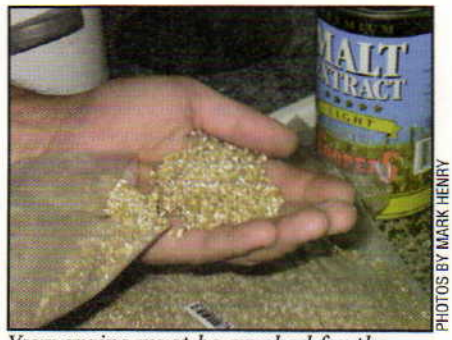
In addition to your regular brewing pot and fermenting vessels, you will also need:

1. Dutch oven, or other large pot with a lid, capable of holding at least seven quarts, that you can put in the oven.
2. A large spaghetti colander.
3. A sauce pan, capable of holding five quarts of water.
4. A thermometer.

The Mini-Mash Procedure:

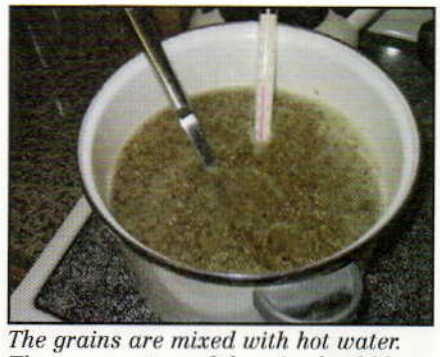
Begin by bringing 1.25 quarts of water per pound of grain that you are mashing up to a light boil in the saucepan. If your pot or Dutch oven is not capable of holding this volume, you can reduce the quarts per pound to 1 quart per pound. Whenever convenient, I like to boil the water I'm using to boil off any chlorine. In the case of our IPA recipe, we will be boiling 3.5 quarts. After a five-minute boil, remove the pot from the stove and allow the water to cool to around 160–170° F. It is not necessary to put the lid on while it cools.

While waiting for the water to cool, turn your oven to its lowest setting. On my stove that is "warm" and it gets the inside up to about 160° F, which is just about perfect. As long as the temp inside your oven is between 140–160° F, you will be just fine. Once your water is in the 160–170° F range, transfer it to your Dutch oven and slowly mix in the crushed grains. Make certain you add the grains slowly enough to prevent dry clumps. After your "mash" is

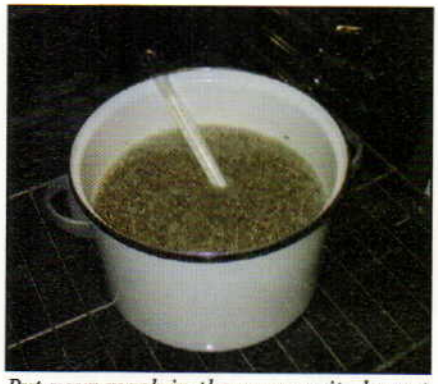


PHOTOS BY MARK HENRY

Your grains must be crushed for the partial mash to work. Your homebrew shop can do this for you.



The grains are mixed with hot water. The temperature of the mix should be between 150–158° F.



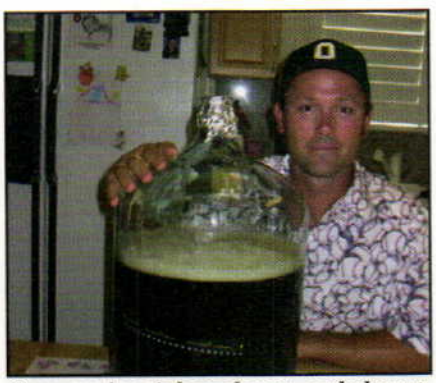
Put your mash in the oven on its lowest setting to maintain the temperature of the mix. Leave the lid on when you're not checking the temperature.

After mashing, the grains should be rinsed with hot water to release the sugars into the wort.

Add hops to the wort and boil them to extract their bitterness. Here, Mark adds Columbus pellet hops.

Once the wort has been boiled and the heat has been shut off, add your malt extract to reach your target gravity.

Your wort can be cooled in a sink, or you can use a wort chiller. The wort must be cooled before adding yeast.



Once you've siphoned your cooled wort to your fermenter, sit back and let the yeast do its work. It'll be beer soon.

thoroughly mixed, put the lid on your pot and put it in the oven for 30–45 minutes. If the lowest setting on your oven leaves you a bit warm, turn the oven off just before you put the pot in it. The temperature of the oven and the mash will stay close enough to achieve the desired results.

Resist the urge to peek while the grain is working! If you let off too much heat and the temp drops below 145° F, you will have to get the temp back up and that risks getting the mash too hot. Best to just leave it to its own devices. After your mash has been in the oven for 30–45 minutes, pull it out. It's time to get the goodies out of grain! While your grain was in the oven, the starch in the grains was being degraded into sugar, and all the flavors these grains will impart were being drawn out.

Place the spaghetti colander over your brewing pot. You may need someone to hold it for you. Dump the grains into the colander, making certain any liquid runs off into your brew pot. I am not able to get a full 2.5 lbs. of mash into my colander. Don't worry, just put as much in as you comfortably can. Pull a few cups of hot tap water and slowly pour it over the mash. Repeat this until you have slowly poured roughly 1.5 quarts of water per pound of grain that you mini-mashed over your entire mash, in this case roughly 3.75 quarts.

While you are waiting the 30–45 minutes, bring 1.5 quarts of water per pound of grain used to a light boil in a large pot. After boiling for five minutes, take it off the heat and put a lid on it, allowing it to cool somewhat. You want the temperature of this water to be between 140–170° F; basically hot, but not boiling. If your colander is capable of sitting on the top of your brew pot without the help of an assistant, then you can slowly pour the water over the grains, allowing the liquid to collect in your brew pot. Otherwise, I recommend ladling the water over the grains to prevent possibly burning your brewing partner and being forced to drink alone. If you have not been able to get all the grain into your colander, then rinse the grain in shifts. Save enough water to finish rinsing any grain still in the Dutch oven. After you have rinsed the grains with all the water, you are finished with them. And you are done mini-mashing. Congratulations! Add additional water to your brew pot to get up to the volume of water you traditionally use for your extract brewing.

The Boil:

You will have approximately 1 to 1.5 gallons of water in your pot from rinsing the grains. Add another gallon or so of water (remember, this is "ballpark" brewing) and two ounces of Columbus hops. Now bring your wort to a nice light boil for thirty minutes. Your boil does not need to be too aggressive to extract the hop bitterness. With fifteen minutes remaining in the boil, add the two ounces of Cascade hops. With two minutes boil time left add the remaining ounce of Columbus hops. After the thirty-minute boil, turn off the heat, wait for the wort to come down off its boil and then mix in the light malt extract and DME. Be sure all the extracts are thoroughly dissolved. You will note that I do not call for boiling the malt extracts. One of the more recent trends in extract brewing is to not boil malt extracts that were boiled prior to being concentrated. This essentially eliminates the need to boil at home. Sanitation is still very important, so you do need to mix in the malt extracts while the wort in your pot is still over 160° F. Once well mixed, put the lid on your pot and cool your wort in a sink or with a wort chiller. Once the wort is cool, pitch your yeast and ferment for 7–10 days. Transfer your beer to a secondary fermenter for three to seven days before packaging.

My name is Mark Henry, and I like brewing with malt extracts. I also like rye beers in the summer and bocks in the winter. By following the ballpark guidelines I've just laid out, you too can enjoy the best the world has to offer. Here are some more of my favorite mini-mash recipes. They all employ malts that must be mini-mashed to work. Enjoy your day at the "park!"

→

Mark Henry is a co-owner of Cascadia Importers, the North American importers of Coopers Brewery products.

Beer made the PARTIAL-MASH way

A Wry Smile Rye Beer

(5 gallons, partial mash)
OG: 1.059 FG: 1.018
IBU: 12 SRM: 9

Ingredients

6.6 lbs. Coopers light malt syrup
1 lb. 6-row pale malt
2 lbs. rye malt
0.5 lb. Munich malt
6 AAU Mt. Hood hops (30 minutes) (1.5 oz. of 4% alpha acids)
1 oz. Hersbrucker hops (5 minutes)
Coopers Ale or White Labs WLP001 (California Ale) or Wyeast 1056 (American Ale) yeast
1.25 cups light dry malt (priming)

Step by step

Crush the pale malt and rye malt, put the crushed malts in a grain bag and mash them at 150–158° F for 60 minutes. Put the grain bag in a colander and rinse the grains with hot water. Boil the "grain tea" for 45 minutes, adding the bittering hops when 30 minutes are left in the boil. Add the finishing hops with five minutes left in the boil. Turn off the heat and add the malt extract. Stir thoroughly and let sit for 15 minutes. Make sure the temperature remains above 160° F. Cool wort in sink and add to fermenter, topping up to five gallons. Add yeast and let ferment seven days at 72° F. Bottle with 3/4 cup of corn sugar and let condition for two weeks.

Say It Ain't So: Strike-Tonic Festbier

(5 gallons, partial mash)
OG: 1.075 FG: 1.021
IBU: 16 SRM: 7
(original recipe by David Brockington and Mark Henry)

Ingredients

6.6 lbs. Muntons light malt syrup
2 lbs. Munich malt
1 lb. German Pilsner malt
1 lb. Dingeman's CaraVienne malt
1 lb. Dingeman's CaraMunich malt
8 AAU Ultra leaf hops (30 min) (2 oz. of 4% alpha acids)
4 AAU Mt. Hood leaf hops (15 min) (1 oz. of 4% alpha acids)
1 oz. Mt. Hood leaf hops (1 min)
White Labs WLP820 (Oktoberfest/Märzen) or Wyeast 2206 (Bavarian Lager) yeast
1 cup light dry malt (for priming)

Step by step

Crush the Pilsner malt, Munich malt, CaraVienne malt and Cara-Munich malt. Put the crushed malts in a grain bag and partial mash them at 150–158° F for 60 minutes. Put the grain bag in a colander and rinse the grains with hot water. Boil the "grain tea" for 45 minutes, adding the bittering hops when 30 minutes are left in the boil. Add the finishing hops with 15 minutes left in the boil. Add the second dose of finishing hops with one minute left in boil. Turn off the heat and add the malt extract. Stir thoroughly and let sit for 15 minutes. Make sure the temperature remains above 160° F. Cool wort in sink and add to fermenter, topping up to five gallons. Finish brewing as normal.

Evergreen Bock

(5 gallons, partial mash)
OG: 1.083 FG: 1.025 IBU: 8 SRM: 14
(2nd in the Best-of-Show round of the 1997 St. Patrick's Day Competition held in Seattle)

Ingredients

6.6 lbs. Coopers light malt syrup
2 lbs. Coopers light dry malt extract
2 lbs. Dingeman's Munich malt
1 lb. Breiss dark Munich malt
0.5 lb. Dingeman's aromatic malt
4 AAU Mt. Hood hops (30 min) (1 oz. of 4% alpha acids)
0.5 oz. Mt. Hood hops (2 min)
1 tsp. calcium chloride
White Labs WLP 830 (German Lager) or Wyeast 2124 (Bohemian Lager) yeast
1.25 cups light dry malt (priming)

Step by step

Crush the Munich malts and aromatic malt and put the crushed malts in a grain bag. Mash them at 150–158° F for 60 minutes. Put the grain bag in a colander and rinse the grains with hot water. Boil the "grain tea" for 45 minutes, adding the bittering hops when 30 minutes are left in the boil. Add the finishing hops with 5 minutes left in the boil. Turn off the heat and add the malt extract. Stir thoroughly and let sit for 15 minutes. Make sure the temperature remains above 160° F. Cool wort in sink and add to fermenter, topping up to five gallons. Ferment for seven days at 72° F, then bottle with 1.25 cups of light dried malt extract.

I find that calcium chloride has the same effect in beer, when used judiciously, as sodium chloride (table salt) has on food.

LIGHTEN up!

Move your light-colored extract beers out of the "red zone"

by Anita Johnson

Too often, a light beer made from malt extract turns out too dark. We've all seen wheat beers the color of pale ales! When using malt extract, it can be difficult to make a light-colored beer. By following these tips, your beers will avoid the dreaded "red zone" and turn a whiter shade of pale.

1. Avoid Carmelization

One of the most common causes of darker-than-expected beer color is the carmelization of malt extract during the brewing process. To avoid this carmelization, completely remove the brew pot from the heat source before adding the malt extract. Simply turning off a gas burner is sufficient. However, because electric burners stay hot long after being turned off, it is best to remove the brew pot from an electric burner before adding the malt extract. Make sure the malt extract is completely dissolved prior to turning the heat back on.

2. Use a Heat Diffuser

Placing a heat diffuser between the bottom of the brew pot and an electric burner can prevent carmelization from the direct heat. Heat diffusers can be found in cooking stores or can be made from a large gauge copper wire bent to support a pot on the burner.

3. Boil a Larger Volume

Boiling all five gallons of your wort, instead of two to three gallons of concentrated wort, will lighten the color of a beer. A "working strength" wort is less likely to carmelize than a more highly concentrated wort. You'll want a vigorous boil to get full utilization of the alpha acids from the hops, but an overly vigorous boil can darken the sugars. A gently rolling boil is best.

4. Add Your Extract Late

Add the malt extracts during the last 10 minutes of the boil to pasteurize the extract and to reduce carmelization. This is a radical departure from conventional homebrewing wisdom, but it significantly lightens the color of the beer. (See the accompanying article on page 40 for more information.)

5. Use Dried Malt Extract

Dried malt extract contributes less color than liquid malt extract due to the manufacturing process. To make liquid malt extract, wort is concentrated by removing a large amount of water. Although this concentration is done under a vacuum to reduce the required temperature, the wort is heated for a long period of time. This long heating process contributes to the darkening of liquid extract. Dry malt is concentrated by spraying wort into a super-heated room (thus the name spray-dried malt). By the time the wort reaches the floor, the water has evaporated and the result is dry malt powder. The spray-drying process darkens the extract less than the vacuum-heating manufacturing process. Since dry malt lacks the moisture content that promotes browning reactions, dry malt also darkens less than liquid malt during storage.

6. Substitute Ingredients

Substituting rice syrup, corn sugar or honey for malt extract will lighten the beer color without sacrificing alcohol content. These fermentables should be added during the last 10 minutes of the boil. Rice syrup solids can replace about 25% of the malt extract, while corn sugar and honey additions should be no more than 15% of the total fermentable sugar in a recipe. Rice syrup, corn sugar and honey lack some of the vitamins and amino acids that yeast need to ferment, so it is advisable to add 1/8 tsp. of yeast nutrient per gallon to avoid stuck fermentations.

7. Try a Partial Mash

An extract brewer may opt to replace a portion of the malt extract with pale barley malt and do a partial mash. In a partial mash, the pale malted barely that replaces the malt extract is mashed to convert the starches into sugars. The sugars are rinsed from the grain and will take the place of a portion of the malt extract in the brew pot. (See the article on page 34 for more information.)

→

Anita Johnson is the owner of Great Fermentations of Indiana.

PHOTOS BY ANITA JOHNSON

A heat diffuser prevents hot spots on the bottom of your brew pot, reducing the likelihood of wort carmelization.

Turning the burner off before adding the malt extract also helps prevent wort carmelization.

Boiling the full wort lessens the amount of wort darkening that occurs during the boil, making for lighter beer.

deLIGHTful EXTRACT BEERS

Easy Wheat

(5 gallons, partial mash)
OG: 1.054 FG: 1.012
IBU: 24 SRM: 6

Ingredients:

5 lbs. wheat dry malt extract
1 lb. pale malt
0.25 lb. CaraPils malt
0.5 lb. wheat malt
6 AAU Tettnang hops (bittering) (2 oz. of 3% alpha acids)
1 tsp. Irish moss
Wyeast 3056 (Bavarian Wheat) or Wyeast 3068 (Weihenstephan Wheat) or White Labs WLP300 (Hefeweizen) or White Labs WLP320 (American Hefeweizen) yeast
5 oz. corn sugar (for priming)

Step by step

Place crushed grains in muslin bag and add to one gallon of 150° F water. Allow grain to steep for 45 minutes. This is your "grain tea." Remove grain bag and rinse grains with two cups of hot water. Add malt extract to "grain tea." Top up kettle to desired volume. Add Tettnang hops and begin 60-minute boil. Add Irish moss with 20 minutes left in the boil. Chill wort as quickly as possible. Pour cooled wort into a fermenter. Add chilled bottled water to equal five gallons. Aerate well by shaking carboy. Pitch yeast. Let ferment for four to seven days. Transfer from the primary to the secondary fermenter. Bottle when the specific gravity is stable around 1.012. To bottle, dissolve five ounces of corn sugar in one cup water and boil 10 minutes to make a priming solution. Add priming solution to beer, fill bottles and cap. Bottle condition at room temperature for one to two weeks.

Kölsch

(5 gallons, partial mash)
OG: 1.045 FG: 1.011
IBU: 23 SRM: 5

Ingredients:

4 lbs. unhopped light dried malt extract
1 lb. unhopped wheat dried malt extract
4 oz. wheat malt
2 oz. honey malt
7 AAUs Spalt hops (bittering) (1.5 oz. of 4.6% alpha acids)
0.6 oz. Spalt hops (aroma)
1 tsp. Irish moss
Wyeast 2565 (Kölsch) or White Labs WLP029 (German Ale/Kölsch) yeast
5 oz. corn sugar (for priming)

Step by step

Place crushed grains in muslin bag and add to two to three gallons of 150° F water. Allow grain to steep for 30 minutes. Remove grain bag. Rinse with hot water and gently squeeze bag to remove liquid. Add malt extract to "grain tea." Stir thoroughly to dissolve malt extract. Add Spalt hops and begin 60-minute boil. Add Irish moss with 20 minutes left in the boil. Add 0.6 oz. of Spalt hops with two minutes left in the boil. Chill wort as quickly as possible. Pour wort into fermenter with enough chilled bottled water to equal five gallons. Aerate well by shaking carboy. Pitch yeast ferment between 65–70° F for four days to one week. Transfer from the primary to the secondary fermenter and allow to condition for a futher three to seven days. Bottle when the beer is clear. Prime with five ounces (approximately 3/4 cup) priming sugar. Allow beers to condition at room temperature for one to two weeks.

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Boil the HOPS, not the EXTRACT

How to make the pale, hoppy extract brew you want.

By Steve Bader

Working in a retail home beer and wine supply shop gives me the opportunity to talk to thousands of homebrewers and listen to their stories, both good and bad, about their brewing experiments.

Extract brewers sometimes ask me, "Why is my pale ale the darkness of an amber beer? Why is my IPA not as bitter as I want it? Why does my beer have a slightly burnt taste?" I believe that all three problems are related to the same procedure.

Like most extract homebrewers, my customers were boiling their malt syrup in only about 2–2.5 gallons of water when making a standard five-gallon batch of beer. The reasons for boiling the malt in a small amount of water are because most kitchen stoves and boiling pots are limited to about this amount. Some of the water evaporated while they were boiling their beer, so that the wort they were boiling was of a very high specific gravity — as high as 1.130. Boiling the syrup for 60 minutes in this high-sugar environment caused some of the malt sugars to be scorched on the bottom of the boiling pot, causing the "burnt malt extract" flavor in their beers. Boiling the malt sugar in such a thick concentration also increased the darkness of their beers.

The amount of hop bitterness extracted from hops during boiling is affected by both time and the thickness of the wort. The longer you boil hops, the more hop bitterness is extracted. After about 45 minutes, however, you begin to get a diminishing return. The thicker the wort that the hops are boiled in, the less hop bitterness is extracted. In a situation where you are boiling approximately 6.6 pounds of syrup in two gallons of water, your boiling gravity is nearly 1.100. In this situation, your hop extraction is roughly 75 percent of what you would achieve with a full boil, causing your beers to be less bitter than what you were shooting for, especially on beers that you wanted to be highly bittered.

The obvious answer was to ask all my customers to change their method and boil their malt and hops in just over five gallons of water for 60 minutes. After evaporation during the boil, they would end up with five gallons of beer. This "full-wort boil" is just what the commercial brewers do, and it is how they get the desired results in their beers.

Well, this is a great idea in theory, but a poor idea in practice for most homebrewers. This would mean that the brewer would have to obtain a larger boiling pot and a wort chiller (since you need to cool the beer from boiling down to at least 80° F to add the yeast). They may even need a propane burner, since their stovetop may not easily boil five-plus gallons of wort. Another hurdle is that it will take longer to bring this much liquid to a boil, if their stovetop has enough heating power to do this. I tried it once, and found that it took nearly 45 minutes to bring the beer up to a boil.

Some homebrewers are willing to spend the money for more cool brewing gadgets, but most just want to keep brewing simple and fun. So while this method is a great answer, it is not very practical for many homebrewers. Then the idea finally hit me like the hop

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PALE, HOPPY extract beers

Northwest Pale Ale

(5 gallons, partial mash)
OG: 1.050 FG: 1.014
IBU: 65 SRM: 15
(4th place overall, Clark County Fair homebrew competition 2002)

Ingredients

6.6 lbs. Coopers light malt syrup
1 lb. Munich malt (10° L)
1 lb. Great Western two-row pale malt
18 AAU Centennial hops (bittering) (2 oz. of 9% alpha acids)
5 AAU Cascade hops (flavor) (1 oz. of 5% alpha acids)
1 oz. Cascade hops (aroma)
1 tsp. Irish moss
White Labs WLP001 (California Ale) or Wyeast 1056 (American Ale) yeast
3/4 cup corn sugar (for bottling)

Step by step

Steep crushed grains (Munich malt and two-row malt) in two gallons of 150° F water for 30 minutes. Remove the grain from the hot water with a strainer, then bring wort to a boil. When boiling starts, add two ounces of Centennial hops and boil for 60 minutes. Add one ounce of Cascade hops and Irish moss with 15 minutes left in the boil. Add one ounce Cascade hops for last five minutes of the boil. Then turn the heat off and add your malt syrup. Stir to dissolve and let the wort stand for five minutes to sanitize. Cool the wort in your sink (or use a wort chiller) and siphon wort to fermenter. Aerate wort and pitch yeast. Let the beer ferment for four to seven days then rack to secondary fermenter. Let condition for three to seven days, then prime with corn sugar and bottle. Allow one to two weeks for bottle conditioning.

Bohemian (Czech) Pilsner

(5 gallons, partial mash)
OG: 1.049 FG: 1.014
IBU: 32 SRM: 7

Ingredients

6.6 lbs. Muntons light malt syrup
0.5 lb. crystal malt (20° L)
1 lb. Pilsner malt
0.5 lb. dextrin malt
10.5 AAU Saaz hops (45 minutes) (3 oz. of 3.5% alpha acids)
3.5 AAU Saaz hops (30 minutes) (1 oz. of 3.5% alpha acids)
3.5 AAU Saaz hops (15 minutes) (1 oz. of 3.5% alpha acids)
1 tsp. Irish moss
White Labs WLP800 (Pilsner) or Wyeast 2278 (Czech Pils) yeast
3/4 cup corn sugar (for bottling)

Step by step

Steep crushed malted grain in two gallons of 150° F water for 30 minutes. Remove the grain from the hot water with a strainer, then bring water to a boil. When boiling starts, add boiling hops and Irish moss and boil for 60 minutes. Add second addition of hops for last 30 minutes of the boil. Add third addition of hops for last 15 minutes of the boil. Fill your sanitized carboy with two gallons of cold water. Then turn the heat off and add your malt syrup, then stir to dissolve and let stand for five minutes to sanitize. Strain the hot wort into the carboy and top off to the five-gallon mark. Add yeast when beer is less than 75° F, aerate the beer and pitch your yeast. Leave beer at room temperature until fermentation begins (about 24 hours), then cool and ferment at 50–55° F. Cooler temperatures cause fermentation to go slower, about three to four weeks. Bottle as usual and enjoy!

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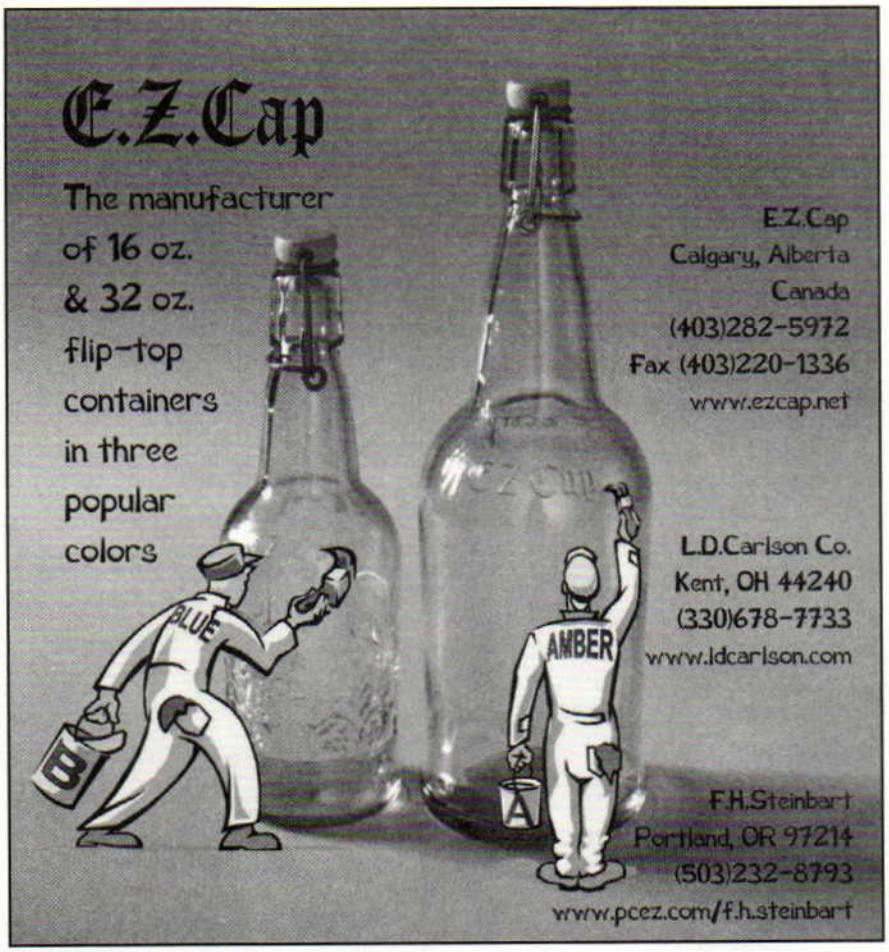


aroma in a dry-hopped pale ale. Why not boil the hops, but not the malt syrup? By doing this, you extract the necessary bitterness from the hops, but avoid the pitfalls of boiling large amounts of malt extract in small amounts of water.

The Method

Begin by steeping a few pounds of crushed grain in about two to three gallons of hot water for about 30 minutes. Remove the grain with a strainer, then boil the grain "tea" and hops for 45 to 60 minutes. Add your finishing hops and malt extract at the end of the boil, immediately after you have turned off the heat source. The wort is at 212° F when the extract is then added, and the wort normally drops to around 170–180° F after the malt extract is added. To ensure pasteurization of the wort, let the wort stand for approximately five minutes. Then proceed as you normally would, adding the wort to cold water and pitching yeast when the wort is around 75–80° F.

Advantages

One positive effect of this method is that you avoid the natural darkening effect caused by the boiling. You also avoid any carmelization of the malt sugars, and any scorching of the sugars to the bottom of your pot, resulting in a "burnt" flavor.

The specific gravity of the wort you are boiling the hops in is very low (1.005 to 1.025), containing only the sugars that the grains contribute, so you maximize the bitterness extracted from the hops you are using. It is now much easier to achieve bitterness levels above 30 IBUs. This method should allow you to make "lighter" colored beers and minimize any "malt extract" flavors. It also will allow you to make more highly-bittered beers.

Disadvantages

There are primarily two negative effects that I am aware of at this time. The first is that, since you are boiling the Irish moss with only the malt sugars from the specialty grains, it is unclear how much the Irish moss will be effective in clearing proteins from

your beer and giving you the maximum clarity in your finished product. My experiments seem to lean toward the beers clearing up quite well. I do not know of any negative effects of boiling the Irish moss without the malt, and since it is an inexpensive ingredient, I see no reason to leave it out.

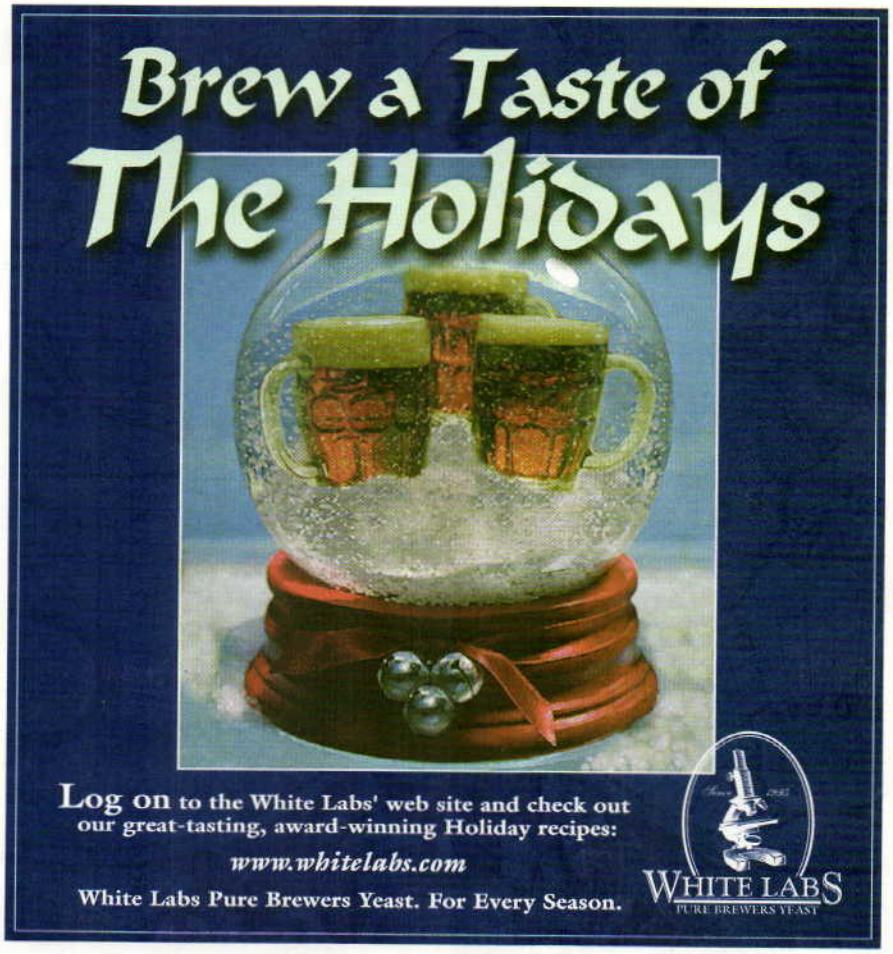
The second negative effect is that you could potentially be missing out on some flavor compounds from the hops being boiled with the entire volume of malt. Since virtually all beer is made with the hops and malt being boiled together, there may be some flavor reactions that you would miss by using this method. Here I believe the effects are hard to determine, since this interaction is difficult to determine to start with. Maybe this is a topic for additional discussion amongst the homebrewing world. One compromise here may be to boil 25% to 50% of your extract with the hops, and the remainder at the end of the boil.

My experiments (and my customers' experience) with using this method the past 8 to 10 months have been positive. In the local Clark County Fair homebrewing competition, one of my employees (Tom Sedlacek) entered an American Pale Ale he made using this method, and received the 4th highest score out of 64 beers in the competition. The recipe for this beer is in the sidebar on page 41.

This method should help more when you are trying to make lighter-colored beers and beers in which you are trying to achieve higher levels of bitterness. One change you will have to make in your recipes is to adjust the amount of bittering hops you use to about 25 percent less — or the amount normally used in all-grain beers.

Homebrewers thrive on experimentation, so go for it! Let me know how your experiments work out by emailing me your results at steve.bader@baderbrewing.com. I am sure there are those who may not agree with this method, and I would love to hear from them to see if we can make even better homebrew! ■

Steve Bader writes the "Replicator" column in every issue of BYO.



The SWIG METHOD

TWO BEERS FROM ONE MASH

Drew's SWIG method of brewing, which combines parti-gyle brewing with concentrated wort boiling, allows homebrewers to make two different beers from one mash. It also moves him inside, out of the cold Canadian winter. So if you want to fill your refrigerator with many styles of beer — take a SWIG!

Imagine the slick salesman's pitch. Would you like to reduce your brewing equipment costs? Would you like to brew two different all-grain batches of beer in the time it would usually take to brew one? Would you like to improve your love life? You can have all this and more, with the Split Wort of Increased Gravity (SWIG) method!

Like many long-time homebrewers, my brewing techniques and equipment have changed and evolved over the years. My first all-grain equipment was a bucket-within-a-bucket lauter tun (as popularized by Charlie Papazian in his "Joy of Homebrewing") and two 20-quart stainless steel-pots picked up cheaply from a local hardware store. I would split a full-wort boil between the pots and usually had good results. Now — after building a propane-fired, three-tier, converted-keg system — I've actually moved back to the old two pots on the stove method, but with a few modifications. I sometimes still use the three-tier system when I want to make a lot of the same kind of beer, and when it's warm outside. But I developed SWIG to diversify the kinds of beer I have on hand, and to brew through the cold winter months, of which there are many in Canada where I live.

SWIG should appeal to a couple of types of homebrewers: Small-scale (five-gallon) brewers who want to increase their volume without increasing brewing time or equipment costs; and larger-scale (10–12 gallon) brew-

ers who find they end up with a little too much of one style of beer and would like some diversity in their brewing.

SWIG: The Theory

SWIG combines two common brewing techniques that have been practiced for decades: parti-gyle lautering and concentrated wort boiling.

Parti-gyle

Parti-gyle lautering is the practice of drawing off a portion of the mash liquid (the first runnings) for a strong beer, then adding more hot liquor and drawing off a second (and sometimes a third), weaker running for successively lower-gravity beers. Parti-gyle lautering has probably been practiced as long as grains have been mashed. In modern brewing, parti-gyle has a distinguished history in both English and Belgian traditions. In 18th century Britain, brewers used the same mash to make a strong beer (often denoted XXX), a common beer (XX) and a small beer (X). The technique was abandoned for the most part with the advent of porter brewing, which used "entire" mashing, meaning the beer was brewed using the entire extract from a mash. In Belgium, the parti-gyle technique gave rise to the three strengths of Trappist ale, the tripel, dubble and single.

Parti-gyle presents a few challenges to the homebrewer. The first is in recipe formulation. The gravity of parti-gyle worts are harder to predict than a standard mash, because the decrease in run-off gravity throughout the sparge is not linear. Also, the SWIG method is not as efficient as some homebrewers are used to. It is difficult to squeeze every last drop of sugar out of the mash, and total efficiencies are usually in the range of 65 to 75 percent. A lower efficiency presents a second challenge: getting enough grains in your mash tun to make up for the loss from efficiency.

Concentrated Wort Boiling

Concentrated wort boiling is a practice that has gained favor in modern brewing, as it permits a larger volume of beer to be produced in a brewery compared to full-wort boiling. Many breweries ferment a high-gravity wort, diluting the beer to normal gravity before packaging. On the homebrewing scene, most extract brewers are familiar with this technique — boiling their malt extract with a limited amount of water, then cooling and diluting the concentrated wort with water before pitching the yeast.

Concentrated wort boiling has its own pitfalls, the first and foremost being the quality of the water used to dilute the boiled wort. As one of the reasons for a full boil is sterilization, the water used in concentrated wort boiling must likewise be sterile. I've found that fresh reverse-osmosis water further treated with UV light for sterilization seems to work well. I try to buy dilution water the day before brew day, to ensure the water is as fresh and microbe-free as possible.

There are other challenges to concentrated wort boiling. For example, because the alpha acids in hops are less soluble at higher gravities, calculating hop bitterness is different in a concentrated wort as compared to a full-wort boil. Also, wort darkening during the boil is more pronounced because of the higher gravity.

SWIG: The Method

There are three key phases to the SWIG method: recipe formulation, planning, and brewing. As mentioned above, SWIG recipe formulation presents two challenges over standard approaches in that mash efficiency is a little more difficult to predict, and reduced hop bitterness extracted at higher wort gravities requires adjustment to the amount of hops added for bitterness and flavor.

Recipe Formulation: Predicting the Original Gravity

As with any mash method, the gravity of sweet wort collected depends on many factors, which vary from brewer to brewer. For SWIG, the challenge is to predict the gravity of two finished beers. As a starting point, I'd use Randy Mosher's figures for parti-gyle brewing (Mosher, Randy: "Parti-Gyle Brewing," *Brewing Techniques*, March-April 1994) and then fine-tune your

CALCULATING COLOR

Malt color is measured in degrees Lovibond. With the Lovibond numbers you can calculate Malt Color Units (MCUs). Simply multiply the weight of each malt by its rating in degrees Lovibond, add the products and divide by the final beer volume in gallons. For example, if a five-gallon recipe consists of 8 lbs. two-row malt (1.8° L), 1 lb. crystal 40 (40° L), and 4 oz. chocolate malt (300° L), the MCUs are: [(8 x 1.8) + (1 x 40) + (0.25 x 300)] / 5, or (14.4 + 40 + 75)/5, or 26.

To convert MCUs to an estimated SRM, use Dan Morey's formula. For values of SRM less than 50, SRM = 1.4922 x $MCU^{0.6859}$ In the above example, the estimated SRM is 14.

CALCULATING SWIG GRAVITY

How do you figure out the grain bill for two worts?

First, calculate the total possible gravity points the malt bill could yield in 10 gallons of beer. This is the weight of each malt times their potential gravity points divided by beer volume. For 18 lbs. of pale malt, 2 lbs. crystal malt (30° L), 1 lb. biscuit malt and 2 lbs. chocolate malt, calculate (18 x 38) + (2 x 33) + (1 x 33) + (2 x 39) or 861 points / 10 gallons = 86 points, or an OG of 1.086.

Second, calculate the extract given a 65% brewhouse efficiency:

86 x .65 = 56 points, or an OG of 1.056.

Finally, the 60/40 split is calculated as:

2 x points x 0.6 (first wort) and 2 x points x 0.4 (second wort).

2 x 56 x 0.6 = 67 points, or an OG of 1.067.

All of these calculations are the reason I use homebrew recipe calculation software!

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numbers based on your system. Mosher suggests that in a parti-gyle mash split into two equal batches, the first runnings will take 58 percent of the expected extract, while the second batch will take 42 percent. This means that if a recipe should produce 10 gallons of 1.050 beer, the first five-gallon batch will be a 1.058 beer, and the second a 1.042 beer.

I've found that with the SWIG method, because mash efficiency is fairly low due to the limited sweet wort collected, the numbers work out to be closer to 60 percent/40 percent with my system, assuming a 65 percent mash efficiency. For example, a mash that would produce 10 gallons of 1.056 gravity wort at a brewhouse efficiency of 65 percent, will produce a 1.067 and a 1.045 wort using the SWIG method. This is for recipes with 20–24 lbs. of base malt. In theory, if you are mashing less malt, your efficiency should rise because you are using a smaller ratio of malt to sparge water. As a consequence, the differential between the two batches should also rise. Of course, mash (or "brewhouse") efficiency will vary from setup to setup. Efficiency is dependent on a large number of variables, from grain crush to mash regime. However, 65 percent is a good estimate to use until you've done a few SWIG batches and figured out the actual efficiency of your own system.

The color from the mash seems to follow the same ratio as extract. In other words, if your 1.056 mash has a predicted MCU of 12, the first wort will have a MCU around 14.5, while the second around 9.5. I believe that it's important to calculate the distribution of color as MCUs rather than SRM, because the former is linear. Once calculated, you can then convert the number to SRM to check style conformance.

One advantage of SWIG brewing is that you can add specialty malts to the second mash session, creating an entirely different second wort. This means you can brew a stronger, pale beer and a weaker dark beer, two pale beers of different gravities, or two dark beers of different gravities. By adding sugar or malt extract to the kettle, you can brew two beers of similar strength.

First Beer	OG	Second Beer	OG	Specialty Malts
Helles Bock	1.065	Brown Ale	1.044	medium crystal and chocolate
Tripel	1.080(*)	Pilsner	1.045	CaraPils
IPA	1.060	Mild	1.040	caramel malt, honey malt, chocolate
Pale Ale	1.055	Cream Ale	1.036	light crystal
Old Ale	1.068	Porter	1.045	dark crystal and chocolate

(* add candi sugar to the boil)

See the table above for some ideas for successive beers using SWIG.

The second addition of specialty malts will add color, flavor, body and possibly a few points of extract. Very little specialty malt is required to add color and flavor — typically 0.5 to 1.5 pounds will suffice.

Recipe Formulation: Accounting for Hop Bitterness

There are several methods of calculating hop bitterness. At least two of them account for wort gravity — Garetz and Tinseth's methods are detailed in Norm Pyle's Hop FAQ (http://www.realbeer.com/hops/FAQ.htm). At higher gravities, alpha acids are less soluble, meaning less bitterness is extracted from the hops. Comparing Tinseth's calculations for a normal 1.059 SG boil to a SWIG 1.059 batch (a 1.084 boil diluted to 1.059 with water) suggests that utilization is about 30 percent lower for the higher-gravity boil. This means that

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you need to add about 30 percent more bittering hops for recipes adapted to SWIG brewing.

Planning: What's Different?

SWIG brewing requires a little more forethought, as managing two simultaneous boils is challenging. My planning is aimed at saving time and making the double boil as easy as possible. A few changes to standard brewing procedures can make a SWIG session easier. First, consider first-wort hopping (FWH) for bittering hops. First-wort hopping means that hops are added to the wort as it is collected, at near but not at boiling temperatures. First-wort hops are thought to contribute flavor and aroma characteristics as well as bittering. This makes the first hop addition easier, and usually means fewer flavor or aroma additions are required. Calculate total water use beforehand so that you have enough purified topping up water on hand.

Several steps in your brew day will be concurrent. For example, if there is a 30 minute lag between worts, the following will be true: While you are collecting the first wort, you are heating the sparge water for the second wort. While you are re-circulating the second mash, you add bittering hops to the first wort. While you are bringing the second wort to boil, you add flavor hops to the first wort. While you add flavor hops to the second wort, you are chilling the first wort. While you are transferring the first wort to the fermenter, you are chilling the second wort. It is useful to track the times on each pot to ensure you add hops and Irish moss at the right times for each brew.

Final Thoughts

I developed SWIG to be able to brew more kinds of beer with less effort. I've discovered it produces very good beer — as good as the beer I was making with full-wort boils. There are many advantages to SWIG, including decreased energy and chilling water usage, decreased equipment costs, the ability to brew indoors, avoiding oversparging, and the ability to produce two different beers from the same mash in the time most brewers take to make one. There are many permutations brewers could make with this technique, limited only by imagination and the number of burners on your stove. For the brewer already doing full-wort boils on the stove, it would be a simple adjustment to collect a concentrated wort, then a regular wort — all you need is an additional 20-quart pot. SWIG can also be used to brew smaller batches of stronger beer (such as dopplebocks, barleywines and Imperial stouts). And for the beginning all-grainer who wants to limit complexity, a single pot and 15 lbs. of mash could be employed for a single concentrated wort session with good results. ■

To see detailed, step-by-step SWIG instructions with a sample recipe, go to http://www.strangebrew.ca/swig/.

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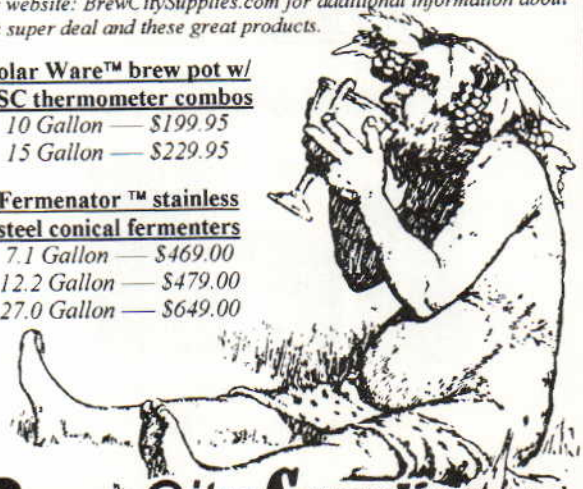

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Fermentation

What happens when yeast and wort collide

by Steve Parkes

PHOTO COURTESY OF BREWERY OMMEGANG

Open fermenters, such as this one at Brewery Ommegang, reveal the vigorous action of fermentation.

On our journey through the science of brewing, we've reached the area of greatest mystery — what happens inside our fermenters once we add the yeast to our carefully-crafted wort. Most homebrewers will be happy to leave the work up to the yeast and simply give them the tools they need to get on with the job of making our beer for us. To be honest, a lot of brewpub and microbrewers approach the issue in the same way. Still, a good understanding of the biochemical pathways responsible for fermentation, and of course flavor formation, is useful to any brewers who wish to control their beer's consistency and quality.

Several large changes occur in the wort during fermentation, namely the reduction in concentration of fermentable sugars, an increase in temperature and a drop in pH. In addition to these changes, the number of yeast cells in suspension increases dramatically, as does ethanol concentration. Along with an increase in alcohol, some other flavor compounds — such as higher alcohols (fusel alcohols), esters, aldehydes and vicinal diketones — also increase.

The reduction in concentration of sugars is due to the uptake of small carbohydrates — primarily glucose, maltose and maltotriose — by the yeast. These are then used for energy and to produce the building blocks needed for cell growth. The disappearance of these carbohydrates is easy to measure with the use of a hydrometer. As the concentration of sugars decreases, the specific gravity of the wort likewise decreases. The rapid drop in pH is due to acid formation and consumption of buffers in the wort, primarily phosphates and amino acids. This lowering of the pH will lead to greater microbial stability of the beer because a lower pH tends to inhibit bacterial growth.

The temperature increase during the main part of fermentation is primarily due to the generation of heat during the breakdown of carbohydrates. The temperature will drop back down once the fermentation slows. In commercial breweries, it is usual to remove this excess heat by cooling the beer during fermentation.

Fusel alcohols and esters are components that are formed as by-products of the yeast metabolism. These and others, such as vicinal diketones (including diacetyl), will be discussed in more detail during the forthcoming article on flavor biochemistry.

Wort Composition

Properly made wort is a rich medium containing all of the nutrients the yeast will require for survival, growth and fermentation. It will contain fermentable carbohydrates, amino acids (sometimes referred to as free amino nitrogen or FAN), chemical ions (such as phosphorus, sulfur, calcium, magnesium, zinc and copper), the vitamin biotin and finally, oxygen. It is important to recognize that the yeast cell's purpose is not fermentation, but rather self-preservation through growth and multiplication (budding). The yeast cell uses the nutrients in the wort to supply it with the energy and building blocks it will require to grow more cells.

Yeast will take up certain constituents of the wort preferentially to others. With regard to carbohydrates, the yeast will take up glucose and fructose, the simpler six carbon sugars (or monosaccharides) first. Then it will move on to maltose (a disaccharide) and finally maltotriose (a trisaccharide). Sucrose is enzymatically degraded, by an enzyme (invertase) inside the cell wall, to glucose and fructose. The yeast also has a preference for the order in which amino acids are taken up. Amino acids are used to build proteins inside the cell and, since enzymes are proteins, without amino acids cell functions are impossible. A normal all-malt wort has more amino acids than are needed for yeast growth. A wort made from up to 50% low-protein adjuncts (such as rice, corn or sugars) contains fewer amino acids, but there are still usually sufficient amino acids for a healthy fermentation. Yeast bring amino acids into the cell in a certain order. Some aren't brought into the cell until 24 hours after the growth cycle begins. Still, yeast needs the complete range of amino acids to produce the proteins right from the start. The implication of this fact is that yeast are able to manufacture amino acids internally. This results in a number of biochemical pathways operating that create a number of beer flavors in turn.

Pitching Rate

One of the parameters that brewers can influence directly is pitching rate. Most flavors developed during fermentation are in some way linked to yeast growth. The degree to which yeast will grow in wort is influenced by the amount of yeast you put in. The general guideline used by commercial brewers is that the correct pitching rate is $1x10^6$ live cells/ml/degrees Plato. Very strong beers sometimes

require a higher pitching rate than normal since high-gravity worts absorb oxygen less readily.

Wort Aeration

It is important to provide the yeast with an adequate supply of dissolved oxygen in order for normal growth to occur. Yeast use molecular oxygen not to respire but to produce materials it requires in the production of new cell-membrane material. A frequent error that crops up in the homebrewing literature is referring to the initial period of fermentation, when yeast are taking up oxygen, as respiration.

Respiration is carried out by some organisms in the presence of oxygen and is a highly efficient method of collecting large amounts of energy from simple sugars. In brewing yeast cells, however, the glucose content of the wort and intracellular glucose levels are always high enough so that the less energy-efficient fermentation pathway is in operation.

Immediately prior to fermentation is the only time in the brewing process when oxygen is intentionally added. If a yeast has a limiting requirement for a certain level of dissolved oxygen in solution, then aeration can have a profound effect on yeast performance. Many English ale yeasts work best in open fermenters and when brewers attempt to use them in closed fermenters, they run into difficulties.

Very strong worts are difficult to aerate sufficiently, which is part of the reason they are so hard to ferment. It is also why the yeast they produce is unsuitable for use in subsequent fermentations. There is no need to worry about over-aeration of the wort, since yeast will take up most of the oxygen very rapidly and any excess is scrubbed from the wort in the first few hours with no adverse effect. In contrast, inadequate aeration can lead to a whole range of problems including: defective initial fermentation, longer fermentation time, fermentations sensitive to cooling, stalled fermentations, defective secondary fermentation (poor removal of green beer flavors) and beer quality problems. Also be aware that poor aeration can lead to yeast health problems in subsequent repitchings, when the yeast is reclaimed and used again.

Progress of Fermentation

If the fermentation is being carried out in an open or clear glass fermenter, then it is possible to monitor the fermentation by observing the qualities of the various foam heads that form on the surface of the fermenting beer, in combination with measurements of temperature and specific gravity. In a closed vessel, progress can only be monitored by measuring the fall in gravity and the rise in temperature.

An ale fermentation carried out using a yeast that rises to the top of a vessel after fermentation has finished follows a distinct sequence of stages. All are recognizable by their appear-

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ance. The first foam head will appear 8–12 hours into the fermentation and will be white with a lacing of brown in it. A second "fluffy" head will start to appear after about 18 hours and the brown solids in the first head will be pushed to the side of the vessel and form a ring around the fermenter. As the gravity reaches 1.014–1.010, the main crop of yeast will rise to the surface and be thick and golden colored. This will remain for only a few hours before falling back in, so must be collected at the correct time. Some brewers collect it by skimming this layer off, leaving behind two to three inches of yeast on top which will then darken and form a protective crust over the beer. Others will drop the beer out from under this layer and reclaim the yeast from the bottom of the vessel.

In the case of lager fermentations, the visual clues are similar. In the initial phase, the young beer becomes covered by a white layer of fine bubble foam. The fermentation has begun. Next you will see the low krausen phase when the fine bubble foam becomes deeper and has brown caps. The foam cover should look as uniform as possible and be creamy. After a couple of days, high krausen begins when the fermentation has entered its most intensive phase. The ridges or crests in the foam become higher and the bubbles coarser. After about five days the krausen collapses, the fermentation becomes less vigorous and the high crests slowly collapse. The foam looks browner. The foam continues to collapse until it forms a loose brown layer over the surface that is removed before transfer to maturation to prevent it mixing with the beer.

Due to poor temperature control, these phases often occur more rapidly as a fermentation progresses quickly. I've encountered a few homebrewers who swear their yeast is defective when in fact they pitched too much yeast and allowed the fermentation to get too warm.

Yeast Metabolism

Once inside the cell, carbohydrates such as glucose, maltose and maltotriose are broken down by enzymes to produce carbon dioxide, ethanol and energy.

$$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + \text{energy}$$

Some of that energy is captured by the yeast cell in the form of adenosine tri-phosphate (ATP), so that it can be used to continue cell growth. The energy that is not captured is released to the environment, and causes the increase in temperature seen in brewery fermentations.

The main pathway for the metabolism of carbohydrates used by yeast is called the Embden-Meyerhof-Parnas (EMP) pathway, also referred to as glycolysis. This is essentially the breakdown of glucose to produce pyruvate. Pyruvate is the starting point for a number of other pathways, although by far the most common path taken is

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the breakdown of pyruvate to acetaldehyde and hence ethanol and CO_2 (i.e. fermentation). Pyruvate is a branching off point for many biochemical pathways including the manufacture of amino acids (needed for proteins and enzymes), lipids (needed for membranes), nucleic acids (needed for genetic material) and flavor compounds such as esters, vicinal diketones, and higher alcohols.

Glycogen

As yeast cells approach the end of the fermentation, they begin to use the carbohydrates assimilated from the wort to store energy inside the cell. They build the complex carbohydrate glycogen inside the cell. It is this glycogen that will allow it to survive the more austere times that are to come as it waits, in the fridge and outside the wort, for the next time you brew. Glycogen is a polysaccharide made up of glucose molecules with alpha 1-4 links and alpha 1-6 linked side chains, and it resembles amylopectin. Amylopectin is a complex polymer made up of glucose molecules linked together in chains with side chains interspersed at intervals throughout. Thus it is multiple-branched and a compact way for a plant to store glucose in a small space.

Towards the end of fermentation, yeast cells begin to synthesize these compounds to use as an energy source during storage. Glycogen can be enzymically broken down to glucose, which enters the EMP pathway and produces small amounts of ATP. This supplies energy to the cell to maintain metabolic processes until extracellular glucose is again available. Glycogen is also the primary source of glucose for sterol (a cell membrane component) synthesis during the lag phase of fermentation. Cells with depleted glycogen reserves are unlikely to perform normally in fermentations.

Much has been written about the various conditions that influence beer flavor during a fermentation, and the way in which they can be influenced on the large scale. As homebrewers our involvement usually only goes as far as providing a measured amount of a certain yeast strain with an appropriate home, some food to eat and a controlled environment, and hoping that it stays happy. The majority of the time this is exactly what it does.

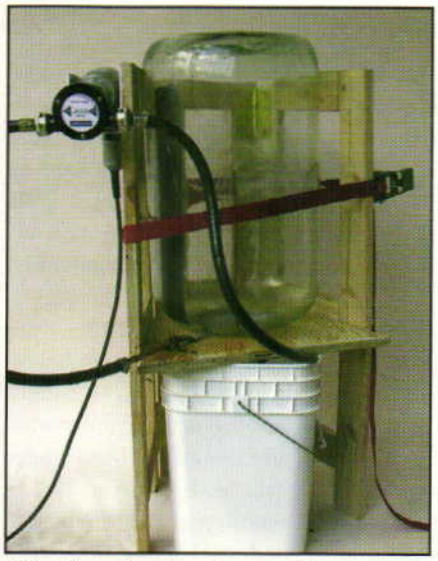
Temperature control is crucial to flavor generation. Good early wort aeration and correct pitching rate will help with consistency. Ensuring the yeast is free of bacteria and wild yeast will aid in guarenteeing long term flavor stability, as will avoiding oxygen ingress late in the fermentation. Good removal or settling of yeast will aid in clarifying the beer and also ensure that the correct amount of yeast remains in suspension for maturation. ■

Steve Parkes' next article will be on flavor development in fermentation. He owns the American Brewer's Guild.

Fermenter Washer

Leave the cleaning to this handy device

by Thom Cannell



PHOTOS BY THOM CANNELL

This clean-in-place device adjusts to hold a carboy or "Corny" keg and circulates cleaning fluid until it's clean.

I've discovered that there are actually a couple of things I don't like about homebrewing. One is waiting for a new brew to condition in the bottle. The other is cleaning the interior of fermenters and kegs. Glass fermenters are the worst; they seem resistant to even the most aggressive cleaning and require that I manufacture some kind of bent brush or scrubber on a stick.

Even an immediate washing with Five Star's PBW doesn't always remove all the scum and kraeusen from the glass. (I fill a newly-empty vessel with water and a half-ounce per gallon of PBW.) But what if I could keep the liquid circulating, constantly washing the interior? Cleaning could be completed without any (or with minimal) manual cleaning. That's why I decided to build a keg and fermenter washer, one that could run unattended and deliver a sparkling vessel.

So I designed a device to hold the fermenter or keg upside down, spray gallons of cleaning liquid into it and permit gravity to do the work of emptying the vessel. Food service and chemical industries routinely utilize a concept called clean-in-place (CIP), which describes cleaning equipment without moving or dismantling. This project uses a similar concept.

I figured that a tall triangular structure would be relatively easy to construct and would safely enclose a glass fermenter. In addition, an open sided structure would be easier to make and use.

To begin, I traced a fermenter-sized circle on scrap cardboard. Then I drew an 8" line that touched one point of the circle at the line's midpoint and did not extend into the center of the circle — a tangent line if you remember your junior-high geometry. Next, I drew two more lines that joined each end of the tangent line and extended to a point on the circle, extending beyond. If you're having troubles imagining this, think of holding a beach ball to your chest while stretching your arms straight out. The ball is held at three points, your chest and at each elbow. In this analogy, your chest is the original tangent line and your arms are the other lines.

Measuring these new line segments disclosed that 12" sides would extend beyond the traced circle. Voila, a three-sided trap with an 8" back and 12" arms. Any fermenter or keg will fit between the open arms.

Calculating the height of the structure was next. Fermenters and kegs are about 25" tall and a small bucket to hold the cleaning solution adds another 8–14" inches to the height. I decided that the total height of the support system should be 30". So now we have a height of 30" and the back width of 8" plus two 12" "arms."

I wanted the device to fold flat as well as be adjustable to fit different vessels, so the wings are hinged. But, hey! — there's an open side to our parallelogram, isn't there? Three inexpensive solutions for holding the container to our frame are a webbing clamp, cargo tie-down or bungee cord. It will wrap the whole structure, form the fourth side and hold everything together tightly.

So what's left? A pump, a collar to hold the vessel above the cleaning solution bucket and a spray wand. The spray wand is made of copper tube, although you might choose PVC or stainless steel. It's drilled to spray radially as well as vertically. We'll get to choosing your pump in a moment.

Support Stand Construction

The support structure is made of two 8' lengths of inexpensive 1" x 2" lumber. If you have near zero carpentry skills, this is the project for you. All that's required is to cut pieces to size, lay the cross supports over the vertical rails and nail them together. However, half-lap joints cut on a table saw are preferable.

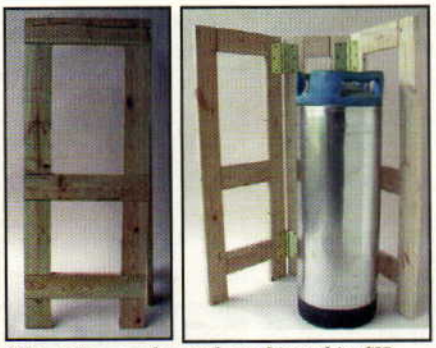
Two vertical rails and three cross braces are needed for each of the three panels. For half-laps, each cross piece is cut to half its depth, 3-1/2" in from each end on the same side. Vertical legs are cut similarly at one end and three 1/2" grooves are cut 14" and 3" from the bottom. Once assembled

PARTS LIST

1" x 2" x 8' lumber (2)	$2.25
15" x 15-3/4" plywood	$2.50
door hinges (4)	$4.00
copper tube (3/8" x 40")	$1.50
bracket (3/8" tube 4")	NC
72-3/4" brads	$1.00
30-3/4" x #8 wood screw	$2.00
pump (drill-type)	$7.50
webbing clamp	$8.00

Tools required

hand saw or power saw
saber saw or jig saw
screw driver(s)
drill and bits
spring-type tubing bender
hammer



The sides are hinged, making this CIP device adjustable and easy to store.

The collar will hold the carboy neck — upside down— while cleaning.

these create an "8" shape. A bit of glue and 3/4" wire brads secure each joint.

Sizes cut from the 1" x 2" x 8's for my three panels were: six 30" risers, three 8" cross pieces for the back, six 12" cross pieces for the sides.

Adding hinges, which make this device adjustable, is easy. Just screw the hinges to the surface. Since the material is actually 3/4" thick, you'll need to purchase two to three dozen 3/4" x #8 wood screws (any screws supplied with your hinges will be too long.) Get screws with flat heads and beveled edges and predrill all holes with a 3/32" bit. This will prevent the wooden rails from splitting.

Locate the hinges near the top and two-thirds of the way to the bottom. Be sure the hinges are vertical and square so the wings will fold.

The collar will lay across your bucket and trap the neck of a fermenter or support a keg. So what you're making is rather like a toilet seat. After some consideration, I decided the opening should be about 6" in diameter. The collar itself is a parallelogram that measures 7" and 13" at the sides and 15" across the front. It approximates the average shape of the uprights and will sit nicely on a majority of buckets.

To make the collar, cut some 3/4" CDX (outdoor grade) plywood to 15" square and cut 20° angles on each side. Locate the center and draw a 6" circle on center. Then drill a 3/4" starter hole inside the circle and use a jig saw or saber saw to cut a nice circular hole. If you have a router, round over all edges, and sand all the edges smooth.

Spray Wand Construction

The spray wand enters from below the collar and must have a "J" shape that allows the neck of your fermenter to extend below the collar. I have several fermenters, so I chose a 3" "J" with a 14" length above the collar. I could have made it 18", or even 20", and it would have worked even better.

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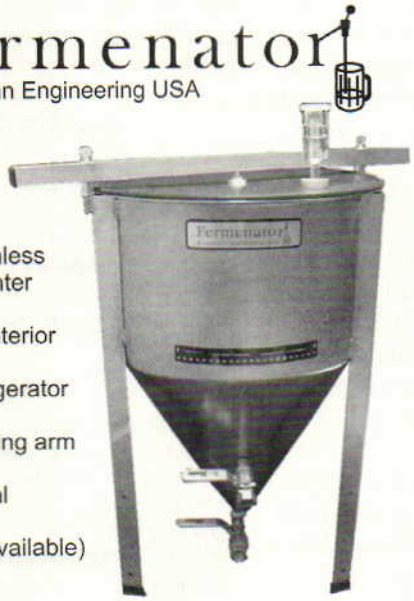

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Using a spring-type tubing bender, bend a "J" into 36–48" of 3/8" copper tubing at 18" from one end. Add a second bend 2-1/2" from the first, making a "U". Measure up 3" and bend a third 90° angle. To fit this vaguely "b" shaped tube into the collar, you'll have to cut a slot.

Draw parallel lines to one corner of the collar. Drill another 3/4" hole the same distance from the collar's edge as your "J" and connect the smaller hole to the larger one.

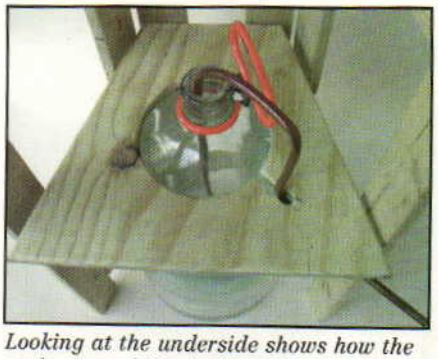
To secure the spray wand, take a 6" piece of 3/8" pipe and hammer it flat. Bend it into a "U" large enough to wrap the spray wand (about 1/2" inner diameter) and solder it to your spray wand. Be sure the "U" points opposite to the spray wand tip! Bend the ears of your homemade bracket flat, drill a mounting hole at each side and you've made a custom bracket. Screw it to the collar and you're done. You should have 4–6" of leftover pipe protruding from the collar's edge.

Note: If you plan to use a corrosive cleaner like lye or Five Star's H.D. Caustic Number 1 or 2, you must use PVC pipe, stainless-steel pipe or other pipe meant to withstand its nature. I'd suggest sticking with safer cleaners, such as PBW, TSP or bleach.

Spray Tip Construction

For your spray tip, you could visit a Tractor Supply Company and purchase one. Or, make a 3/8" deep cut along the copper pipe, then cut in from the side, creating an "L" shape. Bend the extra metal over and gently hammer it down to the remaining tube. File off the extra copper, then solder the seams.

To make the spray holes, select a 1/16-3/32" drill bit and carefully drill one or more holes at the very tip. You can angle the spray depending on your angle of drilling; try to make the holes spray up and sideways. More holes can be drilled radially around the spray tip. I made a few too many. No problem, they'll easily solder shut.



Looking at the underside shows how the carboy's neck fits in the collar and the spray wand extends into the carboy.

A series of holes in the wand tip directs cleaning fluid to all parts of the carboy.

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Does this look easier than scrubbing with a carboy brush? Constant circulation cleans the carboy in no time.

Pump Selection

Selecting a pump was a unique issue. I thought a larger aquarium pump might be the answer, but didn't know. Little Giant Pump Company (www.lgpc.com/) makes pumps that can empty oil wells or tiny aquariums and everything in between. I called them for advice and I'm glad I asked.

Their advice was to use an inexpensive drill-powered pump available at home and hardware stores nationwide. They deliver 150 gallons per hour, surely enough volume to wash any vessel, and are self-priming.

Drill pumps are meant to attach to garden hoses, so I recycled a leftover washing-machine hose. It had two female couplings and both the inlet and outlet of the drill pump had male fittings.

I cut the hose unequally as the intake hose must drop into the cleaning solution bucket. The output hose end slips over the 3/8" spray wand pipe and is secured with a screw-on clamp.

That left only one detail, a way to securely hold my ancient Skill variable-speed drill. I chose to make a bracket out of scrap aluminum. It's simple, just a "U" shape that holds the drill with its handle facing up or down.

When I first turned on the drill, out spewed ancient sludge from the recycled washing-machine hose and some grease stored in the drill pump. So run your drill pump a few minutes before attaching it to your spray wand and clogging the spray holes as I did. (Little Giant suggests lightly lubricating the pump before each use. I suggest food-grade silicone spray, available at most restaurant supply stores and some homebrew stores.)

Does it work? You bet. I can run full strength PBW and not have to throw away five gallons of barely used cleaner. Then all I have to do is sanitize. What could be easier? ■

Thom Cannell's next project is a mash tun for major amounts of grain.

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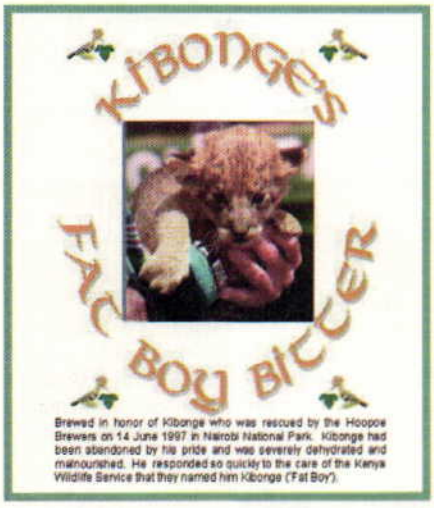

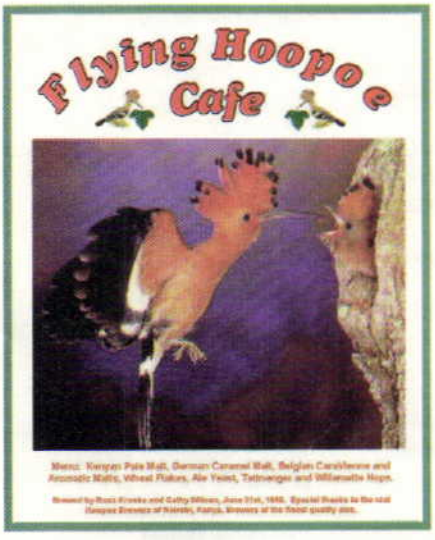

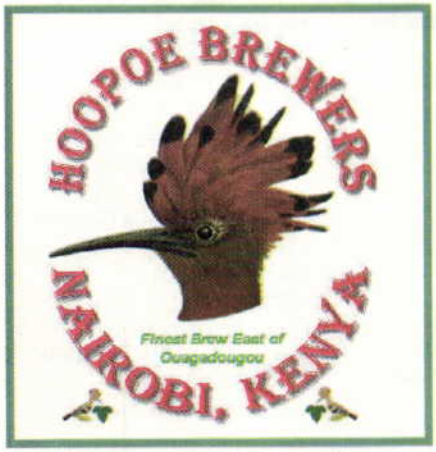

For obvious reasons, Kenyan themes dominate Kruska's beer names and labels. A hoopoe is an African bird.

What do you do when you're out for a drive with your buddies and cross paths with an abandoned lion cub? Name a beer after the little guy, of course.

"We were driving in Nairobi National Park when we saw this little lion cub," Russ Kruska explains as he brews a batch of barleywine in Kenya. "Some guards came to find the cub and took him to an orphanage. They named him Kibonge ('alcoholic drink' in Kiswahili), so we brewed 'Kibonge's Fat Boy Bitter' in his honor."

The bitter is long gone, but Kibonge survived and is living in Uganda while Kruska, 46, bides his time between brewing days by working at the International Livestock Research Institute (ILRI) in Nairobi. Kruska's work involves using computerized satellite images to examine changes in land use over time. After a long day in front of the computer, he is happy to unwind with a good beer, which thanks to his own efforts is always available.

Kruska's introduction to homebrew occurred around his 18th birthday when a friend's father offered him one. He wasn't very impressed with the "Prohibition-style beer made with big amounts of boiled sugar" but found it interesting that it was homemade. His brother began making "as good as import" extract porters in 1981, and a year later, while a graduate student at Michigan State University, Kruska followed suit. "I was completely amazed at how well it came out," he says.

After arriving in Kenya in 1988, Kruska discovered homebrewing was illegal and punishable by jail. This was mostly to combat the distillers of "Chang'aa," a liquor akin to grain alcohol. Tusker, a mass-produced lager, was the only commercial beer sold in Kenya. What was a beer guy to do?

"When I first went to the brewery (Kenyan Breweries) to get malt, I definitely didn't say it was for brewing. I was too scared," Kruska explains, having conjured up a story about needing the malt to make bread. "I was persistent. I kept saying this or that guy said it would be okay. They finally gave me 176 pounds but told me: 'We don't ever want to see your face again.'"

"That really affected me for the next four years," he continues. "I moved to adjunct brewing to make my malt last. I added flaked rice or corn, but my beers weren't that good."

Adding to his difficulties, brewing equipment was non-existent. So Kruska improvised. A maize grinder, powered by a drill, was used for the grains; an electric coffee maker was customized into a water heater; and he fabricated a wort chiller with copper tubing. A few batches were made in trash cans that "weren't food-grade and left a plastic flavor."

One piece of makeshift equipment nearly killed him — an electric conversion heater (a long metal coil) he was using to heat the mash. Kruska reached to shut off a running tap, completed the circuit and "got knocked on my butt. It was like having a heart attack. I quit using those after that."

Things have changed from his early days in Kenya. Visiting friends still bring him hops and yeast and the brewing laws (though it's technically still illegal) have relaxed, so obtaining malt is no longer a hassle. Kruska's only problem now is deciding what to brew. Kenyan themes are popular, with names like "Maji Ya Kunda (Water of Cow Pee)" and "Hoopoe 2000" — consumed during millennium festivities at the base of Mt. Kilimanjaro.

Kruska has even shared his beer with Kenyan Breweries. "The manager called in his technicians in their white lab coats. They were not too impressed, but were enthusiastic, saying things like 'a little rough but nice hop aroma.' Or 'very very rough' about my Scotch ale," Kruska laughs. "I really got a kick out of it." ■

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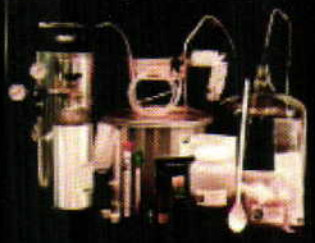

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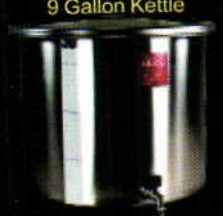

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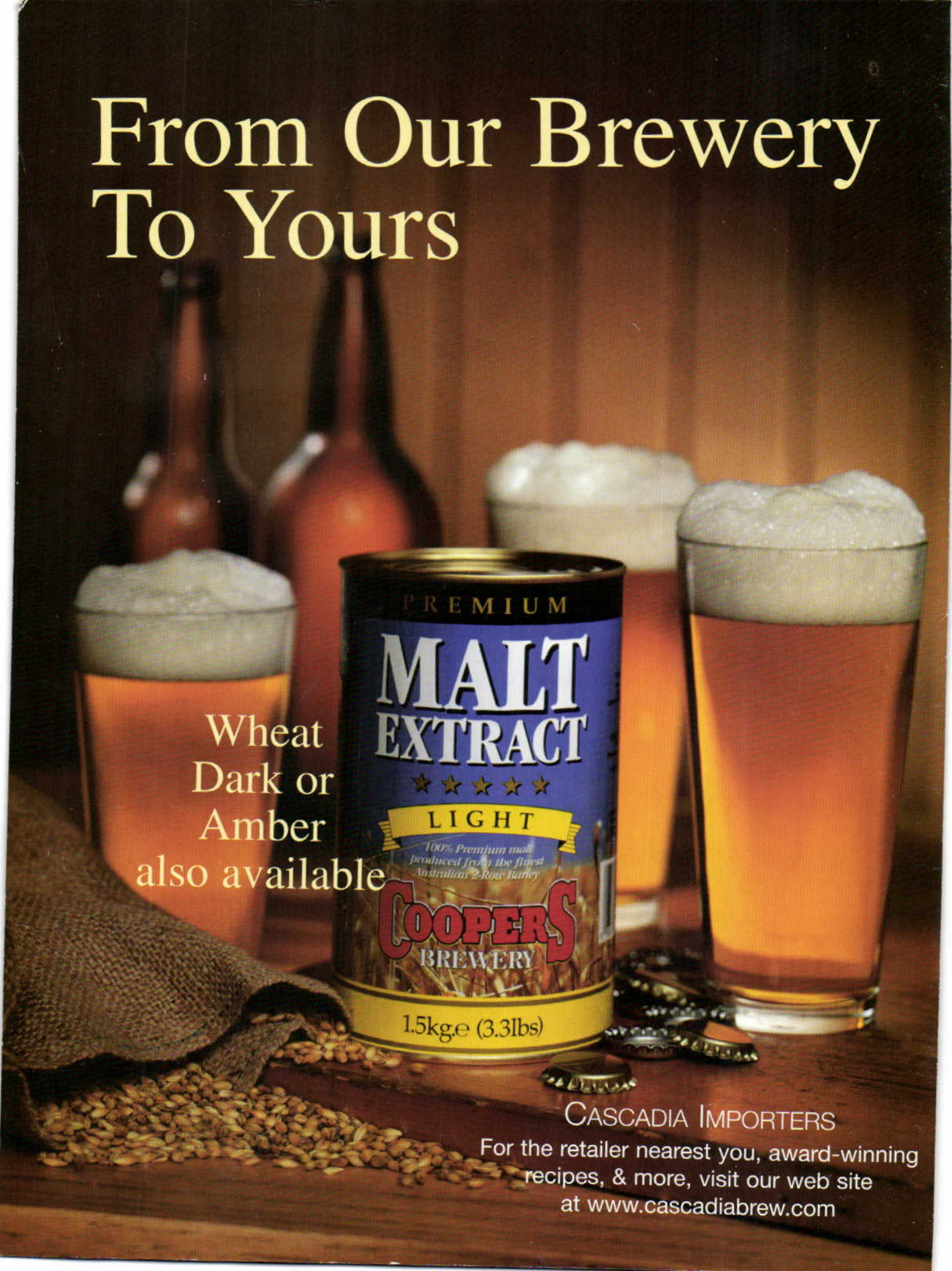
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